

## **SECTION 015639**

### **TEMPORARY TREE AND PLANT PROTECTION**

#### **PART 1 - GENERAL**

##### **1.1 DEFINITIONS**

- A. Diameter at Breast Height (DBH): the diameter of a tree trunk at breast height measured in inches.
- B. Critical Root Zone (CRZ): The ground area around a tree or woody plant trunk equal in diameter to the DBH multiplied times three feet per inch ( $RZ = DBH \times 3\text{-ft/in}$ ).
  - 1. Example: A tree with a 10-inch DBH would have a root zone of 30 feet ( $10'' \times 3'/1'' = 30'$ )
- C. Protected Root Zone (PRZ): The portion of a root zone that shall not be disturbed in any way by construction activities. This area shall be indicated on the plans and permanently fenced from access during the entire construction period.

##### **1.2 SECTION INCLUDES**

- A. Requirements to preserve, protect, and prune as necessary existing trees and shrubs, and other vegetation indicated to remain.
- B. All trees and plant materials to remain on site shall be protected from all trades working on the job, and it shall be the Contractor's responsibility to ensure that all subcontractors are aware of and held responsible for any damage to existing trees and plant material. In addition, Contractor shall be held responsible to insure that following protective measures are carried out throughout the entire construction period.
- C. Maintenance: Throughout the life of the construction project, the Contractor shall be responsible for overseeing the watering, fertilizing, pruning, and other measures necessary to protect all existing trees, lawns, shrubs, groundcover and other plants.

##### **1.3 RELATED REQUIREMENTS**

- A. Storm Water Prevention Pollution Plans.
- B. Landscaping specifications related to trees, shrubs and ground covers, as applicable.

## 1.4 QUALITY ASSURANCE

- A. Arborist: Contractor shall engage and pay a Certified Arborist who will be responsible for supervising implementation of tree and plant protection measures specified in this Section.
  - 1. Arborist shall be subject to acceptance by Owner's Representative.
  - 2. Arborist registered by the American Society of Consulting Arborists.
  - 3. Submit evidence contract with acceptable Certified Arborist prior to commencing site mobilization activities.

## PART 2 - PRODUCTS

### 2.1 BARRIERS

- A. Barriers: As specified in Drawings.

### 2.2 FERTILIZER

- A. Fertilizer: Unless otherwise directed by Owner's Representative, type and quantity of fertilizer shall be determined by soil agronomist engaged and paid by Contractor, who is acceptable to Owner's Representative.

### 2.3 MULCH

- A. Mulch used for protecting root zones from compaction shall be coarsely shredded hardwood mulch.

### 2.4 ACCESSORY MATERIALS

- A. Accessory Materials: As determined by Contractor as necessary for sustained health of trees and plants, subject to acceptance by Owner's Representative. Accessory materials may include mulch, tree and plant stakes, and temporary covers.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Protection: Contractor shall submit to Owner's Representative evidence of a contract with a Certified Arborist who shall supervise the implementation of the following tree protection measures.
  - 1. Prior to construction activities, especially demolition and excavation, erect fencing as indicated on plans to protect all existing trees, shrubs and ground

covers from stockpiling, material storage including soil, vehicle parking and driving, foot traffic and all other construction activities within the Protected Root Zone.

2. Protect Protected Root Zone of existing trees, shrubs, and ground covers from damage due to chemically injurious materials in solution caused by runoff and spillage during mixing, placement of construction materials, and drainage from stored materials.
3. Protect Protected Root Zone from flooding, erosion, excessive wetting and drying resulting from de-watering and other operations.
4. Above-ground surface runoff shall not be directed into the tree Protected Root Zone from adjacent areas. Ensure that sidewalks or other construction do not trap water near the tree. Coordinate with requirements specified in in Technical Specifications 02100 Site Preparation, 02200 Earthwork, 02270 Erosion Control, and 02721 Pipes and Storm Sewer.
5. Protect existing plant materials from unnecessary cutting, breaking, and skinning of roots and branches, skinning and bruising of bark.
6. Use no soil sterilants under pavement near existing trees.
7. Do not allow fires under and adjacent to existing trees or plants.
8. If vehicle or equipment access cannot be accomplished without impacting a Protected Root Zone, apply and maintain a 12-inch layer of shredded hardwood mulch to limit soil compaction.

- B. Maintenance: Throughout duration of the Contract, Contractor shall be responsible for irrigation, fertilizing, pruning, and other measures necessary to protect and nurture all existing trees, plants, ground covers and lawns indicated to remain in Project.

### 3.2 PRUNING

- A. Engage the Consulting Arborist registered by the American Society of Consulting Arborists, or approved equal. Arborist shall direct removal of branches from trees and large shrubs, and correctional pruning and cabling of specified trees that are to remain, if required to clear new construction and where indicated. Arborist shall also direct necessary tree root pruning and relocation work.
- B. Cut branches and roots with sharp pruning instruments. Do not break, chop, or mutilate.
- C. Tree limbs in the way of proposed improvements shall only be trimmed by reputable ISA Certified Arborist or ISA Certified Climber and shall be approved by Owner's Representative.

### 3.3 EXCAVATION AROUND TREES

- A. Excavate within Protected Root Zones of trees only where indicated.

- B. If trenching for utilities is required within Protected Root Zones, tunnel under and around roots of 2 1/2" diameter or larger by hand digging. Do not cut main lateral roots that are 2" or larger. Roots smaller than two-inch diameter that interfere with installation of new work may be cut with sharp approved pruning tools. Pipes should be routed to alternate locations to avoid conflict, wherever possible.
- C. Where excavating for new construction is required within Root Zones that are not protected, hand excavate as necessary to minimize damage to root systems. Use narrow tine spading forks and comb soil to expose roots. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking.
- D. If encountered immediately adjacent to location of new construction and relocation is not practical, cleanly cut roots approximately six (6) inches back from new construction.
- E. Do not allow exposed roots to dry out before permanent backfill is placed. Provide temporary earth cover, pack with wet peat moss or four (4) layers of wet untreated burlap and temporarily support, and protect from damage until permanently relocated and covered with backfill. Water backfill to eliminate voids and air pockets.
- F. Thin branching structure in accordance with ISA Pruning Standards to balance loss to root system caused by damage or cutting of root system. Thinning shall not exceed 30% of existing branching structure.

### 3.4 GRADING AND FILLING AROUND TREES

- A. Maintain existing grade within Protected Root Zone of trees unless otherwise indicated.

### 3.5 REPAIR AND REMOVAL OF TREES

- A. Repair and Removal of Trees: Certified Arborist and Owner's Representative will determine whether trees shall be restored or removed. Treat and restore trees damaged by construction operations in a manner acceptable to Owner's Representative. Perform restoration and pruning promptly after damage occurs to prevent progressive deterioration of damaged trees. If trees cannot be restored, equitable adjustment to Contract Sum shall be made to compensate Owner for loss, in accordance with the 10th Edition, Revised of the Guide for Plant Appraisal by the Council of Tree and Landscape Appraisers or by an equivalent method approved by the International Society of Arboriculture.
  - 1. Remove dead and damaged trees that are determined by Certified Arborist to be incapable of restoration to normal growth pattern.
  - 2. Contractor shall be liable for all damage and necessary restoration actions to existing trees, including trunk, branches, or roots. Restoration shall be performed under direction of Certified Arborist.

### 3.6 REPAIR AND REPLACEMENT OF SHRUBS AND GROUND COVER

- A. Repair shrubs and other vegetation, intended to remain in place, damaged by construction operations in a manner acceptable to Owner Representative. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged plant.
- B. Remove and replace all dead and damaged plants that are determined by the Owner Representative to be incapable of restoration to normal growth pattern.
  - 1. Provide new shrubs of same size and species as those replaced or as acceptable to the Owner Representative.
  - 2. Plant and maintain as specified under Division 32.
- C. Repairs and Replacements of Shrubs and Ground Cover: Repair shrubs and other vegetation damaged by construction operation in manner acceptable to Owner's Representative.
  - 1. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged plant. Remove and replace all dead and damaged plants up to six-inch diameter, which are determined by Owner's Representative as being incapable of restoration to normal growth pattern.
  - 2. Provide new shrubs of same size and species as those replaced or as acceptable to the Owner's Representative.

### 3.7 COMPENSATION TO OWNER FOR LOST AND DAMAGED TREES

- A. The Contractor shall be liable for the loss in value to damaged trees and for all repair or replacement costs resulting from construction operations as determined by the Owner Representative. Because of the irreplaceable nature of many of the existing trees, the amount of assessment shall be determined by the Owner Representative, depending upon tree species, condition before damage, and location value.
- B. Designated sums shall be governed by applicable provisions of the Contract General Conditions.

## PART 4 - MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. No separate measurement shall be made for Temporary Tree and Plant Protection

### 4.02 PAYMENT

- A. This work shall be considered incidental to the Site Grading

**\*\*\*END OF SECTION\*\*\***

## **SECTION 329115**

### **SOIL PREPARATION (PERFORMANCE SPECIFICATION)**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes planting soils specified according to performance requirements of the mixes.
- B. Related Requirements:
  - 1. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
  - 2. Section 329300 "Plants" for placing planting soil for plantings.

##### **1.2 DEFINITIONS**

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
- G. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- H. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- I. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

- J. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- K. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- L. SSSA: Soil Science Society of America.
- M. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- N. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- O. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- P. USCC: U.S. Composting Council.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include recommendations for application and use.
  - 2. Include test data substantiating that products comply with requirements.
  - 3. Include sieve analyses for aggregate materials.
  - 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
    - a. Manufacturer's qualified testing agency's certified analysis of standard products.
    - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.
- B. Samples: For each bulk-supplied material, one (1)-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical



of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
- B. capability to conduct the testing indicated; and that specializes in types of tests to be performed.
  - 1. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

## 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing on-site soil and imported soil.
  - 1. Notify Landscape Architect seven (7) days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
- C. ndment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
  - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

## 1.8 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Landscape Architect or state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.
  - 1. Number and Location of Samples: Minimum of three (3) representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
  - 2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
  - 3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
  - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

## 1.9 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
  - 1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
    - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
    - b. Hydrometer Method: Report percentages of sand, silt, and clay.
  - 2. Bulk Density: Analysis according to core method and clod method of SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  - 3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  - 4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  - 5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D 698 (Standard Proctor).
- C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
  2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
  3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
  4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT NCR-13, including the following:
1. Percentage of organic matter.
  2. CEC, calcium percent of CEC, and magnesium percent of CEC.
  3. Soil reaction (acidity/alkalinity pH value).
  4. Buffered acidity or alkalinity.
  5. Nitrogen ppm.
  6. Phosphorous ppm.
  7. Potassium ppm.
  8. Manganese ppm.
  9. Manganese-availability ppm.
  10. Zinc ppm.
  11. Zinc availability ppm.
  12. Copper ppm.
  13. Sodium ppm and sodium absorption ratio.
  14. Soluble-salts ppm.
  15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
  16. Other deleterious materials, including their characteristics and content of each.
- E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
- F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for six (6)-inch depth of soil.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Do not move or handle materials when they are wet or frozen.
  - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

## PART 2 - PRODUCTS

### 2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

- A. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:
  - 1. Particle Size Distribution by USDA Textures: Classified as sandy clay loam according to USDA textures.
  - 2. Percentage of Organic Matter: Minimum Five (5) percent by volume.
  - 3. Soil Reaction: pH of 6 to 7.5.
  - 4. CEC of Total Soil: Minimum 15 meq/100 mL at pH of 7.0.
  - 5. CEC of Clay Fraction: Maximum 30 meq/100 mL at pH of 7.0.
  - 6. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.
  - 7. Bulk Density: 1.4 g/cu. cm to 1.5 g/cu. cm at 85 percent compaction.
  - 8. Total Porosity: Minimum 45 percent at 85 percent compaction.
  - 9. Macro Porosity: Minimum 5 percent at 85 percent compaction.
  - 10. RCRA Metals: Below maximum limits established by the EPA.
  - 11. Phytotoxicity: Below phytotoxicity limits established by SSSA.
- B. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of sandy clay loam soil according to USDA textures; and modified to produce viable planting soil. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with requirements noted in 2.1 A. 1-11 above:

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least four (4) inches deep, not from bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass.
  2. Additional Properties of Imported Soil before Amending: Minimum of two (2) percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:
    - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
    - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of eight (8) percent by dry weight of the imported soil.
    - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding two (2) inches in any dimension.
- C. Planting-Soil Type: Manufactured soil consisting of manufacturer's basic sandy clay loam according to USDA textures, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials as specified in other articles of this Section to produce viable planting soil complying with the requirements noted in 2.1 A. 1-11 above.
1. Basic Properties: Manufactured soil shall not contain the items listed in 2.1 B. 2. a – c above.
- D. Planting-Soil Type: Manufactured bioswale and raingarden soil consisting of a uniform, well blended mix, free of stones, stumps, roots, or other similar objects larger than two (2) inches. No other materials or substances shall be mixed or dumped within the bioswales or raingarden that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The soil mix shall be free of Bermuda grass, Quack grass, Johnson grass, or other noxious weeds.
1. The planting soil for bioswales and raingarden shall consist of a mixture of sand or crushed glass cullet of equivalent grade, topsoil, and compost components, to obtain an engineered soil mix meeting the following specifications:
  2. Obtain an engineered soil mix meeting the following specifications:
    - a. USDA Texture class: sandy loam or loamy sand. Mineral fraction consists of no less than 40% well-graded sand or glass cullet and no greater than 10% clay (dry weight basis).
    - b. Organic content: 3 – 10% (dry weight basis)
    - c. pH: 5.5 – 7.5

- d. Soluble Salts (Salinity): less than 500 mg/kg (500 ppm)
- e. Phosphorous: soil p-index should be between 15 and 40
- f. Permeability: Minimum 0.50 inches/hour (per field test utilizing ASTM methods)

Soil chemical parameters should be tested according to *Recommended Chemical Soil Test Procedures for the North Central Region, North Central Regional Research Publication No. 221, Revised 1998*. Soil organic matter should be determined according to the “Loss of Weight on Ignition” procedure in the above-referenced publication. The manual is available on line at the following address:

<http://extension.missouri.edu/explorepdf/specialb/sb1001.pdf>.

Volumetric proportions of the components making up the bioswale and raingarden soil mix shall be as follows:

- 1. Sand or glass cullet: >40% by volume
- 2. Leaf or spent mushroom compost: >10% by volume
- 3. Topsoil: > 40% by volume

Existing topsoil on site may be amended to meet the specifications of the bioswale and raingarden soil mix. The existing topsoil shall be tested for pH, organic content, grain size analysis and permeability to identify necessary amendments.

Tests on amended soil shall be performed once per bioswale and raingarden facility for pH and organic content. Tests for remaining parameters are required for every 500 cubic yards of soil mix, and at a minimum once per bioswale and raingarden.

Compost shall be finished (aged), and composted material shall be of plant origin (leaf and spent mushroom compost). Compost shall have a C:N ratio  $\leq 25:1$ .

In the event that sufficient topsoil cannot be obtained from common excavation, topsoil may be obtained from outside the limits of this project according to article 3.1 B, above.

Bioswale and raingarden soil shall not be incorporated into the Work until it is approved by the ENGINEER.

The CONTRACTOR shall save all existing project topsoil, if possible, keeping it in a separate pile, and working into at least the top six inches of the subsoil with a power rototiller.

**DO NOT ADD LIME TO BIOSWALES AND RAINGARDENS, OR BIOSWALE AND RAINGARDEN SOIL AT ANY POINT DURING CONSTRUCTION FOR ANY REASON.**

## 2.2 INORGANIC SOIL AMENDMENTS

- A. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

## 2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
- B. Seal of Testing Assurance," and as follows:
  - 1. Feedstock: Limited to leaves and mushrooms.
  - 2. Reaction: pH of 5.5 to 8.
  - 3. Soluble-Salt Concentration: Less than 4 dS/m.
  - 4. Moisture Content: 35 to 55 percent by weight.
  - 5. Organic-Matter Content: 50 to 60 percent of dry weight.
  - 6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.

## 2.4 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,

paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

- C. Proceed with placement only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

- A. Excavation: Excavate soil from designated areas to a depth of six (6) inches and stockpile until amended.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
- C. Unsuitable Materials: Clean soil to contain a combined maximum of eight (8) percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.
- D. Screening: Pass unamended soil through a two (2)-inch sieve to remove large materials.

### 3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of four (4) inches. Remove stones larger than two (2) inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top two (2) inches of subgrade. Spread remainder of planting soil.
- C. Mixing: Spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
  - 1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
    - a. Mix fertilizer with planting soil no more than seven (7) days before planting.
  - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding eight (8) inches in loose depth for material compacted by compaction equipment, and



not more than four (4) inches in loose depth for material compacted by hand-operated tampers.

- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of four (4) inches. Remove stones larger than two (2) inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
  - 1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top two (2) inches of subgrade. Spread remainder of planting soil.
- C. Application: Spread planting soil to total depth indicated on Drawings, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
  - 1. Lifts: Apply planting soil in lifts not exceeding eight (8) inches in loose depth for material compacted by compaction equipment, and not more than four (4) inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.5 BLENDING PLANTING SOIL IN PLACE

- A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

- B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of six (6) inches. Remove stones larger than two (2) inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.
  - 1. Mix fertilizer with planting soil no more than seven (7) days before planting.
- D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests:
  - 1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.
  - 2. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
- C. Soil will be considered defective if it does not pass tests.
- D. Prepare test reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

### 3.7 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
  2. Parking vehicles or equipment.
  3. Vehicle traffic.
  4. Foot traffic.
  5. Erection of sheds or structures.
  6. Impoundment of water.
  7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

### 3.8 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. This work shall be measured in cubic yard.

### 4.02 PAYMENT

- A. The Work covered in this section shall be included in the cost of Furnish & Install Planting Soil.

**\*\*\*END OF SECTION\*\*\***

## SECTION 329200

### NATIVE GRASS SEED

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION OF WORK

- A. This includes all seeding for disturbed areas indicated on the project plans. See specification Landscape-Plants for landscape beds, including ornamental grasses. The work includes seed, surface preparation, seed spreading, maintenance, straw mulch, and any other work incidental to sufficient establishment of turf and prairie grasses and wildflowers as described in this specification and shown on the plans.
- B. Coordinate placement of erosion control matting and/or blanket. Matting and blanket to be under separate pay item (ESC 5). See Erosion Control Plans, and/or SWPPP.

##### 1.2 RELATED DOCUMENTS

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

##### 1.3 SUMMARY

- A. Section Includes:
  - 1. Seeding.
  - 2. Hydroseeding
  - 3. Prairie grasses and wildflowers.
- B. Related Sections:
  - 1. See plans for Erosion and Sediment Control and Stormwater Pollution Prevention
  - 2. 329300 Plants
  - 3. 02200 Earthwork

##### 1.4 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, native surface topsoil; existing, in-place surface soil. All planting soil for this project shall come from existing topsoil at the site.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
- B. Qualification Data: For landscape Installer, include:
  - 1. List of similar projects completed by Installer demonstrating Installer's capabilities and experience.
  - 2. Project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- C. Product Certificates: For soil amendments and fertilizers, from manufacturer.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and prairie/native seed establishment.
  - 1. Experience: Three years' experience in turf (lawn) and prairie/native seed installation.
  - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 3. Installer's Project Superintendent: Hold a minimum of two (2) year degree in the field of landscape contracting, landscape management, agronomy, landscape architecture, horticulture, or related field, or be a Certified Landscape Technician – Exterior by the Professional Landcare Network (PLANET).

- a. Be present on the project site a minimum of 85% of the time the Installer's crew is present on site.
- 4. Maintenance Proximity: Not more than three hours' normal travel time from Installer's place of business to Project site.
- 5. Pesticide Applicator: State licensed, commercial.
- 6. The submitting bidders shall be, and have been, actively and directly engaged in prairie seed and turf seed installation for a period of two (2) or more years. Provide proof of five (5) or more successful prairie seed installations.
- 7. The submitting bidder must have access and experience with the equipment required for installation of native seed. This may include a no-till fluffy seed drill designed for prairie seed installations. Such drills are manufactured by Truax, Great Plains, and John Deere, Inc. Hydro-seeding may not be substituted for drill seeding.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. All native seed shall be stored in a cooler at 40-50 degrees Fahrenheit prior to installation.
- C. Equipment used for seed dispersal must be thoroughly cleaned prior to use to prevent seed contamination at site.
- D. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing prairie areas, turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of soil amendments with appropriate certificates.

#### 1.8 PROJECT CONDITIONS

- A. 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.
- B. Turf
  - 1. Spring Planting: March 1 – April 15
  - 2. Fall Planting (optimum): September 1 – October 15September 30

3. Spring Planting (acceptable): April 1- June 15, if site conditions and construction schedules warrant the need for spring seeding.
  4. Summer seeding (avoid when possible): permanent seeding done between May 10-August 10 may need to be irrigated.
- C. Native Seed
1. Fall Planting (optimum): September 1 – September 30
  1. Late Fall Planting (acceptable): November 1 – December 21, if site conditions and construction schedules warrant the need for late fall seeding.
  2. Spring Planting (acceptable): April 1- June 15, if site conditions and construction schedules warrant the need for spring seeding.
  3. Summer seeding (avoid when possible): permanent seeding done between May 10-August 10 may need to be irrigated.
- D. Weather Limitations: Proceed with planting in coordination with the Owner, to identify when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

## 1.9 MAINTENANCE SERVICE

- A. Initial Turf 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 turf is established but for not less than the following periods:
1. Seeded Turf: 60 calendar days from date of Substantial Completion.
- B. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season. Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Meadow Maintenance" Article. Begin maintenance immediately after each area is planted and continue until an acceptable turf and prairie are established, but for not less than maintenance period below.
1. Maintenance Period: 60 calendar days from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. 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.

2.2 Seeded Species: As indicated on the Landscape Plans or otherwise approved by Landscape Architect. TURF SEED & NATIVE SEED

A. Full Sun: Proportioned by weight as follows:

1. 80 percent Turf-Type Tall Fescue (*Festuca arundinacea*)
2. 20 percent perennial ryegrass (*Lolium perenne*).

B. Native Seed: Fresh, clean, and dry new seed, of mixed species as follows:

1. Basic Mesic Prairie Seed Mix from Spence Restoration Nursery or approved equal.
2. West Prairie Seed Mix from Spence Restoration Nursery or approved equal.

C. All native seed must be of wild ecotype. No hybrids or cultivars may be included. Seed shall be local genotype as supplied by Spence Restoration Nursery or an approved local source. These specifications do not apply to the temporary matrix (cover crop seed mix of Seed Oats and Annual Ryegrass).

2.3 INORGANIC SOIL AMENDMENTS

A. Inorganic soil amendments should be added only when soil tests dictate necessary amendments for healthy turf grass seed and native seed growth. Owner approval shall be received prior to any additions of inorganic soil amendments. Soil amendments shall be applied according to manufacturer's written specifications.

2.4 ORGANIC SOIL AMENDMENTS

A. Organic soil amendments should be added only when soil tests dictate necessary amendments for healthy turf grass seed and native seed growth. Owner approval shall be received prior to any additions of organic soil amendments.

2.5 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium. If using as a soil amendment, revise fertilizer mix to remedy deficiencies found in soil tests.

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.



## 2.6 MULCHES

- A. Straw Mulch: Contractor to provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley. Hay or chopped cornstalks are not acceptable..

## 2.7 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.8 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: See Drawings.
- B. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long. North American Green BioNet Biodegradable Erosion Control Blanket S75BN or approved equal.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
  - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
  - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - 4. Verify the site is within 4 inches of the specified grade. Verify that seedbed is sufficiently firm.

5. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil..

### 3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations. See Demolition Plans and Landscape Plans for minimum standards of protection and planting operations.
  1. Protect grade stakes set by others until directed to remove them.
  2. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

### 3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to **Section 329115 "Soil Preparation (Performance Specification)."**
- B. Limit turf subgrade preparation to areas to be planted.
- C. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter at time of installation and legally dispose of them off Owner's property.
- D. Apply soil amendments and fertilizers as recommended in soil reports from qualified soil-testing laboratory. Mix amendments and fertilizers into planting soil thoroughly. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
- E. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
  1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  2. Loosen surface soil to a depth of at least 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions determined by soil tests should soil tests deem necessary for healthy turf growth.

Mix thoroughly into top 4 inches (100 mm) to 6 inches (150 mm) of soil. Till soil to a homogeneous mixture of fine texture.

3. Remove stones larger than 2 inches (50 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
  4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- F. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) 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.
- G. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- H. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.4 NATIVE SEED AREA PREPARATION

- A. If vegetation exists on the site, apply a glyphosate herbicide at least three days prior to installation on all actively growing vegetation. Never apply fertilizer to the site.
- B. Limit subgrade preparation to areas to be planted. Consult with Owner on degree of subgrade loosening required, if any, as well as the need for soil amendments or fertilizers.
- C. Newly Graded Subgrades: Consult with Owner on degree of subgrade loosening required, if any, as well as the need for soil amendments or fertilizers.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) 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.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- G. Ensure the drill, if using, is properly calibrated to sow the specified amount of seed over the specified area. Ensure complete coverage of the specified area.
- H. Install seed when soil is sufficiently dry so that soil does not stick to the packer wheels on the drill.

- I. Ensure the drill is properly calibrated to sow the specified amount of seed over the specified area. Ensure complete coverage of the specified area.

### 3.5 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in plans.

### 3.6 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
  1. Do not use wet seed or seed that is moldy or otherwise damaged.
  2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
  3. Do not use same machine as used to apply fertilizer.
- B. Sow seed at the rate indicated on the Landscape Plans.
- C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas on slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh, elsewhere as indicated, and installed and stapled according to manufacturer's written instructions.
- A. Protect seeded areas with erosion-control where shown on Drawings; install per plans.
  1. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
    - a. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

### 3.7 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, **slow-release fertilizer**, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
  1. Mix slurry with **nonasphaltic OR fiber-mulch manufacturer's recommended** tackifier.
  2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than **1500-**

**lb/acre (15.6-kg/92.9 sq. m)** dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

### 3.8 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
  - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
  - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Keep turf uniformly moist to a depth of 4 inches (100 mm) until project acceptance.
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Avoid walking over muddy or newly planted areas.
  - 2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top 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 a turf height of 3-4 inches.

### 3.9 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:
  - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm), and with grass height between 3 and 4 inches.

- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory. In areas where lawns require over-seeding to meet specification, over-seeding will be performed using a slit seeder. No other over-seeding method will be acceptable.

### 3.10 PRAIRIE MAINTENANCE

- A. Maintain and establish meadow by weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
  - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
  - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - 3. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Mowing:
  - 1. Mow at a height of 4 to 6 inches when the oats set seed heads. Mow at a height of 4 to 6 inches once a month or whenever weed growth reaches 10 inches for the remainder of the first season.
  - 2. If cool season weed growth is heavy in the spring of the second season, mow once in late May.
- C. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
  - 1. 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.
  - 2. Water meadow with fine spray at a minimum rate of **1/2 inch (13 mm)** per week for **eight** weeks after planting unless rainfall precipitation is adequate.

### 3.11 NATIVE SEED AREA RENOVATION

- A. Renovate existing native prairie damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
  - 1. Reestablish native seed vegetation where settlement or washouts occur or where minor regrading is required, using the seed mix specified on Landscape Plans.
  - 2. Install new planting soil, as required.

- B. Remove sod and vegetation from diseased or unsatisfactory native seed areas; do not bury in soil.
- C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil, as required.
- D. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- E. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- F. Apply seed and consult with Owner before applying straw mulch. Owner approval shall be received in writing prior to application of straw mulch.
  - 1. Seed application method for areas of existing native seed areas to remain shall be with a slit seeder, broadcast spreader, or other seeding method approved by Owner.
- G. Water newly planted areas and keep moist until new native seed vegetation is established.

### 3.12 NATIVE SEED MAINTENANCE

- A. Maintain and establish native seed grass by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable native seed vegetation. Provide materials and installation the same as those used in the original installation.
- B. Watering: Keep native seed grass uniformly moist to a depth of 4 inches (100 mm) until project acceptance.
  - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Avoid walking over muddy or newly planted areas.
  - 2. Water native seed vegetation with fine spray as needed for adequate establishment of seeded vegetation, at a minimum rate of 1 inch (25 mm) per week, unless rainfall precipitation is adequate.
- C. Mow native seed grass as soon as top 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 a native seed vegetation height of 3-4 inches.

### 3.13 SATISFACTORY NATIVE SEEDING

- A. Native seed installations shall meet the following criteria as determined by Landscape Architect:
  - 1. Satisfactory Seeded Vegetation: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm), and with grass height between 3 and 4 inches.
- B. Use specified materials to reestablish native seed grass that does not comply with requirements and continue maintenance until native seed vegetation is satisfactory. In areas where native vegetation require over-seeding to meet specification, over-seeding will be performed using a slit seeder, broadcast spreader or other method approved by Owner.
- C. If satisfactory native vegetative cover has not been established at final inspection, another inspection shall be made upon written Contractor request that the native seed grass is ready for re-inspection, but no earlier than sixty (60) calendar days thereafter.

### 3.14 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

### 3.15 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by native seed work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- C. Remove nondegradable erosion-control measures after grass establishment period.



## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

The Work of this Section will be measured for payment in ACRE.

### 4.02 PAYMENT

A. The Work covered in this section shall be paid for at the contract unit price as shown in the Schedule of Prices for the following:

1. IDOT CL-1 Seeding
2. Turf Installation
3. Basic Prairie Seed Installation
4. Native Plat & Seed Establishment

**\*\*\*END OF SECTION\*\*\***

## **SECTION 329300**

### **PLANTS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

**A. Section Includes:**

1. Plants.

**B. Related Requirements:**

1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Section 329200 "Turf and Grasses" for turf (lawn) and prairie planting, hydroseeding, and erosion-control materials.

##### **1.2 ALLOWANCES**

- A. Furnish plant material as listed on plant schedules.**

##### **1.3 DEFINITIONS**

- A. Backfill:** The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Potted Stock:** 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 [sizes indicated] [diameter and depth recommended by ANSI Z60.1 for type and size of plant required].
- C. Bare-Root Stock:** 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 the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- D. Container-Grown Stock:** Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- E. d protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Finish Grade: Elevation of finished surface of planting soil.
- G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- H. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- I. s, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" Section 329115 "Soil Preparation (Performance Specification) for drawing designations for planting soils.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

#### 1.4 COORDINATION

- A. Coordination with Turf Areas: Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

## 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

## 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
  - 2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three images showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific (botanical) name of the plant, plant size, and name of the growing nursery.
- B. Samples for Verification: For each of the following:
  - 1. Organic and Compost Mulch: 1-pint (0.5-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis of standard products.
  - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- D. Sample Warranty: For special warranty.

## 1.8 CLOSEOUT SUBMITTALS

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

## 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
  - 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
  - 2. Experience: Three years' experience in landscape installation.
  - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - 4. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
  - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
  - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
  - 1. Notify Landscape Architect of sources of planting materials 14 days in advance of delivery to site.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Deliver bare-root stock plants within 24 hours of digging. 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. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- F. Handle planting stock by root ball.
- G. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.
- H. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
  - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- I. 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.
- J. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and

trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

#### 1.11 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during periods appropriate for plant species and per standard nursery practices. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

#### 1.12 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
    - b. Structural failures including plantings falling or blowing over.
    - c. Faulty performance of tree stabilization.
    - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  2. Warranty Periods: From date of Substantial Completion.
    - a. Trees, Shrubs, Vines, and Ornamental Grasses: 24 months.
    - b. Ground Covers, Biennials, Perennials, and Other Plants: 24 months.
  3. Include the following remedial actions as a minimum:

- a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
- b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
- c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
- d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. ent.
  - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are unacceptable.
  - 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- C. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- D. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- E. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.



- F. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

## 2.2 FERTILIZERS

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
  - 1. Size: 5-gram or 10-gram tablets.
  - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

## 2.3 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
  - 1. Type: [Shredded Dark hardwood
  - 2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
  - 3. Color: Natural.
- B. Leaf Compost Mulch: finished (aged) leaf compost mulch, and shall be well mixed and homogenous, uniform in color and free of foreign material and viable plant seeds. The mulch material shall have no visible free water and produce no dust when handled. It shall be free of substances toxic to plantings and meet the following criteria:
  - 1. 90% of material passing 1/2" screen
  - 2. Organic Matter Content: 35 to 65 percent of dry weight.

## 2.4 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## 2.5 TREE-STABILIZATION MATERIALS

### A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new [hardwood] [softwood with specified wood pressure-preservative treatment], free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.
2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or.
3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.

### B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.

## 2.6 TREE-WATERING DEVICES

- ### A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

1. Color: [green or tan]

## 2.7 MISCELLANEOUS PRODUCTS

- ### A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- ### B. Burlap: Non-synthetic, biodegradable.
- ### C. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329115 "Soil Preparation (Performance Specification)."

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

### 3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
  - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
  - 2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
  - 3. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock. Refer to planting details in landscape plan set.
  - 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  - 5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
  - 6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
  - 7. Maintain supervision of excavations during working hours.
  - 8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Backfill Soil: Subsoil and topsoil removed from excavations maybe used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
  - 1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

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

### 3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
  - 1. Backfill: Planting soil
  - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
  - 4. placing remainder of backfill. Repeat watering until no more water is absorbed.
  - 5. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
    - a. Quantity: Two per plant or Three for each caliper inch of plant.
  - 6. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.
  - 1. Backfill: Planting soil
  - 2. Carefully remove root ball from container without damaging root ball or plant.
  - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
    - a. Quantity: Two per plant or Three for each caliper inch of plant.
  5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

### 3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

### 3.7 TREE STABILIZATION

- A. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet (4.2 m) in height and more than 3 inches (75 mm) in caliper unless otherwise indicated.
  1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.
    - a. Securely attach guys to stakes 30 inches (760 mm) long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle compression spring for each guy wire and tighten securely.
    - b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
    - c. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.
    - d. .

### 3.8 GROUND COVER AND PLANT PLANTING

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

### 3.9 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
  - 1. Trees in Turf Areas: Apply hardwood mulch ring of 3-inch average thickness, with 60-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
  - 2. Hardwood Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch in planting beds as defined on Drawings.
  - 3. Leaf Compost Mulch in BMPs: Apply 3-inch average thickness of leaf-compost mulch in stormwater basins as defined on Drawings.

### 3.10 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

### 3.11 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D.

### 3.12 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### 3.13 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
  - 1. Submit details of proposed pruning and repairs.
  - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
  - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

### 3.14 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.



- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before [Substantial Completion] <Insert time>, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

### 3.15 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
  - 1. althy and well established, but for not less than maintenance period below:
    - 1. Maintenance Period: 24 months from date of Substantial Completion
- C. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
  - 1. Maintenance Period: 24 months from date of Substantial Completion.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

The Work of this Section will be measured for payment by Each.

### 4.02 PAYMENT

- A. The Work covered in this section shall be paid for at the contract unit price as shown in the Schedule of Prices for the following:
  - 1. Plant Plug Installation

**\*\*\*END OF SECTION\*\*\***

