

SECTION 32 14 15
CONCRETE UNIT PAVERS**PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes furnish and install concrete unit pavers and permeable concrete pavers.
- B. Related Sections:
 - 1. Aggregate subbase courses and sand setting bed are specified in Section 31 11 00 – Aggregate Materials.

1.02 REFERENCES

- A. ASTM C902 – Specification for Pedestrian and Light Traffic Paving Brick.

1.03 SUBMITTALS

- A. Product Data: Submit characteristics of paver unit, dimensions, and special shapes.
- B. Shop Drawing: Provide pattern description.
- C. Samples: Submit two samples of the paver, illustrating style, size, color range and surface texture of units being provided.
- D. Manufacturer's Installation Instructions: Submit substrate requirements, installation methods, and material analysis.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Concrete unit paver product information:
 - 1. Concrete Pavers (impervious) as follows, or approved equal:
 - a. "Eco-Priora" paver, 5" x 10" x 3 1/8" (5" x 10" nominal) size.
 - b. Smooth Premier surface finish. Color: Opal
 - c. Installed in 45° herringbone pattern.
 - d. Polymeric sand shall be used to fill joints to make pavers impervious.
 - 2. Manufactured by Unilock
 - 51 International Blvd.
 - Brewster, NY 10509
 - customerservice@unilock.com
 - 1-800-864-5625
 - www.Unilock.com
 - 3. For polymeric sand see Section 31 1100 – Aggregate Materials.
- B. Permeable Concrete unit paver product information:
 - 1. Permeable Concrete Pavers as follows, or approved equal:
 - a. "Eco-Priora" paver, 5" x 10" x 3 1/8" (5" x 10" nominal) size.
 - b. Field pavers: Smooth Premier surface finish. Color: Opal

- c. Striping and access pavers: Standard finish. Color: Natural.
 - d. Installed in 45° herringbone pattern or running bond as noted.
 - 2. Manufactured by Unilock

51 International Blvd.
Brewster, NY 10509
customerservice@unilock.com
1-800-864-5625
www.Unilock.com
 - 3. The specified products establish minimum requirements that substitutions must meet to be considered acceptable.
 - a. To obtain acceptance of unspecified products, submit written requests at least 14 days before the Bid Date.
- C. Provide pavers meeting the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units. Efflorescence is not a cause for rejection.
 - 1. Average compressive strength 8000 psi (55MPa) with no individual unit under 7,200 psi (50 MPa).
Must conform to ASTM C140 for Absorption and Compressive Strength, ASTM C67 for Freeze-thaw Durability, ASTM C418 for Abrasion Durability.
 - 2. Average absorption of 4% with no unit greater than 5% when tested according to ASTM C 140.
 - 3. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C1645, with no breakage greater than 1.0% loss in dry weight of any individual unit. Conduct this test method not more than 12 months prior to delivery of units.
- D. Accept only pigments in concrete pavers conforming to ASTM C 979.
- E. Dimensional Accuracy +/- 3/64"
- F. Maximum allowable breakage of product is 5%.
- G. Minimum solar reflectance index (SRI, calculated according to ASTM E 1980) value of 29, per USGBC Heat Island reduction guidelines.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that subbase is installed to correct gradient, smooth, capable of supporting pavers and imposed loads, and ready to receive Work of this section.
- B. Verify gradients and elevations of base are correct.

3.02 INSTALLATION

- A. Place paver units on setting bed, in patterns specified, from straight reference edge.
- B. Maintain hand tight joints, sand swept.
- C. Tamp and level paver units with mechanical vibrator with protective pad until units are firmly bedded, level, and to correct elevation and gradients. Do not tamp unrestrained edges.

3.03 SETTING BED

- A. Screed setting bed to a nominal depth of 3/4". The thickness of the bed shall be adjusted so

that when the pavers are placed, the top surface of the paver will be at the required finish grade.

3.04 QUALITY CONTROL

- A. Final surface elevations should not vary more than 3/8" under a 10 foot straightedge, unless otherwise stated. The top of the pavers should be 1/8" to 1/4" above the final elevations to compensate for possible minor settling.

END OF SECTION

SECTION 32 92 00 [supersedes 32 92 19 SODDING]

TURF AND GRASSES

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. Seeding
 2. Sodding
 3. Protection fence at sod and seeded areas
 4. Maintenance of sod and seeded areas
 5. Aerating and Reseeding
- B. Related Sections:
 1. Section 015000 – Temporary Facilities and Controls
 2. Section 311000 – Soil Materials

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- C. Planting Soil: See Section 311000 "Soil Materials."
- D. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Prior to commencement of any landscape planting work of this Section, arrange a conference at the site of this Project with the Construction Manager and Director. At least seven (7) days' notice shall be given prior to the conference.
 1. Conference attendance will include the Contractor, the supervisor/foreman appointed to oversee the work of this Section; the supervisor/foreman responsible for soil preparation, mixes, and placement the supervisor/foreman for plant installation work and other persons as deemed appropriate for coordination of work and quality control.
 2. At the conference, review planting installation and sequence schedules of both Project and plant installations, specification criteria and installation, material sources procedures, outstanding submittals and approvals, and such other subjects necessary for coordination of Work.
 3. Establish follow up meeting(s) as necessary.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture specified. Include identification of source and name and telephone number of supplier.
- C. Product Certificates: For fertilizers, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Director for maintenance of turf areas during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Landscaping Installer Qualifications: Engage an experienced installer who has completed landscaping and soil supply, sodding and seeding installation work similar in material, design, and extent to that indicated for this project with a record of successful landscape establishment.
 - (a.) Installer's Field Supervisor(s) for Installation and Maintenance shall be an English speaking supervisor(s) experienced in seeded and sodded lawn installation and maintenance.
 - (b.) Provide names of projects, project locations, client contact names and phone numbers for a minimum of five (5) projects of similar size and scope, for review and by Construction Manager.
 - (c.) Supervisor(s) shall be maintained full-time on Project site when lawn installation or maintenance is in progress.
 - (d.) Perform all lawn installation work with personnel totally familiar with preparations and lawn installation under supervision of an experienced landscape Foreman.
 - (e.) Provide adequate numbers and types of accessible personnel to meet the scheduling requirements of the lawn installation.
 - 2. Soil-Testing Laboratory Qualifications: As directed by Director's Representative.
 - (a.) The contractor shall pay for all testing required in this Section.
 - 3. Grower's Qualifications: Sod shall be commercially grown by a producer specializing in sod production and harvesting with a minimum 5 years' experience.
 - 4. Certifications: Sod shall be accompanied by a certificate indicating compliance with the regulations of the New York State Department of Agriculture and Markets.
- B. Installed Planting Soil Testing: Prior to start of lawn installation, furnish for soil test(s) by a qualified soil-testing laboratory for review by Director and Director's Representative. Soil tests are to state pH, soluble salts, and plant-nutrient content of planting soil including nitrate, phosphorous, potassium, magnesium, calcium, aluminum, ammonium, iron, zinc, copper, manganese, and boron.
 - 1. Report suitability of planting soil mix for turfgrass: State recommended quantities of nitrogen, potash, and additional nutrients to be added to produce satisfactory planting soil in conformance with requirements herein. Provide fertilizer application rates to be used
 - 2. Provide one test and analysis for every 5000 square feet of planting area of proposed lawn planting area.
 - 3. Refer to Specification Section 311000 "Soil Materials."
- C. Fertilizer applicator: State licensed, commercial. Contractor shall conform to all New York State Department of Environmental Conservation (NYSDEC) regulations for application of fertilizers.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original, unopened, and undamaged containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as 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. Accompany each delivery of bulk materials with appropriate certificates.
- C. Accessory and Packaged Materials:
 - 1. Deliver packaged materials in unopened standard size bags or containers, each clearly bearing the name, guarantee, and trademark of the producer, material composition, manufacturers' certified analysis, and the weight of the material.
 - 2. Accessory and packaged material shall be stored off the ground and covered in a manner to prevent materials from getting wet or damp and in such manner that material effectiveness will not be impaired.

1.9 PROJECT/SITE CONDITIONS

- A. Existing Conditions:
 - 1. Existing Trees to Remain: Determine locations of existing trees to remain and protection areas extending to their existing drip lines. Exercise care when planting around existing trees and tree protection areas so as to not damage existing roots and in accordance with specification section 312001 – "Temporary Tree and Plant Protection."
 - 2. Utilities: Determine location of existing and proposed above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required at no additional cost to the Director.
 - 3. Should the Contractor, in the course of Work, find any discrepancies between Contract Drawings and physical conditions, it will be Contractor's duty to inform the Construction Manager immediately in writing for clarification. Work done after such discovery, unless authorized by the Construction Manager, shall be done at the Contractor's risk.
 - 4. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Construction Manager and Director's Representative before planting.
- B. Environmental Requirements and Planting Schedule:
 - 1. Planting Restrictions: Plant during one of the following periods, weather permitting. Coordinate planting periods with maintenance periods to provide required maintenance.
 - (a.) Seeded and Sodded Lawns:
 - 1) Spring Planting: April 15- May 15.
 - 2) Fall Planting: September 1- October 15
 - 2. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.
 - (a.) Do not install seed when ambient temperatures may drop below 40 deg. F or rising above 80 deg. F. Do not install seed when wind velocity exceeds 30 mph (48 k/hr). Do not seed when the ground is frozen, excessively wet, or the soil is otherwise in an unsatisfactory condition for seeding.

- (b.) Do not install sod on saturated or frozen soil. Do not install sod when temperature is below 32 degrees F.

1.10 COORDINATION, SEQUENCING AND SCHEDULING

- A. General: Adjust, relate together, and otherwise coordinate work of this Section with Work of Project and all other Sections of Specifications. Coordination of work to include, but is not limited to:
1. Subsurface Utilities.
 2. Concealed Conditions.
 3. Sequence of planting soil placement and plant installation.
 4. All other construction activities requiring access to lawn areas.
- B. Coordination with Plants: Install lawns and seeded areas after the completion of tree or shrub plantings in adjacent lawn areas and planting beds.
- C. Watering: The Contractor shall be responsible for the coordination of the planting and site water availability. Water, if not available at the time of planting, shall be furnished by the Contractor. All water, water tank trucks, spray heads, hoses and other equipment required for watering shall be furnished by the Contractor as needed at no additional cost to the Owner.
- D. Sequence lawn planting and planting soil installation so as to not drive or operate any mechanical equipment over any installed planting soil material. Planting soil material that has been driven over shall be removed from the site and legally disposed of at the Contractor's expense.

1.11 REGULATORY REQUIREMENTS

- A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary to make Work comply with such requirements without additional cost to the Owner.
- B. Procure and pay for permits and licenses required for work of this section. Process to start work immediately.

1.12 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn areas are established, but for not less than the following periods:
1. Seeded Lawn Areas: 90 days from date of Final Acceptance.
 - (a.) When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
- B. Maintain and establish seeded areas by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed and mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 2. Water lawn at a minimum rate of 1 inch per week.
- D. Mow lawn in accordance with section 3.6 of this specification.
- E. Lawn Post Installation Fertilization Applications:
1. Apply in two (2) applications:
 - (a.) Apply commercial fertilizer application that will provide actual nitrogen of at least 0.5 lb/1000 sq. ft. to lawn area after initial mowing and when grass is dry. Water in fertilizer within 2 hours of application.

- (b.) Apply commercial fertilizer application that will provide actual nitrogen of at least 0.5 lb/1000 sq. ft. to lawn area 30 days after initial mowing when grass is dry. Water in fertilizer within 2 hours of application.

F. Lawn Biostimulant Applications:

1. Apply in two (2) applications.
2. Apply biostimulant to lawn area fourteen (14) days after installation at a rate of 32 Fl. Oz./1000 sq. ft. and water into lawn as directed by manufacturer.

PART 2 - PRODUCTS

2.1 LAWN SEED MIX (TURF)

- A. Seed: Seed mix shall be fresh, recleaned seed from the latest crop. All seed shall be free of noxious weeds and undesirable species. Seed shall contain no less than 75% PLS (pure live seed). Low Maintenance Lawn Seed Mix shall be comprised of the following plant species and meet the specified content percentages:

% of Mix	Botanical Name	Common Name
12.5	Festuca brevipila	Hard Fescue
25	Festuca ovina	Sheep Fescue
25	Festuca rubra subs. fallax	Chewings Fescue
12.5	Festuca rubra	Red Fescue
25	Festuca rubra var. rubra	Creeping Red Rescue
100	Total	

- B. Mix Application Density: Mix to be applied at 5lbs per 1000SF

2.2 SOD

- A. Sod: Turf sod containing 95 percent pure permanent dense growth comprised of Kentucky Blue (max 15%) and Tall Fescue grasses. Color, leaf texture, and density shall be uniform. Sod shall be free of diseases, nematodes, and insects.
1. Sod shall be machine cut as a uniform root and soil thickness not more than 5/8" (1/4"+/-) at the time of cutting.
 2. Mowed Height When Harvested: 1-1/2 to 2-1/2 inches.
 3. Thatch: Maximum 1/2 inch.
 4. Weeds: Free of Bermuda grass, quack grass, Johnson grass, poison ivy, nut sedge, nimble will, Canada thistle, bind weed, bent grass, wild garlic, ground ivy, perennial sorrel, and brome grass.
 5. Containing less than 5 jimson weed, mustard, lamb's quarter, chick weed, cress, or crab grass plants per 100 sq. ft.

2.3 FERTILIZERS

- A. The use of all fertilizers shall conform to all NYSDEC regulations for lawn fertilizer use and application.
- B. Commercial-grade complete fertilizer of neutral character, consisting of Commercial Fertilizer for Installed Planting soil prior to Lawn Installation.
1. Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde and potassium in the following composition:
 - (a.) Composition: Nitrogen and potassium and other supplemental nutrients in amounts recommended in soil reports from a qualified soil-testing agency.

2. Commercial Fertilizer for Post-Installation Fertilization: Granular or pelleted fertilizer consisting of minimum 5.3 percent controlled release nitrogen, potassium, sulfur, and iron in the following composition:

(a.) Composition: Comply with the following analysis:

Guaranteed Analysis:

Total Nitrogen (N): 10%

3% Water Insoluble Nitrogen

4.2% Ammoniacal Nitrogen

2.3% Water Soluble Nitrogen

0.5% Urea Nitrogen

Soluble Potash (K_2O): 4%

Sulfur (S): 2.5%

Total Iron (Fe): 1%

3. Acceptable manufacturer: Lebanon Pro 10-0-4, as manufactured by Lebanon Turf Products, 1600 East Cumberland Street, Lebanon, PA 17042, or approved equal.

2.4 BIOSTIMULANT

- A. Biostimulant: Liquid concentrate of manure extract and biostimulants that include cold water kelp extract, humic acid and fulvic acid, combined with chelated iron and surfactant.
- B. Acceptable Product: Launch 0-0-1 Biostimulant as manufactured by PBI/Gordon Corporation, 1217 West 12th Street, Kansas City, MO 64101-0090, or approved equal. Comply with the following analysis:

1. Guaranteed Analysis:

(a.) Soluble Potash (K_2O).....1.00%

(b.) Iron (Fe).....0.36%

0.36% chelated Iron (Fe) derived from Potassium Hydroxide, Ferrous EDTA (ethylene diamine tetra acetic acid)

2. Non-plant Food Ingredients:

(a.) Manure Extract74.30%

(b.) Humic and fulvic acids.....9.00%

(c.) Kelp Extract1.20%

(d.) Siloxan Surfactant0.36%

2.5 PESTICIDES & HERBICIDES

- A. Pesticides and Herbicides for the point of aesthetics will not be acceptable unless otherwise noted by the Project Manager.

1. If project Manager allows these chemicals, they must be applied in accordance to the State and Federal Registration Standards

2.6 PLANTING ACCESSORIES

- A. Water: Potable, clean, fresh, and free from harmful materials deleterious to plant growth, water shall be furnished and applied by Contractor as necessary for lawn installation and maintenance.
- B. Fungicides and Pesticides: EPA registered and approved before use for type and rate of application by Director's Representative and agencies with jurisdiction of type recommended by manufacturer for application.
- C. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Director's Representative and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Planting soil preparation at seeded areas
 - 1. Limit preparation to areas to be planted.
 - 2. Apply commercial fertilizer as recommended by soil testing laboratory. Work fertilizer into top four inches of planting soil.
 - 3. Fine Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus .1" inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
 - 4. Moistening prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 - 5. Restore areas if eroded or otherwise disturbed after finish grading and before planting.
- D. Turf area preparation
 - 1. All sticks, stones, roots, vegetation, or other objectionable material which might interfere with the formation of a finely pulverized seed bed shall be removed from the soil and a smooth uniform surface grade shall be established. Hollows, depressions, and gullies shall be filled with planting soil.
 - 2. Remove all pre-existing weedy vegetation at the seeding site – 99% of all existing vegetation must be removed. Manually remove weeds including roots.
 - (a.) Coordinate weed removal so as not to damage or destroy adjacent lawns, trees, seedlings, or bare root trees.

3.3 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Preparation" Article of this Specification.
- B. Refer to section 312501 "Erosion and Sediment Control" for erosion control product information.
- C. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- D. Fill cells of erosion-control mat with planting soil and compact before planting.
- E. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

- F. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.4 SEEDING

- A. Uniformly sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 2. Do not use wet seed or seed that is moldy or otherwise damaged.
 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
 4. Evenly broadcast seed.
- B. Sow seed at a total rate of 5 lbs/1,000 SF
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:4 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 2. Bond straw mulch by spraying with organic tackifier according to Manufacturer's Recommendations. Take precautions to prevent damage or staining of structures, paving or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
- E. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.5 SODDING

- A. Begin sodding at bottom of slopes. Install sod in strips, edge to edge, parallel to contours, with staggered joints.
- B. Do not stretch or overlap sod.
- C. Water sod immediately after installation.
- D. Tamp or roll sufficiently to incorporate sod with topsoil.
- E. Water sod and soil to depth of 4 inches within four hours after tamping or rolling.
- F. Water to prevent drying out of sod until sod is successfully established.
- G. Sod shall not be harvested when weather conditions may adversely affect its quality and survival.
- H. Sod shall be harvested and delivered to the project site within a period of 24 hours from the time it was harvested.
- I. Sod shall be fully knitted, healthy, and able to sustain heavy use on the date of acceptance of turf establishment.
- J. Maintenance Period. Sod shall be maintained for 120 days after acceptance.

3.6 TURF AREA MAINTENANCE

- A. Turf Area Maintenance
1. Maintenance: Begin maintenance immediately after seed placement. Maintain turf areas by fertilizing, weeding, mowing, trimming and other operations such as rolling, regarding and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas. Continue maintenance until initial acceptance.
 - (a.) Seeded Turf Establishment Watering: Keep soil moist during seed germination period until initial acceptance. Supplement rainfall with temporary irrigation to produce a total penetration of 2" per day after germination.
 - (b.) Mowing: Coordinate mowing schedule with RCSP maintenance staff.
 - a) When lawn reaches 5 inches in height, mow to approximately 3-1/2" in height. Remove and dispose of grass clippings.

(c.) Reseed: Reseed and/or sod areas larger than 1 square foot not having uniform coverage

B. Replacement And Restoration

1. Seeded and sodded Turf Replacement Requirements: For the maintenance period until Director's final acceptance of all planting, and at no additional cost to Director, the Contractor is to replace any seeding that is dead or that are, in the opinion of the Construction Manager, in an unhealthy or unsightly condition, or inadequate due to improper maintenance. All replacement planting is to be done no later than the next succeeding planting season after receipt of the Construction Manager's instructions.
2. Replacement of planting is to be in accordance with the original specifications and its costs are considered to be included in the bid price.
3. At the completion of the maintenance period and/or the grass establishment period, all non-degradable erosion-control measures, protection measures, etc., shall be removed by the Contractor unless otherwise directed in writing by the Construction Manager.

3.7 SATISFACTORY TURF AREAS

A. Turf installations shall meet the following criteria as determined by Director's Representative:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory and approved by Director's Representative.

3.8 CLEAN UP AND PROTECTION

- A. Promptly remove soil and debris created by seeding work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them as directed by Directors Representative.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from foot and vehicular traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 32 92 00

SECTION 32 93 00

PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Trees
2. Shrubs
3. Groundcovers
4. Ornamental Grasses
5. Tree Stabilization

B. Related Sections:

1. Section 31 20 01: "Temporary Tree and Plant Protection" for protection at existing vegetation
2. Section 31 22 00: "Earthwork and Site Grading"
3. Section 32 92 18: "Landscape Grading"

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- D. Finish Grade: Elevation of finished surface of planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

- F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Area: Areas to be planted.
- H. Planting Soil Mix: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 310513 "Engineered Soils for Earthwork".
- I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- L. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 COORDINATION

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations. Refer to Specification Section 329200 "Turf and Grasses".

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Prior to commencement of any landscape planting work of this Section, arrange a conference at the site of this Project with the Construction Manager and Director. At least seven (7) days' notice shall be given prior to the conference.
 - 1. Conference attendance will include the Contractor, the supervisor/foreman appointed to oversee the work of this Section; the supervisor/foreman responsible for soil preparation, mixes, and placement, the supervisor/foreman for turf and grass installation work (As specified in Section 329200 Turf and Grasses), the supervisor/foreman for plant installation work, and other persons as deemed appropriate for coordination of work and quality control.
 - 2. At the conference, review planting installation and sequence schedules of both Project and plant installations, specification criteria and installation, material sources procedures, outstanding submittals and approvals, and such other subjects necessary for coordination of Work.
 - 3. Establish follow up meeting(s) as necessary.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

- a. Include in plant list the botanical and common names, size, quantity, form, root ball, limb height (if applicable), other requested data, and source locations for all plant materials.
 - b. Include names, addresses and phone numbers of each nursery source associated with each plant item.
 - c. Plant lists shall clearly identify deviations from specified plants and any approved substitutions. Where deviations or other changes occur in plant list, identify both the original specified plant item and the new plant item.
 - d. Plants listed with submittal shall be available at the nursery for inspection and selection as specified in Part 1 "Plant Sourcing", Selection and Inspection" herein. Contractor shall evaluate and verify at proposed nursery source that plant material conforms to the requirements of the Contract Documents prior to scheduling Director's Representative inspection and selection / tagging trip.
2. Maintain and re-submit updated Plant List and Source Identification as deviations or other changes occur until Substantial Completion. Submit as a Record Document at completion of Contract work.
 3. Submit technical descriptive data for each manufactured or packaged product of this Section including fertilizers, mulch, soil amendments, tree staking materials and plant treatment material as applicable. Include manufacturer's product testing and certified analysis and installation instructions for manufactured or processed items and materials. Include guaranteed analysis and weight of pre-packaged material as specified for certification of material not pre-packaged.
- B. Samples for Verification: For each of the following:
1. 1 lb. of mulch in labeled plastic bag.
 2. One package Mycorrhizal Inoculant
 3. Tree Anchoring Material:
 - a. Platimat: 12" length
 - b. Anchors: One for each size of tree specified
 - c. Galvanized Wire: 12" length
 - d. Ratchet Tensioner: One
 4. New Plant Protection Materials
 - (a.) 12x12" PVC coated wire mesh
 - (b.) 12" length tension wire
 - (c.) U post – full size
 - (d.) Tension wire ground post – Full size

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer: include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Installer shall have experience working with tight conformance to grade conditions. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Schedule: Upon being awarded the Contract the Contractor shall submit a detailed schedule of landscape activities including but not limited to the following:

1. Date for Landscape Kickoff Meeting – this shall happen at the earliest possible time
2. Dates for Landscaping Submittals
3. Dates for Plant Tagging and Procurement trips
4. Dates for detailed landscape operations including soil deliveries, soil placement and plant installations itemized by each exterior plant type.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.9 QUALITY ASSURANCE

A. Qualifications:

1. Nursery/Plant Supplier Qualification: Plant Nursery(ies) shall have a nursery facility as an integral part of operation where majority of plants can be grown and reviewed, shall be reputable, and shall have been in continual operation with a minimum of 7 years' experience as a plant grower. Nursery shall be capable of the following as a minimum:
 - a. Supplying plant material conforming to the quality standards, visual characteristics, sizes, species cultivars, and quantities indicated by the Contract Documents.
 - b. Conformance to cultural practices and maintenance procedures suitable for healthy plant material.
2. Plant Installer Qualifications: Engage an experienced installer who has completed plant installation work similar in material, design, and extent to that indicated for this project with a record of successful landscape establishment.
 - a. Installer's Field Supervisor(s) for Installation and Maintenance shall be an English speaking supervisor(s) experienced in tree, shrub, groundcover and plant installation and maintenance.
 - b. Provide names of projects, project locations, name of supervisor for installer, client contact names and phone numbers for a minimum of five (5) projects of similar size and scope, for review by Director's Representative.
 - c. Supervisor(s) shall be maintained full-time on Project site when installation or maintenance is in progress.
 - d. Perform installation work with personnel totally familiar with preparations and exterior plant installation under supervision of an experienced landscape Foreman.
 - e. Provide adequate numbers and types of accessible personnel to meet the scheduling requirements of the exterior plant installation.
 - f. Certified Project Arborist: Must be currently certified by International Society of Arboriculture and must have a minimum of five (5) years' experience. The certified project arborist must be on site when all installation, maintenance of plants including pruning and root pruning, and while all earth moving is taking place to enforce tree protection requirements (Section 31 20 01 "Temporary Tree and Plant Protection".
3. Soil-Testing Laboratory Qualifications: As indicated in Specification section 31 10 00 "Soil Materials"
 - a. The contractor shall pay for all testing under this Section.

- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

1.10 PLANT SOURCING, SELECTION, AND INSPECTIONS

A. General:

- 1. Contractor shall locate plant material source(s), confirm the availability of each plant type in compliance with Contract Documents, and shall submit, as specified, a complete list of all plant material for Project with nursery source identification for each plant.
- 2. All proposals for substitutions of plant material must be approved by the Director's Representative in writing.
- 3. Director's Representative, after review of submitted Plant List and Source Identification, will inspect plant materials at place of growth from identified nursery stock and at site before planting for compliance with requirements of genus, species, variety, size, quality, and other characteristics and for the purpose of plant selection.
 - a. For the purpose of plant material selection by Director's Representative and Owner, the terms "inspect" and "inspection" are to be construed as an evaluation, consideration, judgment, and review for acceptability at time of observation.
 - b. Trees are to be inspected and tagged prior to being dug. Container grown trees will not be considered.
- 4. In addition to inspection at place of growth, Director's Representative and Owner retain the right to inspect plant materials for size, condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of the work even if previously inspected and approved.
- 5. Plant material not selected and tagged or otherwise reviewed as acceptable shall not be delivered to Project and plant material subsequently rejected after delivery shall be removed immediately from Project site and replaced at no additional cost to the Owner.

B. Sourcing:

- 1. Source all plant material from nurseries that grow material within 400 miles of the City of Yonkers, NY. Contractor shall make effort to source planting material from the same USDA Plant Hardiness Zone: USDA Zone 7A.
- 2. All trees and shrubs shall be nursery grown. Tree and shrubs may require inspection and tagging prior to delivery to site.
 - a. A representative sample of each shrub species will be tagged. The remainder of shrubs shall meet the quality of the representative sample.
- 3. Groundcovers shall be available for inspection at a single location prior to delivery to site.

4. A nursery source may be rejected by Director's Representative if it is determined before, during, or after inspection and/or receipt of the plants that nursery source does not meet any of the following:
 - a. The quality standards set forth by Contract Documents are not met by the nursery or nursery plant stock.
 - b. Nursery or nursery plant stock exhibits an infestation with pest or disease.
 - c. The intended visual characteristics of the plants are not met by the nursery stock.
 - d. Nursery cannot supply the specified plants in sizes, species cultivar and/or quantities indicated by Contract Documents.
 - e. The nursery does not follow cultural practices or maintenance procedures suitable for healthy plant material.

C. Contractor's Preparation for Plant Selection

1. Make all pre-selection arrangements with and at nursery supply source(s) to insure a ready supply of materials, equipment, and manpower required for an efficient selection and tagging procedure.
2. Request visit of the Director's Representative, together with Construction Manager and Owner as applicable, at least fourteen (14) days in advance of the Contractor's desired inspection date for each type plant material.
3. Director's Representative's may travel for each inspection/tagging trip and Contractor shall confirm that quantities of material for inspection meet or exceed the following requirements:
 - a. 1-4 Specified: Three (3) times the amount of material available for inspection
 - b. 5-9 Specified: Two (2) times the amount of material available for inspection
 - c. 10 or greater specified: One and one-half (1.5) times the amount of material available for inspection
4. As directed by Owner, plant Installer's Supervisor and nursery representative shall be present for plant inspection and tagging at the nursery source and at applicable times on-site.

D. Plant Material Inspection and Selection at Nursery

1. Director's Representative may inspect plant material and make selection prior to digging at place of growth for compliance with genus, species, variety, size, quality, and desired design intent.
 - a. Trees may be inspected and selected at the nursery sources by Director's Representative for conformity to the specification requirements.
 - b. The Director's Representative may only require inspection of representative samples of each species of shrub, groundcover, vine, perennial, and annual.
 - c. Nursery shall certify in writing that all plant materials tagged are disease and pest free.
2. Selected plants shall be tagged in the nursery as directed by Director's Representative. Seals may be placed by Director's Representative on selected plants and not removed until the end of the Guarantee / Warranty period.
3. Inspection and selection by Director's Representative shall not affect the right of inspection and rejection during delivery or during and after installation.
4. Photographs: Furnish photographs of the plant material at the Director's Representative's option or request.
 - a. Photographs (using digital camera) shall be taken at the nursery source. A scale figure or measuring device to indicate size shall be in each photograph.

- 1) Tree photographs shall include images of the entire plant, and detail photographs showing the following: base of the tree, leaves, branching structure, form and habit.
 - 2) Shrub photographs shall include images of the entire plant, and detail photographs showing the following: base of the plant, leaves, branching structure, form and habit, rootball (for balled and burlap material), and/or roots (for potted material).
- b. Each photograph taken shall be labeled with the botanical and common names, nursery name, location and date.
 - c. Furnish Director's Representative with an electronic photograph file within 5 days of Director's Representative's request.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Notify Director's Representative of sources of planting materials seven days in advance of delivery to site.
- B. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- C. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing or proposed 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 materials with appropriate certificates.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet, condition.

1.12 FIELD CONDITIONS

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

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting:

- | | |
|--------------------------------|----------------------------|
| a. Deciduous trees and shrubs: | March 15 to May 1 |
| b. Evergreen trees and shrubs: | March 30 to May 15 |
| c. Groundcovers: | April 15 to May 30 |
| d. Ornamental Grasses: | April 15 to May 30 |
| e. Bulbs: | Do not plant in the Spring |

2. Fall Planting:

- | | |
|--------------------------------|----------------------------|
| a. Deciduous trees and shrubs: | October 15 to November 30 |
| b. Evergreen trees and shrubs: | September 1 to October 15 |
| c. Groundcovers: | September 1 to October 15 |
| d. Ornamental Grasses: | September 1 to October 15 |
| e. Bulbs: | September 1 to November 30 |

3. The following species are fall planting hazards and shall be dug and planted in the Spring only. Digging or planting at times other than spring season shall be done at Contractor's risk, and shall not relieve Contractor of the obligation of Warranty/Guarantee obligations. If the Contractor elects to plant trees on this list in the fall without having arranged for a spring-dug tree, the Warranty Period shall be extended by an additional year with the same replacement warranty as spring planted trees (see Article 1.13. A.).

a. Trees:

- 1) Betula
- 2) Carpinus
- 3) Celtis
- 4) Cercis
- 5) Cercidiphyllum
- 6) Crataegus
- 7) Fagus
- 8) Halesia
- 9) Koelreuteria
- 10) Liquidambar
- 11) Liriodendron
- 12) Malus
- 13) Nyssa
- 14) Ostrya
- 15) Prunus
- 16) Pyrus

- 17) Quercus –except Q. palustris
- 18) Salix
- 19) Sorbus
- 20) Styrax
- 21) Tilia tomentosa
- 22) Ulmus parviflora
- 23) Zelkova

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

1.13 WARRANTY & MAINTENANCE

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

- 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from Owner abuse, lack of adequate maintenance by Owner or neglect by Owner.
 - b. Structural failures including plantings falling or blowing over.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 2. Warranty and Maintenance Periods: From date of Substantial Completion.
 - a. Trees, Shrubs: 1 year from date of Substantial completion
 - b. Ground Covers, Perennials, and Ornamental Grasses: 12 months from date of substantial completion.
- 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. For replaced plant material, provide extended warranty for period equal to original warranty period.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

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

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Director's Representative and approved by Director, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each tree and shrub with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial – grade complete fertilizer of neutral character, consisting of fast and slow release nitrogen, 50 percent derived from natural organic sources of urea, formaldehyde, phosphorus, and potassium in the following composition:
1. Composition: Nitrogen, phosphorus, and potassium and other supplemental nutrients in amounts recommended in soil testing reports from a qualified soil-testing agency.

2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
1. Type: Shredded hardwood.
 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 3. Color: Black or Dark Brown

2.4 TREE-STABILIZATION MATERIALS

- A. Rootball Anchoring:
1. Manufacturer: Platipus Anchors, Inc. 1902 Garner Station Boulevard, Raleigh, NC 27603. (886) 752-8478. Platipus-anchors.com, or approved equal.
 2. Model: Rootball Fixing System – Plati-Mat
 3. Size and installation per manufacturer's guides

2.5 PLANT PROTECTION FENCING

- A. See Section 31 20 01. Temporary Tree and Plant Protection.

2.6 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. 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 Director's Representative and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Director's Representative's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Director's Representative. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 311000 "Soil Materials."

- B. Placing Planting Soil: Place planting soil over exposed subgrade in accordance with Section 311000 "Soil Materials."
- C. Before planting, obtain Director's Representative's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time directed by Director's Representative, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Excavate to the depth and width as shown on the drawings.
 - 3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 6. Maintain supervision of excavations during working hours.
 - 7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Backfill Soil: Use planting soil, as specified in Section 311000 "Soil Materials" for backfill. Subsoil and soil removed from excavations may not be used as backfill soil unless otherwise indicated. Refer to Specification Section 312200 "Earthwork and Site Grading."
- C. Obstructions: Notify Director's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Director's Representative if subsoil conditions show evidence of unexpected water seepage or retention in tree or shrub planting pits.
 - 1. Upon completion of planting pit or trench excavation and prior to planting, fill excavations with 12" minimum depth water and allow water to naturally drain out. When water has drained out, fill excavation again with 12" minimum depth water and measure rate of drainage. Drainage rate should be a minimum of 1" per hour (1 inch drop in water elevation per hour within pit or excavation).
 - a. Frequency of Drainage Testing:
 - 1) Tree Pits: test each tree pit
 - 2) Planting Bed Areas: one drainage test for every 1,000 sq. ft. of planting bed, or one drainage test per planting bed less than 1,000 sq. ft.
 - 2. If pits or planting beds do not drain freely, notify Director's Representative for direction prior to installation of trees.

- E. Fill excavations with water and allow water to percolate away before positioning trees and shrubs.

3.5 TREE AND SHRUB PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
 - 1. Backfill: Planting soil mix as specified in Section 311000 "Soil Materials".
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
 - 1. Backfill: Planting soil as specified in Section 311000 "Soil Materials."
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches as directed by Director's Representative. Do not prune for shape.
- B. Prune, thin, and shape trees and shrubs as directed by Director's Representative.
- C. Prune, thin, and shape trees and shrubs according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Director's Representative, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.
- E. Perform Tree and Shrub Pruning work, under the supervision of a Certified Project Arborist.

3.7 TREE STABILIZATION

- A. Trunk Stabilization by Rootball Anchoring: Install rootball anchors as directed by manufacturer's recommendations.

3.8 GROUNDCOVER AND PLANT PLANTING

- A. Set out and space groundcover and plants other than trees and shrubs, as indicated on Drawings, in even rows with triangular spacing or as shown in drawings.
- B. Use planting soil as specified in 311000 'Soil Materials' for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Organic Mulch in Planting Areas: Apply 4-inch average thickness of organic mulch over entire surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems. See Article 2.3 for materials.

3.10 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.11 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Director's Representative.

1. Submit details of proposed pruning and repairs.
 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved, under the supervision of a Certified Project Arborist.
 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Director's Representative.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that Director's Representative determines are incapable of restoring to normal growth pattern.
- C. Repair and replace, in kind, any existing vegetation disturbed by construction practices that is shown to remain.
1. All existing trees are to be replaced in accordance with specification Section 312001 "Temporary Tree and Plant Protection"
- D. Reinvigorate Tree's affected by compaction or significant loss of canopy through use of Air Spade as directed by the Director's Representative.
1. Acceptable Uses of an Air Spade
 - a. Expose root flares and root structure 6" to 18" below grade for base investigation.
 - b. Expose root flare for Micro Injections.
 - c. Expose root's that were impacted by additional soil during site operations.
 - d. Create Tunnels under existing roots without impacting tree health.
 2. Prepare Site
 - a. Remove existing grass with sod cutter
 - b. Adjust depths of cutter to lowest measurement.
 - c. **Special Note Within the Critical Root Zone (CRZ):** Hand tools should be used where possible. However, use of a sod cutter should be gauged downward to 5/8th of an inch cutting if used within this sensitive area of the tree
 - d. Certified Project Arborist Shall Mark Surface Roots within the Critical Protection Zone. This area should utilize finer care with the use of hand tools only when removing grass or sod for reinvigoration.
 - e. Grasses/Debris to be removed manually in beds and not put on tractor pulled through beds.
 - f. Machinery shall have wooden boards or padding underneath at all times to reduce further compaction and stress to trees.
 3. Types of Acceptable Aeration Techniques:
 - a. Radial Method: Trenching with an air excavator, excavate a soil trench 3 to 6-inches wide and a minimum of 12-inches deep from (approximately) 3-feet from the trunk out to the dripline area. The trenches shall radiate out from one foot apart at the closest point.
 - 1) Technique will be effective for root invigoration at moderate depths due to the existing compaction.
 - b. Root Collar Excavation Method: Air excavator should be used to remove excess soil at a depth between 6-18 inches. This technique can be used when grade changes have occurred in excess of one inch to avoid quick decline through suffocation of absorbing roots and decay.
 4. Procedure for air spade
 - a. Use air spade to remove soil from around the roots and base of the tree trunk to expose root system.
 - b. Fill trenches with new topsoil and soil amendments.

- c. Never add fertilizer to the heritage trees at time of invigoration as it will have a deleterious effect.
- 5. Procedure After Radial Air Spade
 - a. Apply new soil to the trenches to cover exposed roots and level area for mulch application.
 - b. Application of mulch within CRZ 3-inch average thickness of organic mulch. See section 2.3 for materials.
 - 1) Do not place mulch within 6 inches of trunks or stems.
 - c. Water Tree immediately after Invigoration. 10 gallons of water per 1 DBH of Tree.
 - 1) Watering should be gradual and break between every 10-20 gallons to allow for tree to absorb the water without overflowing into other areas.
 - d. Plant Protection Fencing Installed Immediately after watering occurs.
 - e. Construction Tree Protection Signage needs to be in place immediately following the procedure.

3.12 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades.
 - 1. Install protection fencing in accordance with drawings.
 - 2. Maintain protection fencing during installation and maintenance periods. Replace if damaged. Remove protection fencing at end of maintenance period outlined in Article 1.13, herein.
- D. Treat, repair, or replace damaged plantings.
- E. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION 32 93 00