# SECTION 02281 - TERMITE CONTROL

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Soil treatment for termite control below grade at exterior foundation perimeter.

### 1.2 RELATED SPECIFICATIONS

A. See Civil Engineering Drawings.

### 1.3 REFERENCES

A. EPA - Environmental Protection Agency - Federal Insecticide, Fungicide and Rodenticide Act.

### 1.4 SUBMITTALS FOR REVIEW

A. See General Conditions- Submittals: Procedures for submittals.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

### 1.5 SUBMITTALS FOR INFORMATION

A. General Conditions - Submittals: Procedures for submittals.

B. Test Reports: Indicate regulatory agency approval reports when required.

C. Manufacturer's Application Instructions: Indicate caution requirements.

D. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

### 1.6 SUBMITTALS AT PROJECT CLOSEOUT

A. General Conditions - Contract Closeout: Procedures for submittals.

B. Record moisture content of soil before application, date and rate of application, areas of application, diary of toxicity meter readings and corresponding soil coverage.

### 1.7 MAINTENANCE DATA

A. Submit under provisions of General Conditions.

B. Maintenance Data: Indicate re-treatment schedule.

1.8 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this Section with minimum 3 years documented experience, approved by manufacturer and licensed by the State of North Carolina.

1.9 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for application, application licensing and authority to use toxicant chemicals in accordance with EPA.

B. Provide certificate of compliance from Town of Duck indicating approval of toxicants.

1.10 SEQUENCING

A. Sequence work under the provisions of Division 1 specifications.

B. Apply toxicant 12 hours prior to installation of vapor barrier under slabs-on-grade.

1.11 WARRANTY

A. Provide five year warranty under provisions of General Conditions.

B. Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Re-treat where required.

C. Inspect and report annually to Owner in writing.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bayer Corp., Premis 75

B. Aventis environmental Science USA, Termidor

C. Dow Agro Sciences, dursban TC

2.2 MIXES

A. Provide EPA registered termiticide complying with requirements of local authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application a the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product’s EPA-Registered label.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify site conditions under provisions of General Condiditons.

B. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

### 3.2 APPLICATION

A. Spray apply toxicant in accordance with manufacturer's instructions.

B. Apply toxicant at locations indicated in Schedule at end of Section.

C. Apply extra treatment to structure penetration surfaces such as pipe or ducts, expansion joints, control joints and areas where slab will be penetrated.

D. Re-treat disturbed treated soil with same toxicant as original treatment.

E. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

### 3.3 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of General Conditions.

B. Do not permit soil grading over treated work.

### 3.4 SCHEDULES

A. Locations:
   1. Under Slabs-on-Grade.
   2. Both Sides of Foundation Surface.
   4. Soil Within 5 feet of Building Perimeter.

END OF SECTION 02281

# SECTION 02310 – EARTHWORK FOR BUILDINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.

### 1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

B. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

C. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

G. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

### 1.3 QUALITY ASSURANCE

A. Preexcavation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Protect structures and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

### 3.3 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.4 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

### 3.5 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.6 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Place and compact final backfill of satisfactory soil to final subgrade elevation.

F. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.7 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under building slabs, use engineered fill.
2. Under footings and foundations, use engineered fill.

3.8 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

## 3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.

## 3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

## 3.11 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## 3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of

other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.13 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02310

# SECTION 02459 - TIMBER PILES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes round timber piles.

### 1.2 UNIT PRICES

A. The Contract Sum: Base the Contract Sum on number and dimensions of piles indicated from tip to cutoff, plus not less than 12 inches (305 mm) of overlength.

B. Work of this Section is affected as follows:

1. Test piles that become part of permanent foundation system will be considered as an integral part of the Work.
2. No payment will be made for rejected piles, including piles driven out of tolerance, defective piles, or piles damaged during handling or driving.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for piles, including details of driving shoes, tips or boots, and pile butt protection.

### 1.4 INFORMATIONAL SUBMITTALS

A. Square timber pile treatment data.

B. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.

C. Pile-driving records.

D. Field quality-control reports.

## PART 2 - PRODUCTS

### 2.1 TIMBER PILES

A. Square Timber Piles: ASTM D 25, unused, clean peeled, one piece from butt to tip; of the following species and size basis:

1. Species: Southern yellow pine.

2. Size Basis: 8” Square.

B. Pressure-treat timber piles according to AWPA C3 as follows:

1. Service Condition: Land and freshwater.
2. Treatment: Waterborne preservative.

2.2 PILE ACCESSORIES

A. Driving Shoes: Fabricate from ASTM A 1011/A 1011M, hot-rolled carbon-steel strip to suit pile-tip diameter.

2.3 FABRICATION

A. Pile Tips: Cut and shape pile tips to accept driving shoes. Fit and fasten driving shoes to pile tips according to manufacturer's written instructions.

B. Pile Butt: Trim pile butt and cut perpendicular to longitudinal axis of pile. Chamfer and shape butt to fit tightly to driving cap of hammer.

C. Field-Applied Wood Preservative: Treat field cuts, holes, and other penetrations according to AWPA M4.

D. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch (305-mm) intervals; label the distance from pile tip at 60-inch (1.52-m) intervals.

PART 3 - EXECUTION

3.1 DRIVING PILES

A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.

B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

C. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:

1. Location: 4 inches (102 mm) from location indicated after initial driving, and 6 inches (152 mm) after pile driving is completed.
2. Plumb: Maintain 1 inch (25 mm) in 4 feet (1.2 m) from vertical, or a maximum of 4 inches (102 mm), measured when pile is aboveground in leads.
3. Batter Angle: Maximum 1 inch (25 mm) in 4 feet (1.2 m) from required angle, measured when pile is aboveground in leads.

D. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by Architect.

E. Cutting Off: Cut off butts of driven piles square with pile axis and at elevations indicated.

F. Pile-Driving Records: Maintain accurate driving records for each pile.

3.2 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Pile foundations.

B. Testing Agency: Owner will engage a qualified independent testing agency to perform tests and inspections.

C. Tests and Inspections:

1. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on two piles.

END OF SECTION 02459

# SECTION 02920 - 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 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. This Section includes the following:
   1. Sodding.

B. Related Sections include the following:
   1. Division 2 Section “Site Preparation and Demolition” for topsoil stripping and stockpiling.
   2. Division 2 Section “Earthwork” for excavation, filling and backfilling, and rough grading.

### 1.3 DEFINITIONS

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

B. Planting Soil: Native or imported topsoil, mixed with soil amendments.

C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

### 1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Certificates: For sod, soil amendments and fertilizers, signed by product manufacturer.
   1. Source of sod.

C. Qualification Data: For landscape Installer.

D. Invoices for sod, fertilizer and lime.

E. Planting Schedule: Indicating anticipated planting dates for each type of planting.

### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn and establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Reserve or purchase sod early in the planting season to ensure availability.

C. Fertilizer and Lime
1. The Architect and Owner shall be furnished with copies of all invoices for all fertilizer and lime used on the project. Invoices for fertilizer shall show the grade furnished. Invoices for lime shall show total minimum carbonates and minimum percentages of the material furnished that pass the 100, 20, and 10 mesh sieves. Each lot of fertilizer and lime shall be subject to sampling and testing at the discretion of the Architect. Sampling and testing will be in accordance with the official methods of the Association of Official Agricultural Chemists. Upon completion of the project, a final check of the total area treated, and if the minimum rates of application have not been met, the Architect or Owner may require the distribution of additional quantities of fertilizer and lime to make up the minimum rates of application specified by the Architect.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged products in original sealed, undamaged containers, labeled with the name, trade name or trademark, and warranty of the producer.

## 1.7 SCHEDULING

A. Schedule grassing to provide a permanent lawn by final inspection for the building construction completion.
1. Permanent grass cover to be planted from April 1 to May 15 or September 1 to November 31.
2. If finished grades are not completed in time to permit planting and establishment of the permanent grass during the favorable season between the dates specified above, apply a 3 inch cover of pine straw to protect the new graded areas from erosion and to keep windborne dust to a minimum.
a. Wheat straw is not permitted.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. When delays in operations carry the work beyond the most favorable planting season for the species designated, or when conditions are such, by reason of drought, high winds, or excessive moisture, that satisfactory results cannot be obtained, stop the work and resume when conditions are satisfactory.

## 1.8 WARRANTY

A. Special Warranty: Warrant following lawns and grasses for warranty periods indicated against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor’s control.
1. Warranty Period for Sodded Lawns: 60 days from date of Project Acceptance.

1.9 MAINTENANCE

A. Provide protection against traffic by warning signs and barricades; repair any areas damaged as a result of the Contractor's own operations or erosion.

B. Maintain and establish lawn 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.

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 6 inches.
   1. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
   3. Water lawn, supplementing rainfall, to provide a total minimum rate of 1 inch per week.
   4. Water during the cool of the day during the summer months.
   5. Do not water when there is danger of freezing.
   6. Water in a manner which will prevent erosion from the application of excessive rates.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

E. Maintain lawn areas until date of Final Inspection. Mow at least twice before acceptance.

PART 2 - PRODUCTS

2.1 SOD

A. Bermuda Grass Sod: 'Celebration' Bermuda Grass Sod provided by an Official Certified Grower of 'Celebration' Variety of Bermuda Grass.
   1. The source of the sod must have been grown on sand or loamy sand USDA soil texture.

2.2 LIME

A. Ground limestone containing not less than 85% of total carbonates; 90% passing through a No. 10 mesh sieve and 25% passing through a No. 100 sieve. Coarser materials will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the 100 mesh sieve; no additional payment will be made for the increased quantity.

2.3 FERTILIZER

A. 10-10-10 commercial mixed grade, and uniform in composition.

## 2.4 NITROGENOUS FERTILIZER

A. Nitrate of soda containing not less than 16% nitrogen, or ammonium nitrate containing not less than 33 1/3 % nitrogen.

## 2.5 ORGANIC SOIL AMENDMENTS

A. Compost: Certified compost complying with the Testing Assurance Program of the US Compost Council; well-composted, stable, and weed-free organic matter, pH range of 6 to 8; moisture content 40 to 50 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of maximum 4.0 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
   2. Bulk Density: 800 to 1000 pounds per cubic yard.
   3. Feedstock: Agricultural, food, or industrial residuals; or source-separated or compostable mixed solid waste.
   4. Metals and Contaminants: Meet or exceed US EPA Standard 40.

## 2.6 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

## 2.7 MULCHES

A. Straw: Clean baled pine straw.

## 2.8 EROSION-CONTROL MATERIALS

A. Erosion-control Fiber Mesh: Biodegradable twisted jute mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area.

B. Wood Stakes: 1 inch by 1 inch by 12 inches long, tapered wood stakes.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

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

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

C. Loosen planting areas to a depth of at least 4 inches by plowing, disking, or harrowing. Smooth irregularities in the surface resulting from tillage prior to sodding operations.

## 3.3 FERTILIZER

A. Distribute uniformly at a rate of 1,000 pounds per acre and incorporate into the soil to a depth of approximately three inches by disking, or harrowing. The incorporation of fertilizer may be a part of the tillage operation.

## 3.4 LIME

A. Following, or simultaneously with the incorporation of fertilizer, distribute lime at the rate of 1,200 pounds per acre and incorporate into the soil to a depth of at least three inches by disking, or harrowing. The incorporation of lime may be a part of the tillage operation.

## 3.5 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

## 3.6 SATISFACTORY LAWNS

A. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

## 3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Remove all excess material and debris from the project site.

B. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

C. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

D. At the completion of the establishment period remove all stakes, tools, equipment, and debris. Leave the site in a neat condition.

END OF SECTION 329200

# SECTION 02921 - SOIL PREPARATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section specifies soil preparation required for planting.

B. Work of this Section includes:
1. Soil Testing.
2. Soil Amendments.
3. Fertilizers.
4. Top Soil.
5. Mulch.
6. Subsoiling.

C. Related Sections include the following:
1. Division 2 Section "Turf and Grasses".
2. Division 2 Section "Plants."

### 1.2 REFERENCES

A. ASTM D 5268-02 - Standard Specification for Topsoil Used for Landscaping Purposes.

B. Voluntary Uniform Product Guidelines - Mulch and Soil Council.

### 1.3 DEFINITIONS

A. Finished Grade: Elevation of finished surface of planting soil.

B. Topsoil: Original surface soil where the most organic matter has accumulated, typically producing a darker color soil than underlying subsoil.

C. Planting Soil: Native or imported topsoil, mixed with soil amendments.

D. Subgrade: Elevation of subsoil remaining after completing excavation and rough grading, or top surface of a fill or backfill, prior to placing planting soil.

### 1.4 SUBMITTALS

A. Product Data: For each type of packaged product required, including organic amendments, commercial fertilizers, and chemical additives.
1. Product Data Sheets with manufacturer’s certification of chemical composition.
2. Material safety data sheets.

B. Samples: For each of the following:

1. 1/2 pound of mulch required for the Project, in labeled plastic bags.

C. Test Reports: Submit results of analysis for the following:
   1. Topsoil.
      a. Include Soil Testing Laboratory's recommendations for amendments and application rates to produce acceptable planting soil.
   2. Subsoil.
   3. Compost.
      a. Verify product meets requirements.
   4. Installed planting soil.

D. Equipment List: Outlining models of equipment to be used for subsoiling.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An Installer who has successfully completed work similar in extent to that required for this Project.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor, with a minimum of 3 years of experience in supervising similar projects in the region, on the Project site during the work of this section.

B. Soil Testing Laboratory Qualifications: An independent laboratory, approved by the Project Director, with the experience and capability to conduct the testing indicated.

C. Soil Sampling: Take soil samples as follows and as directed by the soil testing laboratory:
   1. Use stainless steel or chrome plated sampling tools.
   2. Use a clean plastic container to collect samples. Do not used a galvanized or metal container.
   3. Composite samples to be derived from ten 5 ounce samples taken from random locations and mixed together.
   4. Composite samples to be a minimum of 16 ounces.
   5. Air-dry composite samples prior to sealing in plastic bags.
   6. Label plastic bags with name and sample number that corresponds to sample information sheet.

D. Soil Testing: Soil analysis to include the following:
   1. Finished grade soils:
      a. Percent organic matter.
      b. Percent deleterious material.
      c. Mechanical analysis (% sand, % silt, % clay).
      d. pH.
      e. Phosphorus.
      f. Potassium.
      g. Calcium.
      h. Magnesium.
      i. Manganese.
      j. Boron.
      k. Soluble salts content in mmhos/cm or ds.
      l. Cation exchange capacity.
   2. Subsoil:
      a. Mechanical analysis (% sand, % silt, % clay).

b. pH.
c. Phosphorus.
d. Potassium.
e. Calcium.
f. Magnesium.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manner to protect them from damage and contamination, and to comply with manufacturer's storage instructions.

B. Packaged Materials: Deliver packaged materials in original, unopened bags or containers, each bearing the name of the manufacturer and the name, composition and quantity of the material.

C. Bulk Materials: Coordinate delivery of materials to allow timely placement in destination locations. If stockpiling is necessary, store materials only in approved locations, as directed by the Project Director.
1. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
2. Stockpile materials away from edge of excavations. Do not store within drip line of trees to remain.

## 1.7 PROJECT CONDITIONS

A. Do not proceed when ground or materials are frozen or at field capacity.

# PART 2 - PRODUCTS

## 2.1 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter. Derived from agricultural, food, or industrial residuals; biosolids; yard trimmings, or source-separated or compostable mixed solid waste. Not possessing objectionable odors nor resembling the raw material from which it was derived. Not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
1. pH: 5.5 - 8.0
2. Soluble Salts: 4.3 - 9.9 mmhos/cm
3. Organic Content: 40% - 60% percent of dry weight.
4. Moisture Content: 35% - 55% by weight.
5. Particle Size: 100% passing through 25 mm sieve.

## 2.2 CHEMICAL AMENDMENTS

A. Dolomite Lime: Agricultural grade mineral soil conditioner containing 35 percent minimum magnesium carbonate and 49 percent calcium carbonate, 100 percent passing #65 sieve.

B. Iron Sulfate Ferrous: 30-35 percent iron, 35-50 percent sulphur. Obtain from commercial fertilizer supplier.

C. Sulphate of Potash: Agricultural grade containing 50 percent to 53 percent of water soluble potash.

D. Single Superphosphate: Commercial product containing 18-20 percent available phosphoric acid.

E. Calcium Nitrate: Agricultural grade containing 15-1/2 percent nitrogen.

F. Urea Formaldehyde: Commercial product containing 38 percent nitrogen.

## 2.3 MINERAL AMENDMENTS

A. Sand:
1. Grading Dry Weight Basis:

| Percent Passing | Sieve Designation |
|---|---|
| 100 | 10 mm (3/8") |
| 95-100 | 2.00 mm (#10) |
| 20-80 | 0.41 mm (#40) |
| 0-5 | 0.075 mm (#200) |

2. Chemical Properties:
   a. Salinity: Saturation extract conductivity not to exceed 3.0 milimhos/cm.
   b. Boron: Concentration in saturation extract not to exceed 1.0 parts per million.
   c. Sodium Absorption Ratio (SAR), as calculated from analysis of saturation extract, not to exceed 6.0.

## 2.4 TOPSOIL

A. Topsoil shall conform to the requirements specified in Section "Earthworks"
1. Topsoil Source: Existing in-place or stockpiled topsoil on-site. Verify suitability of topsoil to produce planting soil.
   a. Supplement with imported topsoil from off-site sources when quantities are insufficient.
2. Topsoil Source: Imported topsoil from off-site sources. Obtain from a naturally well drained local or regional site, where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes. Source area for topsoil shall not have been under active cultivation for a minimum period of 5 years.
   a. Mechanical analysis to match existing, on-site topsoil/subsoil.

## 2.5 PREPLANT FERTILIZER

A. Components: 50 percent of nitrogen derived from natural organic resources of urea-formaldehyde. Available phosphoric acid from superphosphate, bone, or tankage. Potash derived from muriate of potash containing 60 percent potash for each use. Fertilizer to consist of the following percent by weight, unless otherwise determined by soil test; mixed by commercial fertilizer supplier:
1. Trees, shrubs, groundcovers, perennials and lawn areas:
   a. 10 percent nitrogen.
   b. 10 percent phosphorous.
   c. 10 percent potash.

## 2.6 MULCH

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs.
   1. Type: Aged, Double Shredded Hardwood Bark Mulch, as defined by the Mulch and Soil Council - www.mulchandsoilcouncil.org. Exposed to weathering and natural decay; maximum wood content of 15%; not containing reprocessed wood products.

## 2.7 EQUIPMENT

A. Subsoiler: Heavy duty soil ripper/subsoiler capable of penetrating severely compacted soils to a depth of 16 inch - 22 inch having a single tool bar mounted on a three point hitch with 1 - 3, 1 inch by 8 inch by 24 inch adjustable subsoiler shanks.
   1. Chisel plows, disks, and bar sheer plows are not acceptable equals.

B. Tractor: 90 - 130 horsepower hydraulically equipped tractor with wheel weights or filled tires to enable necessary traction during subsoiling.

## 2.8 PLANTING SOIL

A. General:
   1. Unless otherwise specified, the following are acceptable results for all soil types.

| | |
|---|---|
| pH Range | 5.0-7.0 |
| Magnesium-Mg | 100+ units |
| Phosphorous-P205 | 150+ units |
| Potassium-K20 | 120+ units |
| Carbon Nitrogen Ration-C/N | Max 30:1 |
| Soluble Salts/Conductivity | not to exceed 500 ppm/0.5 mmhos/cm (organics <5%) |
| | not to exceed 3000 ppm/2.5 mmhos/cm (organics >5%) |

   2. Composition of mineral fraction: The texture of the planting soil to be similar to the texture of the existing topsoil and subsoil, and fall within the following:

| | |
|---|---|
| Sand | 20-60 percent. |
| Silt | 12-50 percent. |
| Clay | 7-40 percent. |

   3. Organic content: 4-8 percent.

B. Combine all components to create a homogeneous mixture prior to placement on subgrade.

## 2.9 SOURCE QUALITY CONTROL

A. Submit mulch samples for verification prior to delivery to site.

B. Soil Tests
   1. Existing in-place topsoil: Submit one composite soil sample for testing.
      a. Take samples from 6 inch deep cores.
   2. Stockpiled topsoil: Submit one composite soil sample for testing.
   3. Imported Topsoil: Submit one composite soil sample for testing for each unique source.
   4. Subsoil: Submit one composite soil sample for testing.
      a. Take samples from 6 inch deep cores below top surface of subsoil.

5. Submit test results a minimum of 30 days prior to commencing soil preparation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify the following items are in place, and have been accepted by the Project Director: Rough grading of subgrade, landscape walls, steps, planters, and other hardscape elements.

B. Examine rough grading and subgrade prior to soil preparation. Alert Project Director to unacceptable rough grading or subgrade.

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

### 3.2 PREPARATION

A. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff to drainage systems and adjacent properties.

B. Prior to, and subsequent to subsoiling, clear weeds, groundcovers and sod, roots and stumps, stones and clods larger than 1 inch in diameter, debris and other material that may hinder proper grading, tillage, planting, or subsequent maintenance operations.

### 3.3 SUBSOILING

A. Loosen subgrade of planting areas to a minimum depth of 24 inches prior to installing planting soil.
   1. Rip area in two directions perpendicular to each other with subsoiler shanks mounted at 18 inch centers. Rip in multiple passes as necessary in the first direction to achieve the required depth, before ripping in the second, perpendicular direction.
   2. Bring subgrade to a uniform grade.

### 3.4 SOIL PLACEMENT

A. General:
   1. Provide a 4 inch minimum depth of planting soil in lawn areas.
   2. Provide a 8 inch minimum depth of planting soil in planting beds.
   3. Completely backfill tree and shrub planting pits with planting soil.
   4. If depth of planting soil mix exceeds 12 inches, place in multiple layers of 12 inches or less. Tamp each layer to eliminate air pockets and to control settling. Do not over compact; soil to drain properly. Overfill deep placements to allow for settlement.
   5. Rake planting soil to a smooth, even surface.

### 3.5 PREPLANTING FERTILIZATION

A. General: Apply preplant fertilizer at the following rates. Apply not more than seven days before planting. Work well into soil:

1. Trees: 5 oz/2 inches of trunk diameter, mixed throughout tree pit backfill
2. Shrubs: 2 oz/12 inches of height or spread; or 1.5 lbs/100 s.f. of bed for massed plantings
3. Groundcovers and Herbaceous Plants: 1.1 lbs/100 s.f. of bed area
4. Lawns: 500 lbs/acre (1.1 lbs/100 s.f.)

## 3.6 MULCHING

A. General: Immediately install 1 inch minimum temporary mulch layer in planting beds as erosion control. The temporary layer may remain in place as part of the final mulch layer.

B. Provide 2 inches depth mulch in planting areas and mulch rings.

C. Do not place mulch against plant trunks or stems.

## 3.7 FIELD QUALITY CONTROL

A. Submit test results from one composite soil sample of installed planting soil.

## 3.8 CLEANUP AND PROTECTION

A. General: Protect and avoid damage to existing utilities and to other site work in place.

B. During soil preparation and fine grading operations, keep pavements and surrounding areas clean, and maintain work area in an orderly condition.

C. Protect prepared areas from damage due to landscape operations, operations by other contractors and trades, and others. Repair damaged areas prior to planting.

D. Promptly remove surplus materials and debris resulting from the work of this Section and dispose of legally off site.

END OF SECTION 320513

# SECTION 02930 - PLANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section specifies trees, shrubs and ground covers.

B. Related Sections include the following:
   1. Division 32 Section “Soil Preparation”.
   2. Division 32 Section “Turf and Grasses”.

### 1.2 REFERENCES

A. ANSI Z60.1-2004 - American Standard for Nursery Stock.

### 1.3 DEFINITIONS

A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with 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 kind, type, and size of exterior plant required.

C. Planting Soil: Native or imported topsoil, mixed with soil amendments.

### 1.4 SUBMITTALS

A. Qualifications: Submit qualifications for installation firm and installation supervisor to Project Director prior to the pre-installation conference.

B. Certification: Certify that selected plants will be available at the time of installation in the size, quantity, and species specified.

C. Planting Schedule: Indicate anticipated planting dates.

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

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An Installer who has successfully completed work similar in extent to that required for this Project.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor, with a minimum of 3 years of experience in supervising similar projects in the region, on the Project site during the work of this section.

B. Pre-installation Conference: Conduct conference at Project site.

C. Plants: Provide trees, shrubs, perennials, groundcovers, and bulbs of quantity, size, genus, species and variety indicated and complying with recommendations and requirements of ANSI Z60.1 “American Standard for Nursery Stock”. Provide healthy, vigorous stock, free of disease, insects, eggs, larvae and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.

D. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory: Provide inventory of all plants. All plants are subject to inspection and approval by Project Director at location of supplier and upon delivery to site for conformance to project requirements. Such approval does not limit right of inspection and rejection during progress of work. Submit written request for inspection of plant material at location of supplier to Project Director at least two weeks in advance of expected shipment date(s); indicate location of supplier and quantity to be inspected. Project Director reserves right to refuse inspection at that time if, in his judgment, sufficient quantity of plants is not available for inspection.

B. Marking: Mark plants for identification. Securely attach waterproof tag bearing legible designation of botanical name to all woody plants and at least 25 percent of each species and variety of herbaceous plants in any one shipment.

C. Acceptance: Plants will not be accepted until inspected and approved by Project Director. Plants not meeting specifications for quality and size will be rejected. Replace rejected stock with stock of designated variety, size, age, etc., as specified under this Contract at no additional cost to the Owner.

D. Storage: Supplier to store and maintain propagated or procured plant materials until site is in acceptable condition for plant material installation to begin.

E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

F. Store plants in a manner so as to provide ample sunlight and air circulation. Foliage of adjacent plants should not touch.

G. Provide adequate irrigation while plants are being stored.

H. Preparation for Shipment: Protect and maintain plants prior to, and during, shipment to site for installation. Ship plants in stages to prevent storage of plant material on site for more than 48 hours.

I. Delivery: Deliver plants after preparations for planting have been completed and install immediately. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during delivery. If planting is delayed more than six hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with mulch, soil, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.

J. On-site Storage: Water root systems of plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

K. Handling: Do not drop plants. Handle planting stock by root ball. Do not pick up container plants by stems for trunks.

## 1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
1. Deciduous Material: Spring - April 15 to June 30; Fall - October 1 to November 15. Dig and install plant materials while dormant in spring or fall or after leaves have fully expanded and hardened off.
2. Evergreen Material: Spring - April 15 to June 30; Fall - September 1 to October 31. Do not move freshly dug evergreen material without proper conditioning during active growth.
3. Perennial Material: April 15 to November 15.
4. Bulbs: October 1 to November 15.
5. Periods may be extended at the discretion of the Project Director, according to climate, weather and soil conditions.
6. Do not plant when ground is frozen or at field capacity.
7. Proceed with planting only when existing and forecasted weather conditions permit.

B. Proceed with landscape work as rapidly as portions of site become available. Do not proceed with planting until all other trades have completed their work in those respective areas of the site that are to be planted.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Project Director before planting to determine corrective action.

## 1.8 WARRANTY

A. Warranty Period: Repair or replace plantings and accessories that fail in materials, workmanship, or growth for a minimum period of one year after the date of Acceptance by the Project Director.

B. Replacement: At the end of the warranty period, replace dead plants and plants not in a vigorous, thriving condition, as determined by the Project Director, without cost to the Owner. Make replacements as soon as weather conditions permit and within the appropriate seasonal planting period.

1. Match: Replacements shall closely match adjacent specimens of the same species. Replacements are subject to all requirements of this Section.
2. Repair work: Make necessary repairs due to plant replacements at no cost to the Owner.
3. Warranty extension: Extend the guarantee of replacement plants for an additional one year period from the date of their acceptance by the Owner after replacement. In the event that a replacement plant is not acceptable during or at the end of the extended guarantee period, the Owner may elect one more replacement or a credit for each item.

## 1.9 MAINTENANCE

A. Initial Maintenance Period: Begin immediately after each plant is planted, and continue until end of warranty period.

B. Maintenance Tasks:
1. Maintenance consists of keeping plants in healthy growing condition, and keeping beds and individual mulch rings in neat appearance; performed by qualified and approved individuals. Protect plants from damage. Maintenance activities include, but are not limited to, the following:
    a. Watering: As necessary to promote natural growth. Apply in amounts to prevent excessive runoff; suitable for irrigation and free from ingredients harmful to plant life.
    b. Weeding and Cleaning: Keep planting areas free of weeds, grasses, and trash.
    c. Cultivating.
    d. Pruning.
    e. Fertilizing.
    f. Re-mulching.
    g. Tightening and repairing of guys: Remove stakes and guy wires at the end of the initial warranty period.
    h. Straightening of trees to a plumb position.
    i. Removal of dead material.
    j. Resetting plants to proper grades or upright position.
    k. Restore planting saucers.
    l. Protection from insects, pests, and disease.
2. Spray insecticides or herbicides only by authorized personnel; conform to the National Arborist Association Standards under the section entitled Standards for Pesticide Application Operations as currently adopted and as approved by the Project Director; EPA approved.

C. During the maintenance period, any decline in the condition of plantings requires immediate action to identify potential problems and to undertake corrective measures. If problems persist, engage professional arborists and/or horticulturalists at no cost to the Owner to inspect plant materials and to identify problems and recommend corrective procedures. Advise the Project Director immediately of such actions. Submit inspection and recommendation reports to the Project Director.

D. Continuing Maintenance Agreement:
1. Furnish proposal to Owner for continuing maintenance agreement for period of one year.
2. Upon execution of agreement with Owner, commence maintenance service on date when initial maintenance services are concluded.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIALS

A. Provide plants complying with ANSI Z60.1-04.

B. Tree Size: Shade trees: minimum 3 inches caliper and 12 feet tall at time of planting.

C. Woody plants: well formed and full, balanced crowns with minimal crossing branches.

D. Perennial plants: well rooted in containers.

E. Damaged, poor quality and poorly formed plants may be rejected at any time prior to review and acceptance of installed materials by Owner.
   1. Rejected plants will be replaced at no additional cost to the Owner.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Test Drainage: Test five plant beds and pits chosen by the Project Director. Do not proceed with planting operations until the Project Director has reviewed test drainage results and accepted soil drainage conditions.
   1. To test soil drainage, dig a pit 18 inches deep x 6 inches wide and fill it with water twice in succession. Notify the Project Director of the elapsed time for the pit to drain completely after the second filling. Do not test when the ground is frozen or after a heavy rainfall.
   2. If the water fails to drain from the hole within 18 hours (1 inch per hour), the soil may be considered to be poorly drained.

B. Plant Locations: Stake individual plant locations and outlines of shrub and ground cover areas to be planted as indicated on Construction Drawings in ample time to allow inspection by the Project Director. Do not proceed with digging until locations are approved by Project Director.

### 3.2 PLANTING

A. Planting pit excavation: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation. Excavate the pit to three times the diameter of the root ball.

B. Setting: Set balled and burlapped (B&B) and container stock plumb and in center of pit with top of ball at 1/8 the height of the root ball higher than the adjacent finished grade. Place plants on undisturbed existing soil or well-compacted backfill. Remove burlap and wire baskets from tops of balls; retain on bottom. Remove any soil deposited during the B&B process which may obscure the flare at the base of the tree. Rotate plants to the desired orientation as directed by Project Director.

C. Backfill and Planting Saucer: Backfill pits with planting soil. Work soil carefully into voids and pockets, tamping lightly every 6 inches until complete. Form saucer around plant pit and fill with water. Let water soak into soil and fill again.

D. Staking: Stake each tree immediately following planting. Do not use staking and guying as a means to set plants plumb.

E. Pruning: Prune each tree and shrub according to standard horticultural practice and to preserve the natural character of the plant. Pruning after plants have been delivered and inspected and accepted by the Project Director. Review pruning procedures with the Project Director before proceeding. Unless otherwise indicated by the Project Director, do not cut tree leaders; remove only injured or dead branches from flowering trees.

F. Mulching: Mulch top of planting pits and ornamental planting beds. Provide a 2 inch thickness of mulch to finish level with adjacent finish grades after planting trees and shrubs and prior to planting perennials. Top dress all trees and planting beds immediately after completion of perennials in beds.

## 3.3 CLEANUP AND PROTECTION

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

B. Protect plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods.

C. Promptly remove surplus materials and debris resulting from the work of this Section and dispose of legally off site.

## 3.4 ACCEPTANCE

A. Plant areas will be accepted when plants are in compliance with the following conditions:
   1. General Condition: Healthy, free of pests and disease, and in flourishing condition.
   2. Branches: Free of dead and dying branches and branch tips.
   3. Foliage: Plants shall bear foliage of normal density, size, and color.

END OF SECTION 329300