

SECTION 02000 SITEWORK (Revised: June, 2010)

1 GENERAL

1.1 Drainage

- 1.1.1 All grades shall slope away from buildings at ¼” per foot (minimum).
- 1.1.2 All grades over 10 percent shall be sodded/ hydromulched.
- 1.1.3 All sewers and drains shall be installed to provide self cleaning velocities.

2 PRODUCTS

3 EXECUTION

3.1 Asphalt Pavement Repair

- 3.1.1 Where asphaltic pavement is cut, cracked, or in any other way damaged by construction or related activities, it will be the Contractor’s responsibility to replace it as follows.
 - 3.1.1.1 Asphalt shall be saw-cut and removed in a straight line, perpendicular to the direction of roadway or walk.
 - 3.1.1.2 New pavement shall conform to ODOT Items 402 and 404. Thicknesses will be determined by the University upon examination of existing material after cut.
 - a. Roadway
 - b. Parking
 - c. Walkway
 - 3.1.1.3 All new asphalt in parking areas shall be sealed with two (2) applications of coal tar pitch emulsion, meeting all requirements of federal specification R-P-355D. The first application shall be loaded with sand at a rate of 3-4 pounds of sand per gallon of sealer. Sealer shall not be diluted beyond the manufacturer’s recommendations. Rate of application shall meet the manufacturer’s recommendations.
 - 3.1.1.4 Asphalt will be placed in two (2) compacted lifts.
- 3.1.2. All new asphalt joints will be sealed with a nontracking, rubberized asphaltic crack filler. AC 20 will not be allowed. An oil bath, doubled jacket, agitated melting kettle shall be used for preparation of this product. “HiSpec” by W.R. Meadows or equal. All cracks ½” or larger.

3.2 Underground Utilities

- 3.2.1 The consultant shall lay out all cable, conduit, duct banks, piping and, in general, all underground work in a manner to avoid all existing trees, shrubs, etc., wherever possible. Avoid root structures of all plantings. Final layout must be approved by the University.

SECTION 02200 EARTHWORK: (Revised: March, 2009)

1 GENERAL

1.1 Scope of Work

- 1.1.1 Extent of earthwork is indicated on drawings.
- 1.1.2 Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials.

1.2 Quality Assurance

- 1.2.1 Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- 1.2.2 Testing and Inspection Service: Owner may engage soil testing and inspection service for quality control testing during earthwork operations.

1.3 Job Conditions

- 1.3.1 Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
 - 1.3.1.1 Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - 1.3.1.2 Do not interrupt existing utilities serving facilities occupied and used by Owner or others during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
 - 1.3.1.3 Provide minimum of 48 hour notice to Owner and receive written notice to proceed before interrupting any utility.
- 1.3.2 The use of explosives is not permitted on the site.
- 1.3.3 Protection of persons and property: Barricade open excavations occurring as part of this work and post excavations with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
- 1.3.4 Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- 1.3.5 Protection of plant material: Perform excavation, within drip line of large trees to remain, by hand and protect the root system from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

2 PRODUCTS

2.1 Soil Materials -- Definitions

- 2.1.1 Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, SM, SW, and SP. Satisfactory soil may include CL classified soil. However, contractor needs to obtain approval from the owner representative before import of soil to the site.
- 2.1.2 Unsatisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- 2.1.3 Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.

- 2.1.4 Backfill and Fill Materials: Satisfactory soil materials free of clay, rock, or gravel larger than 2” in any dimension, debris, waste, frozen materials, vegetable, and other deleterious matter.

3 EXECUTION

3.1 Excavation

- 3.1.1 Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- 3.1.2 Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner. Unauthorized excavation, as well as remedial work directed by Landscape Architect, shall be at the Contractor’s expense.
- 3.1.3 Under footings, foundation bases or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
- 3.1.4 Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by owner.
- 3.1.5 Additional Excavation: When excavation has reached required subgrade elevations, notify Owner, who will make an inspection of conditions.
- 3.1.6 If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Landscape Architect.
- 3.1.7 If removal of unsuitable bearing materials is encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by landscape architect.
- 3.1.8 Stability of excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.
- 3.1.9 Maintain sides and slopes of excavations in safe conditions until completion of backfilling.
- 3.1.10 Shoring and bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition.
- 3.1.11 Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
- 3.1.12 Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing excavation progresses.
 - 3.1.12.1 Provide permanent steel piling or pressure treated timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.
- 3.1.13 Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
- 3.1.14 Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, stumps, suction, and discharge lines and other dewatering system components necessary to convey water away from excavations.

- 3.1.15 Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run off areas. Do not use trench excavations as temporary drainage ditches.
- 3.1.16 Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill for fill. Place, grade, and shape stockpiles for proper drainage.
- 3.1.17 Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
- 3.1.18 Dispose of excess soil materials and waste material as herein specified.
- 3.1.19 Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form work, installation of services, other construction, and for inspection.
- 3.1.20 In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
- 3.1.21 Excavation for Pavements: Cut surface under pavements to comply with cross sections, elevations, and grades as shown.
- 3.1.22 Excavations for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.
- 3.1.23 Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups,
- 3.1.24 For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths.
- 3.1.25 For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive sub base, excavate to sub base depth indicated, or, if not otherwise indicated to 6" below bottom of work to be supported.
- 3.1.26 Except as otherwise indicated, excavate for exterior water bearing piping (water, steam, condensate, drainage) so top of piping is not less than 3' 0" below finished grade.
- 3.1.27 Grade bottoms of trenches as indicated, nothing under pipe bells to provide solid bearing for entire body of pipe.
- 3.1.28 Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level bottom of adjacent footing.
 - 3.1.28.1 Concrete is specified in DIVISION 3
- 3.1.29 Do not backfill trenches until tests and inspections have been made and backfill authorized by Owner. Use care in backfilling to avoid damage or displacement of pipe systems.
- 3.1.30 Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

3.2 Compaction

- 3.2.1 General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.
- 3.2.2 Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well defined moisture density relationship determined in accordance with ASTM D 1557.
 - 3.2.2.1 Structures, building slabs, steps, and pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum density.
 - 3.2.2.2 Lawn or unpaved areas: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density.
 - 3.2.2.3 Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum density.
- 3.2.3 Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
- 3.2.4 Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 3.2.4.1 Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.3 Backfill and Fill

- 3.3.1 General: Place acceptable soil material in layers to required subgrade elevations for each area classification listed below:
 - 3.3.1.1 Under grassed area, use satisfactory, excavated, or borrowed material.
 - 3.3.1.2 Under walks and pavements, use subbase material.
 - 3.3.1.3 Under steps, use subbase material.
 - 3.3.1.4 Under building slabs, use subbase material.
 - 3.3.1.5 Under piping and conduit, use subbase material where subbase is indicated; shape to fit bottom 90 degrees of cylinder.
- 3.3.2 Backfill excavations as promptly as work permits, but not until completion of the following:
 - 3.3.2.1 Acceptance of construction below finish grade including perimeter insulation.
 - 3.3.2.2 Inspection, testing, approval, and recording locations of underground utilities.
 - 3.3.2.3 Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structure or utilities, or leave in place if required.
 - 3.3.2.4 Removal of concrete formwork.
 - 3.3.2.5 Removal of trash and debris.
 - 3.3.2.6 Permanent or temporary horizontal bracing is in place on horizontally supported walls.

- 3.3.3 Ground Surface preparation: Remove vegetation, debris, unsatisfactory soil materials, obstruction, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- 3.3.4 When existing ground surface has a density less than that specified under “Compaction” for particular area classification, break up ground surface, pulverize, moisten, condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- 3.3.5 Topsoil: Topsoil is defined as friable clay loam surface soil found in depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 1 inch in diameter, and without weeds, roots, and other objectionable material.
- 3.3.6 Strip topsoil, from areas to be excavated or filled, to whatever depths encountered in a manner to prevent intermingling with underlying subsoil and other objectionable materials.
 - 3.3.6.1 Remove heavy growths of grass from areas before stripping.
 - 3.3.6.2 Stockpile topsoil in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind blown dust.
 - 3.3.6.3 Dispose of unsuitable or excess topsoil same as waste material, herein specified.
- 3.3.7 Placement and Compaction: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand operated tampers.
- 3.3.8 Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- 3.3.9 Place backfill and fill materials evenly adjacent to structures, piping, and conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping conduit, by carrying material uniformly around structure, piping, and conduit to approximately the same elevation for each lift.

3.4 Grading

- 3.4.1 General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- 3.4.2 Grading outside building lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- 3.4.3 Finish services free from irregular surface changes, and as follows:
 - 3.4.3.1 Lawn or unpaved areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 - 3.4.3.2 Walks: Shape surface of areas under walks to line, grade, and cross section, with finish not more than 0.10 foot above or below required subgrade elevation.
 - 3.4.3.3 Pavements: Shape surface of areas under pavement to line, grade, and cross, section, with finish surface not more than ½ inch above or below required subgrade elevation.

- 3.4.4 Grading surface or fill under building slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 0.5 inch when tested with a 10 foot straightedge.
 - 3.4.4.1 Hold rough grading down 4 inches from finish grade lines to allow for topsoil in lawn areas.
 - 3.4.4.2 Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.5 Pavement Subbase Course

- 3.5.1 General: Subbase course consist of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.
 - 3.5.1.1 See other DIVISION 2 specification sections for paving specifications.
- 3.5.2 Grade Control: During construction, maintain lines and grades including crown and cross slope of subbase course.
- 3.5.3 Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with compacting and rolling of each layer of subbase course.
- 3.5.4 Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
- 3.5.5 When a compacted subbase course is shown to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.6 Field Quality Control

- 3.6.1 Quality control testing during construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. All testing procedures are sole responsibility of contractor.

3.7 Maintenance

- 3.7.1 Protection of graded area: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- 3.7.2 Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- 3.7.3 Recondition completed compacted areas where they have been disturbed by subsequent obstructions.
- 3.7.4 Settling: Where settling is measureable is observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore clearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.8 Disposal of Excess and Waste Materials

- 3.8.1 Removal of designated areas on Owner's property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile or spread as directed by owner.

- 3.8.2 Remove waste materials, including unacceptable excavated material, trash, and debris and waste materials and dispose of it off Owner's property in a legal manner.

SECTION 02900 TURF AND GRASSES (Revised: March, 2009)

1 GENERAL

1.1 Definitions

- 1.1.1 Finish Grade: Elevation of finished surface of planting soil.
- 1.1.2 Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- 1.1.3 Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- 1.1.4 Subgrade: Surface or elevation of subsoil remaining after completing excavation or top surface of fill.
- 1.1.5 Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.2 Submittals

- 1.2.1 Product Data: For each type of product indicated.
- 1.2.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the bottom of botanical and common name and percentage by weight of each species and variety, and percentage or purity, germination, and weed seed. Include the year of production and date of packaging.
- 1.2.3 Qualification Data: For qualified landscape installer.
- 1.2.4 Planting Schedule: Indicating anticipated planting dates for each type of planting.
- 1.2.5 Maintenance Instructions: Recommended procedures to be established by owner for maintenance of lawns during calendar year. Submit before expiration of required initial maintenance periods.

1.3 Quality Assurance

- 1.3.1 Installer Qualifications: A qualified landscaper installer whose work has resulted in successful lawn establishment.
- a. Installers Field Supervision: Require installer to maintain an experienced full-time supervisor on project site when planting is in progress.
 - b. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to project site.
- 1.3.2 Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in type of tests to be performed.
- 1.3.3 Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

- a. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

1.4 Delivery, Storage, and Handling

- 1.4.1 Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.5 Project Conditions

- 1.5.1 Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
 - a. Spring Planting: April 1 to May 20.
 - b. Fall Planting: August 15 to October 1.
- 1.5.2 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.6 Maintenance Service

- 1.6.1 Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
 - a. Seeded Lawns: 60 days from date of Substantial Completion
(When initial maintenance period has not elapsed before end of planting season, or lawn is not fully established, continue maintenance during next planting season.)

2 PRODUCTS

2.1 Seed

- 2.1.1 Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology: Rules for Testing Seeds" for purity and germination tolerances.
- 2.1.2 Seed Species: State-certified seed of grass species, as follows:
 - a. Sun and Partial Shade-Irrigated Areas: Proportioned by weight as follows:
 - A. 1/6 Eclipse Kentucky Bluegrass
 - B. 1/6 Challenger Kentucky Bluegrass
 - C. 1/6 merit Kentucky Bluegrass
 - D. 1/6 Citation II Perennial Rye Grass
 - E. 1/6 Palmer Perennial Rye Grass
 - F. 1/6 Saturn Perennial Rye Grass
 - b. Sun and Partial to Full Shade-Nonirrigated areas: Percentage as follows:
 - A. 0.8% 3rd Millenium Tall Fescue
 - B. 0.8% 2nd Millenium Tall Fescue
 - C. 0.8% Focus Tall Fescue
 - D. 0.1% Bluegrass 85/80
 - E. 0.1% Perennial Ryegrass VNS
 - F. Purity- 97.67 Crop- 0.24 Inert- 2.09

2.2 Topsoil

- 2.2.1 Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
- a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well drained construction of mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.

2.3 Fertilizer

- 2.3.1 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, phosphorous, and potassium in the following composition.
- a. Composition: 18-24-12

2.4 Mulches

- 2.4.1 Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt, hay, or treshed straw of wheat, rye, oats or barley.
- 2.4.2 Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.5 Erosion-Control Materials

- 2.5.1 Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturers recommended steel wire staples, 6 inches long.

3 EXECUTION

3.1 Examination

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

3.2 Preparation

- 3.2.1 Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- a. Protect adjacent and adjoining areas from hydro seeding and hydro mulching overspray.
 - b. Protect grade stakes set buy others until directed to remove them.
- 3.2.2 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.

3.3 Lawn Preparation

- 3.3.1 Limit lawn subgrade to areas to be planted.

- 3.3.2 Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- a. Spread topsoil to a depth of 6 inches to meet finish grades, after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.
 - b. Rake topsoil before seeding operations to remove all rocks over ½ inch in diameter.
 - c. All lawn areas abutting curbs shall be properly compacted and prepared to prevent settlement of lawns behind curbs.
- 3.3.3 Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine textures. Grade to within plus or minus ½ inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- 3.3.4 Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- 3.3.5 Before planting, restore areas if eroded or otherwise disturbed after finish grading.

3.4 Preparation For Erosion-Control Materials

- 3.4.1 Prepare area as specified in "Lawn Preparation" Article.
- 3.4.2 For erosion-control mats, install planting mix into two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by manufacturer.
- 3.4.3 For erosion-control blanket or mesh, install from top slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- 3.4.4 Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 Seeding

- 3.5.1 Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- a. Do not use wet seed or seed that is moldy or otherwise damaged.
 - b. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

3.6 Newly Seeded Lawn

- 3.6.1 Sow seed at a total rate of 6 lbs. per 1,000 square feet for new lawns and existing lawn rate of 9 lbs per 1,000 square feet.
- 3.6.2 Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- 3.6.3 Protect seeded areas with slopes not exceeding 1:4 by spreading straw mulch. Spread uniformly to an approximate thickness of two straws to form a continuous blanket over seeded areas. Spread by hand, blower, or other suitable equipment.
- 3.6.4 Protect seeded areas from hot, dry weather or drying winds by applying topsoil within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a depth of 3/16 inch and roll surface smooth.

3.7 Hydro Seeding

- 3.7.1 Hydro seeding: Mix specified seed, fertilizer and fiber mulch in water using equipment specifically designed for hydro seed application. Continue mixing until uniform to a depth of 3/16 inch, and roll surface smooth.
- a. Mix slurry with nonasphaltic tackifier.
 - b. Apply slurry uniformly to all areas to be seeded in a one-step process.

3.8 Lawn Maintenance

- 3.8.1 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. Provide materials and installation the same as those used in the original installation.
- a. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
- 3.8.2 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.
- a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - b. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- 3.8.3 Mow lawn as soon as top of growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 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. Schedule initial and subsequent mowings to maintain the following grass heights:
- a. Mow grass to a height of 2 to 3 inches.

3.9 Satisfactory Lawns

- 3.9.1 Lawn installations shall meet the following criteria as determined by Architect:
- a. Satisfactory Seeded Lawn: 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 sports not exceeding 5 by 5 inches.
- 3.9.2 Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.10 Cleanup and Protection

- 3.10.1 Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- 3.10.2 Erect temporary fencing or barricades and warning signs as required, protecting newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.
- 3.10.3 Remove nondegradable erosion-control measures after grass establishment period.

SECTION 02925 PLANTS (Revised: March, 2009)

1 GENERAL

1.1 Definitions

- 1.1.1 Backfill: The earth used to replace or the act of replacing earth in an excavation.
- 1.1.2 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.
- 1.1.3 Balled and Potted Stock: Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of exterior plants required.
- 1.1.4 Bare-Root Stock: Exterior plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of exterior plant required.
- 1.1.5 Clump: Where three or more young trees were planted in a group and have grown together as a single tree having three or more main stems or trunks.
- 1.1.6 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 type and size of exterior plant required.
- 1.1.7 Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted exterior plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of exterior plant.
- 1.1.8 Finish Grade: Elevation of finished surface of planting soil.
- 1.1.9 Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil of planting soil.
- 1.1.10 Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.
- 1.1.11 Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- 1.1.12 Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- 1.1.13 Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.2 Submittals

- 1.2.1 Product Data: For each type of product indicated.
- 1.2.2 Samples for Verification: For each of the following:

- a. Edging materials and accessories, of manufacturer's standard size, to verify color selected.
- 1.2.3 Qualification Data: For qualified landscape installer.
- 1.2.4 Material Test Report: For imported topsoil.
- 1.2.5 Planting Schedule: Indicating planting dates for exterior plants.
- 1.2.6 Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.
- 1.2.7 Warranty: Sample of special warranty.

1.3 Quality Assurance

- 1.3.1 Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - a. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- 1.3.2 Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- 1.3.3 Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 - a. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorous, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- 1.3.4 Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
 - a. Selection of exterior plants purchased under allowances will be made by architect, who will tag plants at their place of growth before they are prepared for transplanting.
- 1.3.5 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. Take caliper measurements 6 inches above the ground for trees up to 4-inch caliper size, and 12 inches above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- 1.3.6 Observation: Architect or Owner may observe trees and shrubs either at a place of growth or at site before planting for compliance with requirements for genus, species, variety, size and quality. Architect or Owner retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1.4 Delivery, Storage, and Handling

- 1.4.1 Deliver exterior plants freshly dug.
 - a. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

- 1.4.2 Do not prune trees and shrubs before delivery except as approved by Architect or Owner. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery and handling.
- 1.4.3 Handle planting stock by root balls.
- 1.4.4 Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather and mechanical damage, and keep roots moist.

1.5 Project Conditions

- 1.5.1 Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - a. Spring Planting: March 15 to June 15.
 - b. Fall Planting: September 15 to November 15.
- 1.5.2 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed according to manufacturer's written instructions and warranty requirements.
- 1.5.3 Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Architect or Owner.
 - a. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.6 Warranty

- 1.6.1 Special Warranty: Installers standard form in which Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - Death and Unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control.
 - Structural failures including plantings falling or blowing over.
 - Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Warranty Periods from Date of Substantial Completion:
 - Trees and Shrubs: One year.
 - Ground Cover and Plants: One year.
 - c. Include the following remedial actions as a minimum:
 - Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - A limit of one replacement of each exterior plant will be required except for losses or replacements due to failure to comply with requirements.

- Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

1.7 Maintenance Service

- 1.7.1 Initial Maintenance Service for Trees and Shrubs: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Section 02925 Part 3 Execution for Trees and Shrubs ; begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below.
 - a. Maintenance Period: 60 days from date of Substantial Completion
- 1.7.2 Initial Maintenance Service for Ground Cover and Plants: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Section 02925 Part 3 Execution for Ground Cover; begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below.
 - a. Maintenance Period: 60 days from date of Substantial Completion
- 1.7.3 Owner Representative and Installer Representative inspect site monthly. Monitor health and landscape traits.

2 PRODUCTS

2.1 Tree and Shrub Material

- 2.1.1 General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- 2.1.2 Provide trees and shrubs of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- 2.1.3 Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- 2.1.4 Label at least one tree and one shrub of each variety and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
- 2.1.5 If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 Shade and Flowering Trees

- 2.2.1 Shade trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 - a. Provide balled and burlapped trees.
 - b. Branching height: One-half of tree height.
- 2.2.2 Small Upright Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
 - a. Stem Form: Single Trunk
 - b. Provide balled and burlapped trees.

2.3 Deciduous Shrubs

2.3.1 Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

- a. Shrub sizes indicated are sizes after pruning.
- b. Provide balled and burlapped shrubs.

2.4 Coniferous Evergreens

2.4.1 Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

- a. Provide balled and burlapped trees.

2.5 Broadleaf Evergreens

2.5.1 Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required by ANSI Z60.1.

2.6 Ground Cover Plants

2.6.1 Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

2.7 Topsoil

2.7.1 Topsoil: ASTM D 5260, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

- a. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay, lumps, and other extraneous harmful obstructions to plant growth.
 - Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.8 Fertilizer

2.8.1 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, phosphorous, and potassium in the following composition:

- a. Composition: 18-24-12

2.9 Mulches

2.9.1 Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

- a. Type: Shredded Hardwood.

2.10 Weed-Control Barriers

2.10.1 Nonwoven Fabric: Polypropylene or polyester fabric, 3 oz. / sq. yd. minimum.

2.11 Tree Stabilization Materials

2.11.1 Stakes and Guys:

- a. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
- b. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
- c. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

2.12 Landscape Edging

2.12.1 Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

- a. Border Concepts, Inc.
- b. Collier Metal Specialties, Inc.
- c. Russell, J.D. Company (The)
- d. Sure-Loc Edging Corporation

2.12.2 Edging Size: 3/16 inch wide by 4 inches deep.

2.12.3 Stakes: Tapered steel, a minimum of 12 inches long.

2.12.4 Accessories: Standard tapered ends, corners, and splicers.

2.12.5 Finish: Standard Point.

2.12.6 Paint Color: Black.

2.13 Miscellaneous Products

2.13.1 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.

2.13.2 Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4-inch-wide minimum, with stretch factor of 33 percent.

2.13.3 Planter Filter Fabric: Woven or nonwoven geotextile manufactured for separation applications and made of polyolefin, or polyester fibers or combinations of them.

3 EXECUTION

3.1 Examination

3.1.1 Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance.

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

3.2 Preparation

- 3.2.1 Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- 3.2.2 Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff airborne dust to adjacent properties and walkways.
- 3.2.3 Lay out exterior plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
- 3.2.4 Trunk wrapping: Inspect tree trunks for injury, improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.
- 3.2.5 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.
 - a. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- 3.2.6 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.

3.3 Planting Bed Establishment

- 3.3.1 Loosen subgrade of planting beds to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - a. Apply superphosphate fertilizer directly to subgrade before loosening.
 - b. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively dry.
- 3.3.2 Finish Grading: grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- 3.3.3 Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

3.4 Excavation For Trees and Shrubs

- 3.4.1 Pits and Trenches: 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.
 - a. SEE DIG PERMIT/EXCAVATION LOCATED IN BACK
 - b. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
 - c. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - d. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.
- 3.4.2 Subsoil removed from excavations may be used as backfill.
- 3.4.3 Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

- a. Hardpan layer: Drill 6-inch diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free draining material.
- 3.4.4 Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- 3.4.5 Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 Tree and Shrub Planting

- 3.5.1 Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.
- 3.5.2 Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
 - a. Remove burlap and wire baskets from tops of root balls and partially 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.
 - b. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- 3.5.3 Set container-grown stock plumb and in center of pit or trench with top of root ball 1 inch above adjacent finish grades.
 - a. Carefully remove root ball from container without damaging root ball or plant.
 - b. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- 3.5.4 Set and support bare-root stock center of pit or trench with trunk flare 1 inch above adjacent finish grade. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots. Tamp final layer of backfill. Remove injured roots by cutting cleanly; do not break.
- 3.5.5 Organic Mulching: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.
- 3.5.6 Trunk Wrapping: Inspect tree trunks improper pruning, and insect infestation; take corrective measures required before wrapping. Wrap trees of 2-inch caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling.

3.6 Tree and Shrub Pruning

- 3.6.1 Remove only dead, dying, or broken branches. Do not prune for shape.
- 3.6.2 Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character.

3.7 Tree Stabilization

- 3.7.1 Guying and Staking: Guy and stake trees exceeding 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches long, driven to grade.

- a. For trees more than 6 inches in caliper, anchor guys to pressure-preservative-treated deadmen 8 inches in diameter and 48 inches long buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
- b. Support trees with bands for flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
- c. Support trees with strands of cable or multiple strands of tie wire encased in hose sections at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
- d. Attach flags to each guy wire, 30 inches above finish grade.

3.8 Ground Cover and Plant Planting

- 3.8.1 Set out and space ground cover and plants as indicated.
- 3.8.2 Dig holes large enough to allow spreading of roots and backfill with planting soil.
- 3.8.3 Work soils around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- 3.8.4 Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- 3.8.5 Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting.

3.9 Planting Bed Mulching

- 3.9.1 Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches.
 - a. Material and Steam Treatment: Nonwoven fabric with seams pinned.
- 3.9.2 Mulch backfilled surfaces of planting beds and other areas indicated. Provide mulch ring around trees in lawn areas.
 - a. Organic Mulch: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.10 Edging Installation

- 3.10.1 Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

3.11 Plant Maintenance

- 3.11.1 Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring plant saucers, adjusting and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
- 3.11.2 Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

3.12 Cleanup and Protection

- 3.12.1 During planting, keep adjacent paving and construction clean and work area in orderly condition.

- 3.12.2 Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.13 Disposal

- 3.13.1 Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

SECTION 02950 LAWN IRRIGATION SYSTEM (Revised: March, 2009)

1 GENERAL

2 PRODUCTS

- 2.1 Materials:** The materials chosen for the design of the sprinkler system have been specifically referred to by the manufacturer so as to enable the University to establish the level of quality and performance required by the system design. Equipment by other manufacturers may be used only if approved by the Director of the Grounds Maintenance Department.
- 2.2 Copper Pipe and Fittings:** All copper pipe and fittings used shall meet all local plumbing codes.
- 2.3 Polyethylene Pipe:** Secondary lines -- All polyethylene pipe specified on the plan shall be NSF approved and shall have a working pressure of 100 psi. All polyethylene pipe shall be continuously and permanently marked with the manufacturer's name, material, size, and schedule.
- 2.4 PVC Pipe – Main Line:** All PVC pipe specified on the plan shall be high impact, poly-vinyl chloride (PVC) pipe, having a working pressure of 100 psi or Schedule 40. All pipes shall meet or exceed ASTM standard 1120 ASTM-1785. All PVC pipe shall be continuously and permanently marked with manufacturers name, material, size, schedule, and ASTM standard.
- 2.5 Polyethylene Pipe Fittings:** Plastic type insert fittings shall be used and double clamped with stainless steel clamps.
- 2.6 PVC Pipe Fittings:** PVC, Schedule 40 socket type or compression type fittings shall be used as specified on the plan.
- 2.7 Sprinkler Risers**
- 2.7.1 Sprinklers of poly PVC pipe shall be installed with one of the following types of risers:
- a. 3 elbow swing joints made of Marlex 90 ells MPT x FPT connecting the side outlet of the pipe to the sprinkler.
 - b. Barbed fittings with Rainbird Funny Pipe or approved equal.
 - c. Schedule 80 PVC nipples.
- 2.7.2 Riser types to be used will be detailed on plan.
- 2.7.3 Teflon tape shall be used on all threaded connections.
- 2.8 Manual Valves:** All manual valves shall be brass.

- 2.9 Hydraulic Remove Control Valves:** Valves for use in hydraulically controlled automatic control systems shall be specified on the plans and manufactured by the Toro Co. or approved equal. These types shall be used in conjunction with well water or pumping systems.
- 2.10 Electric Remote Control Valves:** Electric valves shall be used as specified on the plans and manufactured by the Toro Co. or approved equal. The valves shall be normally closed diaphragm type with slow opening and closing action. Actuation shall be by encapsulated type solenoid rated 24 volts, 60-50 cycle, 2.0 watts minimum. Accessibility of functional parts shall be provided without removal of valve from plumbing system. Manual flow control adjustment shall provide shut-off provision. External bleed shall be provided to enable manual operation. Threads shall be female pipe inlet and outlet. Size and flow direction shall be indicated on an external surface. These types shall be used in conjunction with city water.
- 2.11 Quick Coupler Keys:** Contractor shall provide quick couplers at locations as approved in plans. A minimum of 2 keys appropriate to the quick couplers shall be provided to the Grounds Maintenance Dept.
- 2.12 Valve Boxes:** Valve boxes shall be a 10" x 15" x 12" AMETEK box or approved equal. Valve box extensions shall be compatible. Color shall be evergreen and box shall be vandal proof. Special tools needed to remove cover shall be provided.
- 2.13 Communications Circuitry**
- 2.13.1 Hydraulic: All control tubing shall be polyethylene tubing as manufactured by the Toro Co. or approved equal. All control tubing shall be rated for a maximum continuous working pressure of 200 psi and have 1/4" O.D. +/- .005 and a 1/8" I.D. +/- .003". All tubing connections shall be brass compression couplings or tees utilizing self-aligning brass females, secured by 1/4" Cicolac retainers as manufactured by the Toro Co.
- 2.13.2 Electric: Electric control lines from each controller to the automatic valves shall be direct burial type and placed in the same trench as the water supply to the sprinkler.
- a. Wire used to connect the automatic remote valves to the controller shall be 600 volt, single conductor with poly insulation and have UL approval to type PE. Minimum gauge acceptable is #16 and minimum ground wire gauge is #14. Colors for wire shall be different from black and white used on 115 volts A.C. Power.
 - b. All ground wire splices shall be made watertight using DBY splice kits or thermocaps depending on the size wire.
 - c. All wire shall be spliced only at valve and tee locations. Wiring shall be bundled together at intervals of 10 ft. and expansion curls (as specified in Sec. III) shall be provided within 3' of a solenoid and at least every 300' in length.
- 2.14 Shrub and Lawn Sprinkler Heads**
- 2.14.1 All full and part circle sprinklers shall be a fixed spray or gear driven sealed unit as per the Toro or Hunter Companies. The body of the sprinkler shall be constructed of Cicolac material and the sprinkler shall be easily serviced from the top. It shall have an accessible screening device and shall perform to the manufacturer's specifications with regard to the diameter of throw and gallons per minute at a given pressure. Spacing of heads shall not exceed the manufacturer's maximum recommendation. Matched precipitation will be required on all full and part circle sprinklers operating on the same zone.
- 2.14.2 All sprinkler heads shall be located a minimum of 4" from sidewalks, buildings, etc.
- 2.15 Control Equipment**
- 2.15.1 Solid state automatic controllers shall be as specified on the plans and as manufactured by the Toro Company. The controller shall be totally solid state. Each station shall have an independent time control with up to 60 minutes maximum per station. Changes on station timing and program

start time shall be easily made without interfering with set program. The controller operation shall provide rapid advance between stations and a manual override on each station for manual operation. The controller shall provide for schedules up to 2 weeks and permit multi-cycle operator as often as 3 times per day.

- 2.15.2 The controller shall be capable of operating 24v AC electric remote control valves. The controller shall have an active day light with timing accurate to 1 minute per month.
- 2.15.3 The wall mount type controller cabinet shall be of injection molded high impact plastic which shall resist corrosion and provide for an attractive appearance. The door shall be mated with the other cabinet parts and made of the same material. Location of the controller subject to approval of the Grounds Department.
- 2.15.4 A rain sensor shall be provided with the system.
- 2.15.5 Surge protection devices are not effective unless there is a good grounding electrode located at each control location. This ground rod must be capable of discharging a lightning stroke containing several thousand amps, from 20,000 to 100,000 amperes, still protecting the controller and solenoids from costly damage.

2.16 Backflow Prevention Units: Backflow prevention units shall be as per local codes and manufactured by the Febco or Watts Co.

2.17 Thrust Blocks: Thrust blocks shall be installed at all fittings as per plans where unbalanced water pressure may exist. Concrete shall be poured between the fittings and an adjacent undisturbed trench wall in such a manner to prevent any pulling apart or movement of the pipeline.

2.18 Drains: Where systems must be winterized to prevent freeze damage, a quick coupler will be required at the location at or near the water source to facilitate blowing all trapped water out of the system.

2.19 Grounding Devices: All controllers will be grounded to meet all local applicable codes.

3 EXECUTION

3.1 Staking: The contractor shall stake the location of each run of pipe and all sprinkler heads or sprinkler valve locations prior to trenching. Before installation is started in any given area, the Owner's representative shall be notified for review of field layouts.

3.2 Trenching and Backfilling

- 3.2.1 The contractor shall do all necessary excavating and backfilling required for the proper installation of the work.
- 3.2.2 On sodded areas the contractor will remove and replace sod where possible from the trench area to the necessary width and depth required to facilitate his installation.
- 3.2.3 Mainline PVC should have a minimum depth of 18". Laterals should have a minimum depth of 12". Pipe should be laid on sub-base uniformly sloped without humps or depressions.
- 3.2.4 All backfill material shall be free from rocks and non soil material to prevent damage to the pipe and wire. Backfilling trenches containing plastic pipe should be done when the pipe is cool to avoid excessive contraction in cold weather. All backfill material will be compacted in 6" lifts as it is brought up to finish grade so as to insure no settling results.

3.3 Installation

- 3.3.1 All pipe, fittings, valves, etc., shall be carefully placed in the trenches with concrete thrust blocks to be poured to all fittings and valves where required for proper operation. Interior of pipes shall be kept free from dirt and debris, and when pipe laying is not in progress, open ends shall be temporarily sealed.
- 3.3.2 Plastic pipe shall be installed in such a manner so as to provide for expansion/contraction as recommended by the manufacturer.
- 3.3.3 All plastic pipes to sprinkler heads, which are not immediately connected shall be installed with an excess stub which extends above ground so as to mark locations of sprinkler heads. These ends shall be temporarily sealed so as to keep dirt/debris from entering into the pipe. All fittings shall be double clamped.
- 3.3.4 Plastic pipe shall be cut with a hand saw with the assistance of a square in a sawing vice, or other manner to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth unobstructed flow will be obtained.
- 3.3.5 All plastic shall be installed in dry weather temperature is above 40°F. All PVC plastic to PVC plastic joints shall be solvent weld joints. All plastic to metal joints shall be made with plastic male adapters. The solvent weld joints shall be made in the following manner:
 - a. Thoroughly clean the mating pipe/fitting with cleaner and apply primer.
 - b. Apply uniform coat of solvent to the outside of the pipe with an approved applicator.
 - c. Apply solvent to the fitting in a similar manner.
 - d. Re-apply a light coat of solvent to the pipe and quickly insert it into the fitting.
 - e. Give the pipe or fitting a quarter turn to insure even distribution of the solvent and to make sure the pipe is inserted to the full depth of the fitting socket.
 - f. Hold in position for 15 seconds.
 - g. Wipe off excess solvent which appears at the outer shoulder of the fitting.
- 3.3.6 Care should be taken so as not to use an excess amount of solvent, thereby causing an obstruction to form on the inside of the pipe.
- 3.3.7 The joints shall be allowed to set at least 24 hours before pressure is applied to the system on PVC pipe.

3.4 Electrical Installation

- 3.4.1 The contractor will be required to make connections to the building systems as is required for the proper operation of the automatic control system.
- 2.4.2 All control circuitry, whether electrical or hydraulic, passing through the wall of the building or beneath the sidewalk, road, or drive, shall be installed in a suitable sleeve; whereas in all other locations they shall be installed in the pipe trench and protected by the pipe whenever possible.
- 2.4.3 The joining of all underground wire shall be as per specification 1.13 in this section.
- 2.4.4 Expansion curls shall be provided within 3 feet of each wire connection to a solenoid and at least every 300 feet in length. Expansion curls are easily formed by wrapping at least 5 turns of wire around a rod or pipe 1" or more in diameter, then withdrawing the rod.

3.5 Sample Program

- 3.5.1 A sample watering program shall be set up by the Contractor and tested in the presence of the Owners Representatives. All stations should be operated for 2.5 minutes for 1 complete cycle. The cycle shall then be repeated and all values checked to insure proper operation.
- 3.5.2 Defective components shall be required or replaced immediately.

- 3.5.3 If, in the opinion of the Owner's Representatives, the system is not operating properly, additional testing may be ordered. The additional testing will be the obligation of the Contractor and at no cost to the Owner.
- 3.5.4 The Contractor will place the final irrigation program on the Controller after test operation. The program will be supplied by the Owner's Representatives.

3.6 Adjustments: Adjustments shall be made on all sprinkler heads/automatic equipment by the contractor. Adjustments shall be made to perform optimum performance of each separate item.

3.7 Testing

3.7.1 General

- a. Individual components shall be tested as required.
- b. All equipment for testing shall be provided by the Contractor. Further tests may be required by the Owner if, in his opinion, the system does not appear to be properly installed.
- c. All costs of testing will be the obligation of the Contractor.

3.7.2 Pipe Lines

- a. After each zone of the irrigation system is completed it shall be thoroughly flushed prior to the attachment of sprinkler heads. After the flushing is complete, all valves shall be closed and a pressure of 100 psi (pressure regulating valve supplied by Contractor for testing purposes), as controlled by the pressure regulating valve, shall be allowed to enter the system. This static pressure shall be held for 1 hour and shall be measured at the lowest (elevation) quick coupling valve in the zone under test. Next, all sprinkler heads in the system shall be randomly operated. This will create certain areas of surges and unbalanced pressures. After the testing of the sprinkler heads, all pipe lines will be inspected for any leaks and such leaks shall be repaired.
- b. The inlet pressure at the pressure regulating valve shall be increased to 150 psi, and this pressure shall be held for 1 hour as measured at the lowest (elevation) quick coupling valve.
- c. All pipe line tests shall be performed in the presence of the Owners representative.

3.8 Start-Up and Shutdown of System

3.8.1 Drainage of system in the first fall, following acceptance of the installation shall be the total responsibility of the Contractor.

3.8.2 The Contractor shall start up the system in the spring following the fall drainage.

3.9 As-Built Drawing: After completion of the installation, the Contractor shall furnish an "as-built" drawing showing all sprinkler heads, valves, drains, pipelines, quick couplers and locations to scale with dimensions where required. Instruction sheets and parts lists covering all operating equipment will be bound into a folder and furnished to the Owner in duplicate. Copies to be distributed to Grounds Department and Space Planning Department.

3.10 Instructions: After completion/testing of the system, the Contractor will instruct the Owner's personnel in the proper operation/maintenance of the system.

4 WARRANTY

**4.1 Parts and labor 1 full year from acceptance
Parts 2 years from acceptance**

SITE FURNISHINGS AND AMENITIES

1 RECOMMENDATIONS

- 1.1 Utilize site furnishings** and amenities that are attractive to look at and that complement the Campus Architecture.
- 1.2 Site furnishings and amenities** should have a consistent design, style and appearance. This consistency could be different from one area of Campus to one another, but consistent within each area, i.e., site furnishings and amenities within the Centennial Mall could be different than furnishings and amenities in the Engineering Complex or at Scott Park Campus.
- 1.3 Use site furnishings and amenities** made of durable materials to withstand extensive use and reduce maintenance issues, weather conditions and vandalism.
- 1.4 Site furnishings and amenities** should be comfortable and inviting.

2 LOCATION

- 2.1 Locate site furnishings** at natural gathering points (e.g., building entrances, Campus gateways, plazas, major pedestrian intersections), and periodically along pathways to provide a “rest stop” or a place for more intimate activities (such as studying, reading, conversation.)

3 SOURCE:

- 3.1 Recommend manufacturers** and/ or supplier equal products should be considered for every project.
 - a. “Donor Bench” for Centennial Mall area: manufacturer- Smith and Hawken. ; Model- Giverny 6’, surface mount



b. Bench Standard outside of Mall and Commons Area:

gretchen's™ bench collection

U.S. net prices

<i>description</i>	PolySite™ <i>price (ship.wt.)</i>	Ipe* no finish <i>price (ship.wt.)</i>	Redwood no finish* <i>price (ship.wt.)</i>	Jarrah no finish <i>price (ship.wt.)</i>	Red Oak LF-80 finish* <i>price (ship.wt.)</i>	Jarrah LF-80 finish <i>price (ship.wt.)</i>
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Backless Bench

To order: Specify collection name, model description, PolySite™ or wood. For wood, specify jarrah, ipe, or redwood for exterior use; red oak or jarrah with LF-80 finish for interior use. For PolySite, specify color. Available freestanding/surface mount only. Specify powdercoat color for metal components.

Gretchen's Bench, Backless, 72" 22" x 17" x 72"	\$ 930 (145)	\$ 940 (165)	\$ 1030 (95)	\$ 1030 (110)	\$ 1030 (110)	\$ 1260 (125)
Gretchen's Bench, Backless, 96" 22" x 17" x 96"	N/A	1090 (205)	1190 (125)	1190 (145)	1190 (145)	1420 (165)

Option

Special Stain on Red Oak \$230/bench



backless bench

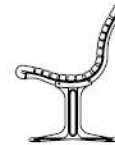
Backed Bench - without Armrests

To order: Specify collection name, model description, PolySite™ or wood. For wood, specify jarrah, ipe, or redwood for exterior use; red oak or jarrah with LF-80 finish for interior use. For PolySite, specify color. Specify freestanding/surface mount or wall mount support. Specify powdercoat color for metal components.

Gretchen's Bench, Backed, without Armrests, 72" / 25" x 32" x 72"	\$ 1070 (160)	\$ 1200 (190)	\$ 1330 (110)	\$ 1330 (125)	\$ 1330 (125)	\$ 1560 (140)
Gretchen's Bench, Backed, without Armrests, 96" / 25" x 32" x 96"	N/A	1370 (235)	1540 (145)	1540 (160)	1540 (160)	1770 (175)

Option

Special Stain on Red Oak \$230/bench



backed bench without armrests

Backed Bench - with Armrests

To order: Specify collection name, model description, PolySite™ or wood. For wood, specify jarrah, ipe, or redwood for exterior use; red oak or jarrah with LF-80 finish for interior use. For PolySite, specify color. Specify freestanding/surface mount or wall mount support; ornamental or loop armrest. Specify powdercoat color for metal components.

Gretchen's Bench, Backed, with Armrests, 72" / 25" x 32" x 72"	\$ 1260 (165)	\$ 1390 (195)	\$ 1520 (115)	\$ 1520 (130)	\$ 1520 (130)	\$ 1750 (145)
Gretchen's Bench, Backed, with Armrests, 96" / 25" x 32" x 96"	N/A	1560 (240)	1730 (150)	1730 (180)	1730 (180)	1960 (190)

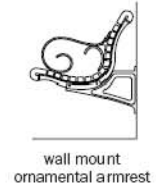
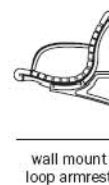
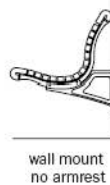
Option

Special Stain on Red Oak \$230/bench



backed bench with loop armrests

Available support options:



* FSC certified wood available for 25% upcharge. Call for a quote.

- c. Bike Rack: Manufacturer- The Derovations Corp.; Model- 'Swerve Rack', embedded ;Color- Powder Coated Black



- d. Trash Receptacle: See below, page 30

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Tomorrow's Waste Solutions Today. SM

Decorative Litter Containers

- " More economical than traditional metal/concrete litter containers.
- " Attractive upscale granite colors look like natural stone and won't fade or scratch off.
- " Rugged Rim[®] ensures a long, functional life.
- " Base can be weighted to deter theft and increase stability.
- " Large capacity is ideal for high volume areas and require less frequent servicing by sanitation crews.
- " Permanently attached lids ensure that lids won't get lost or stolen.
- " Capacity: 45 gallon
- " Color: Graystone
- " Size: 27.25" x 27.25" x 46.50"
- " Load Rating: 150 lbs.



Special Offer \$349.00 each

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e. Recycle Container:



The One-in-One Super Sorter



The Super Sorter One-In-One's small convenient size makes it perfect for an indoor or outdoor area where space is limited. This container uses space efficiently and can be incorporated into any location. The One-In-One is attractive, durable, low maintenance and is suited for any centralized recycling or waste collection. The sloped lid eliminates "on top" waste. Available in various colors and with multiple opening options.

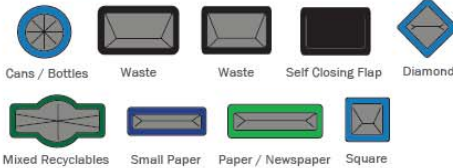
Features:

- Designed for public areas
- Will not rust or dent
- Side hinged lid makes for easy opening against walls
- Sloped lid eliminates "on top" waste



MADE WITH A MINIMUM
35% RECYCLED CONTENT

Openings:



Super Sorters are lockable to prevent tampering



Side hinged lid allows for easy opening against walls



Three other size options available

Specifications:

- 30 Gallon Size
- Weight: 37 lbs
- Dimensions 20.5"L x 15.75"W x 44.5"H

Accessories:

- Hard & Soft ground mounts
- Optional wheels
- Advertising Signage

Stamping for Openings:

- Plate charge: \$95 one time charge

Shipping:

- 10 per skid
- Skid Weight: 300 lbs.
- Skid Dimensions: 40"L x 46"W x 88"H

Stock Colors:



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- f. Bollards Permanent: Manufacturer- Canterbury International; Model- Octagon Ballard (13" base x 42" height)



- g. Tables: Manufacturer- Victor Stanley; Model- Center Post Square Table-IP-4, Surface Mount-Similar to Homestead Series; Color- Powder coat Bronze

