

## 02840 EXTERIOR PLANTS (NATIVE LANDSCAPING AND STORMWATER TREES) GREEN INFRASTRUCTURE STRATEGIES

[NTS: This specification is intended to be used as part of the Milwaukee Metropolitan Sewerage District's Green Solutions Program for implementation of green infrastructure strategies into Contract Documents by local municipalities or other entities. The specification is also intended to be used in conjunction with the Green Infrastructure Sizing Calculator and the Green Infrastructure Typical Details developed for the Green Solutions Program. The specification is considered to be a technical guidance document to assist users with the design of green infrastructure strategies. It is the responsibility of the local municipality or design engineer to make revisions to the specification as needed for specific design projects. It is recommended the documents are reviewed by a licensed professional engineer before releasing for construction. Note that the specification was last updated by the District in 2016.]

### A. SCOPE

This Section covers the work necessary to furnish and install native landscaping and stormwater tree green infrastructure strategies, including preparation of plant beds, exterior plants (trees, shrubs, plant plugs and perennials).

#### 1. GENERAL

[NTS: Update language of this Section as necessary based on applicable references to front-end specifications.]

See CONDITIONS OF THE CONTRACT, and Division 1, GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.

#### 2. RELATED WORK

[NTS: The list below may not be fully inclusive depending upon the specifics of each individual project. Update language of this Section as necessary based on applicable references to other technical specification sections.]

The applicable requirements, materials and workmanship specified in the following Sections are included by reference in this Section. The list below is from the Wisconsin Department of Transportation (WisDOT) Standards and Specifications for Highway and Structure Construction, latest edition.

Section 627 Mulching  
Section 628 Erosion Control  
Section 630 Seeding  
Section 631 Sodding  
Section 645 Geotextile Fabrics

The following specifications as developed for the Milwaukee Metropolitan Sewerage

District's Green Solutions Program may also include related work.

- a. Section 02837 Bioretention / Bioswale Green Infrastructure Strategy
- b. Section 02838 Rain Garden Green Infrastructure Strategy
- c. Section 02841 Soil Amendment Green Infrastructure Strategy

### 3. DEFINITIONS

- a. **Balled and Burlapped Stock:** Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size is subject to meeting ANSI Z60.1 limitations for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.
- b. **Balled and Potted Stock:** Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is subject to meeting ANSI Z60.1 limitations for type and size of tree or shrub required.
- c. **Container Stock:** Healthy, vigorous, well-rooted exterior 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 kind, type, and size of exterior plant required.
- d. **Finish Grade:** Surface or elevation of soil remaining after topsoil has been spread to the specified depth on drawings.
- e. **Subgrade:** Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.
- f. **Growing Season:** Period of time approximately between March and November, during which rainfall and temperature are conducive to plant growth.

### 4. SUBMITTALS

- a. Product Data: For each type of product indicated.
- b. Samples for Verification: 1/2 lb. of mulch specified placed in labeled plastic bag.
- c. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:
  - 1. Manufacturer's certified analysis for 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.

- d. Qualification Data: Statement of landscape installer's qualifications in performing native landscape installations and complying with the following:
  - 1. A minimum of 5 years' experience.
  - 2. Proof of five or more successful native landscape examples to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, photographs of completed projects, names and address of architects and owners, and other information specified. See "Quality Assurance" article in this section for additional contractor requirements.
- e. Material List: Provide list of each landscape material (trees, shrubs, perennials, plugs) and identify intended type, size, and nursery source.
- f. Planting Schedule: Indicate expected delivery and installation dates for each type of landscape work, during seasons identified for such work.
- g. Planting Plan: CONTRACTOR to develop planting plan that shows conformance with planting plan and planting schedule shown on drawings. Prior to staking tree locations, shrub locations, groundcover locations, and plug beds, CONTRACTOR to schedule meeting with OWNER to review planting plan.
- h. Maintenance Instructions: Typewritten recommended seasonal procedures to be provided by CONTRACTOR to OWNER for maintenance of exterior plants during a calendar year. Include recommendations for care of trees and shrubs to promote healthy, vigorous growth and avoid susceptibility to disease. Submit before expiration of required maintenance periods.
- i. Tree Certification: Signed statement by nursery certifying that plants conform to specified requirements.
- j. Photographs of Trees: Submit images within fourteen days of proposed field inspections of each plant species of each size and each quality grade clearly showing the full range of variations between the grades.
  - 1. Scale: Include a yardstick in each photograph to provide scale.
  - 2. Background: Ensure form and condition of plant is clear from background.
  - 3. Identification: Provide the following information:
    - a. Name of Project and OWNER.
    - b. Name and address of grower.
    - c. Date photograph was taken.
    - d. Species name and quality grade.
- k. Topsoil Analysis: Contractor shall furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand,

silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil. A minimum of two samples from each different soil area and type and from each imported soil source is required.

1. Report suitability of topsoil for plant growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil for each planting type (turf, perennials, woody plant material, etc.).
2. Soil analysis requirement applies to all soils and conditions within this project, including import soils and on-grade soils.

## 5. DEPARTURES FROM PLANS AND SPECIFICATIONS

Submit in writing to the OWNER for review, details of any proposed departures from these Contract Documents, and the reasons therefor. Submit such requests as soon as practicable after the Notice to Proceed. Make no such departures without prior written acceptance of the OWNER.

## 6. QUALIFICATIONS / QUALITY ASSURANCE

- a. Nursery Qualifications: A company specializing in growing and cultivating the plants with three years' experience. Plant materials shall be free of disease and hazardous insects.
- b. Installer Qualifications: A qualified landscape installer with five years' experience (minimum) who have completed native landscape work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment. Qualified landscape installer must provide five or more successful native landscape installations.  
Installer's Field Supervision: CONTRACTOR shall provide an experienced full-time supervisor on project site when exterior planting is in progress.
- c. Provide consistent quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
- d. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- e. Observation: OWNER may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. OWNER retains right to observe trees and shrubs further for size and condition of balls and root systems,

insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site. Notify OWNER of sources of planting materials 14 days in advance of delivery to site.

- f. Allowance for losses: Grow additional plants to ensure that the contract quantities shall be achieved after normal production losses from natural causes, breakage, natural random non-conformities, transplant shock and/or delivery damage. Replace any plants that are damaged, fail or are rejected.

## B. MATERIALS

### 1. TREE MATERIAL

- a. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, mold, insects, eggs, larvae, prematurely opened buds, and defects such as crooked leader, abrasion of bark, knots, sun scald, injuries, abrasions, and disfigurement. All of the above are cause for rejection.
  - 1. Single stem trees should have one main straight leader limbed to the height specified in the planting schedule, a well-balanced crown, and height and caliper as indicated in planting schedule. Trees not meeting these requirements will be rejected.
  - 2. Branching Height: One-third to one-half of tree height, minimum of 5 feet.
  - 3. Source location: Plant material should be selected from material grown in like hardiness zone to the project.
- b. Grade: Provide trees of sizes and grades complying with ANSI Z60.1 for type of trees required. Trees of a larger size may be used if acceptable to OWNER, with a proportionate increase in size of roots and root ball upon review and approval by OWNER.
- c. Label at least one tree of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
- d. Tree Root Union: Trees will not be accepted if the Tree Root Union has been buried. Trees must be harvested that have had the tree root union uncovered prior to digging. Root ball size must meet ANSI Z60.1 standards; shaving off excess soil from root ball after digging of tree will not be accepted. Failure to comply with this requirement is cause for rejection of affected plant material. Provide balled and burlapped trees.

### 2. SHADE AND FLOWERING TREES

- a. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
    1. Provide balled and burlapped trees.
    2. Branching Height: One-third to one-half of tree height, 5 feet minimum.
  - b. Small Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
    1. Stem Form: as noted on the drawings.
      - a. Single Stem.
      - b. Multistem, clump with two or more stems.
      - c. Multistem shrub, with multiple stems.
    2. Provide balled and burlapped trees.
  - c. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
    1. Stem Form: Clump.
    2. Provide balled and burlapped trees.
  - d. No species or size shall be substituted without approval by OWNER.
3. DECIDUOUS SHRUBS
- a. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub. Provide balled and burlapped shrubs.
  - b. Label at least one shrub of each variety with a securely attached, waterproof tag bearing legible designation of botanical and common name.
  - c. No species or size shall be substituted without approval by OWNER.
4. PLUGS
- a. Plugs shall have a minimum size of 2-inch diameter or 2-inch-by 2-inch square and 3-inch depth. Plugs shall be thoroughly rooted through the container.
  - b. No species or size shall be substituted without approval of OWNER.
  - c. Plugs shall be inoculated with VAM (Vesicular Arbuscular Mycorrhizae) endomycorrhizal fungi as provided by plug supplier.
  - d. Plugs shall be healthy, free from disease and pests at time of delivery. Plugs must be well developed and fully rooted into growing cell container.

- e. For plug species, see planting schedule.

## 5. PLANTS

- a. Perennials and Grasses: See pot sizes specified in plant schedule. Provide healthy, field- grown plants from a commercial nursery, of species and variety shown on plan.

## 6. TOPSOIL

- a. A loamy, friable mineral soil essentially free from heavy or stiff clay lumps, stones, cinders, concrete, brick, roots, sticks brush, litter, plastics, metals, refuse or other deleterious materials in accordance with ASTM D 5286-92. The soil shall be free of herbicides, petroleum-based materials or other substances of a hazardous or toxic nature which may inhibit plant growth. The soil shall be free of noxious weeds, seeds or vegetative parts of weedy plants that cannot be selectively controlled in the planting.

- b. The soil shall be taken from the a horizon of a well-drained site and have a USDA soil texture classification of a clay loam or loam. The topsoil shall have the following particle size distribution:

USDA particle name	size (mm)	allowable limit
gravel	2.00 - 4.75	less than 5%
sand	0.05 - 2.00	25 - 45 %
silt	0.002 - 0.05	25 - 40 %
clay	minus 0.002	15 - 30 %

- c. The topsoil component shall meet the following specifications. Perform the following tests and submit test reports showing the following criteria are met:

1. The particle size analysis as defined above.
2. The pH shall be 5.5 to 7.8
3. The soluble salts shall be less than 1.5 mmoh/cm
4. The organic matter content shall be 3.0 to 6.0%

- d. Provide certification from the supplier that the topsoil does not contain any toxic substances harmful to plant growth.

- e. Off-site (borrow) topsoils meeting the criteria shown above must be used for the planting mix and their source or location communicated to the landscape architect.

- f. Soil nutrient/ pH analysis to be performed by an agronomic soil testing agency; apply and incorporate any recommended fertilizers or soil amendments to achieve proper growing conditions. Testing for topsoil

suitability to meet these specifications is the responsibility of the contractor. Results to be supplied to landscape architect and owner.

- g. Topsoil from the site may be used if it meets the above requirements. Additional topsoil shall be provided as required by drawings and specifications.

## 7. INORGANIC SOIL AMENDMENTS

- a. Lime: ASTM C 602, agricultural limestone containing a minimum 80% calcium carbonate equivalent and as follows: Any application of lime recommended by CONTRACTOR must be substantiated by lab test results and reviewed by OWNER.
  - 1. Class: Class T, with a minimum 99% passing through No. 8 (2.36-mm) sieve and a minimum 75% passing through No. 60 (0.25-mm) sieve.
  - 2. Class: Class O, with a minimum 95% passing through No. 8 (2.36-mm) sieve and a minimum 55% passing through No. 60 (0.25-mm) sieve.
  - 3. Provide lime in form of dolomitic limestone.
- b. Sulfur: Granular, biodegradable, containing a minimum of 90% sulfur, with a minimum 99% passing through No. 6 (3.35-mm) sieve and a maximum 10% passing through No. 40 (0.425-mm) sieve.
- c. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 30 to 35% iron and 30 to 50% sulfur and supplied by a commercial fertilizer supplier.
- d. Aluminum Sulfate: Commercial grade, unadulterated.
- e. Perlite: Horticultural perlite, soil amendment grade.
- f. Agricultural Gypsum: Finely ground, containing a minimum of 90% calcium sulfate.
- g. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- h. Diatomaceous Earth: Calcined, diatomaceous earth, 90% silica, with approximately 140% water absorption capacity by weight.
- i. Zeolites: Mineral clinoptilolite with at least 60% water absorption by weight.
- j. Hydrogel: "Soil Moist"(tm) Hydro by JRM Chemical Inc. (1-800-962-4010) or approved equal. Applied and mixed according to manufacturer's recommendations.



## 8. ORGANIC SOIL AMENDMENTS

- a. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55% by weight; 100% passing through 3/4-inch (19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50% of dry weight.
  - 2. Source: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste. Leaf humus compost, manure composts, peat, peat-humus and mushroom compost products are not acceptable.
- b. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.1 to 5.0.
- c. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000%.
- d. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
  - 1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cubic foot (cubic meter) of loose sawdust or ground bark.
- e. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25% by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

## 9. FERTILIZER

- a. Do not apply any fertilizer other than compost to any area to be installed with bioretention soil mix.
- b. Containing fifty percent of the elements derived from organic source; of proportion necessary to eliminate and deficiencies of topsoil, as indicated in analysis.
- c. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4% nitrogen and 20% phosphoric acid.
- d. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20% available phosphoric acid.

- e. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50% 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 soil-testing agency.
- f. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50% 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 soil-testing agency.
  - 2. Pre-approved slow-release fertilizer: Davey Arbor Green Pro or approved equal.
- g. Calcium nitrate: Agricultural grade containing 15-1/2% nitrogen.

#### 10. HERBICIDE

- a. Preemergent Herbicide: Granular type, Treflan or equal, to be applied at a rate per manufacturer's recommendation.
- b. Do not apply pre-emergent herbicide to areas where seeding will be installed.
- c. Glyphosate herbicide applied to areas where plugs will be installed. See Preparation section in this specification.

#### 11. MULCHES

- a. Double-shredded hardwood mulch, well composted, free from deleterious materials, locally harvested and produced, and suitable as a top dressing of trees and shrubs.
- b. All trees planted in a seeded area shall have a 6-foot diameter double-shredded hardwood mulch ring 2 inches thick.
- c. All shrub beds, with and without trees, shall have a 2-inch layer of double-shredded hardwood mulch.
- d. All rain gardens shall have a 2-inch layer of double-shredded hardwood mulch. Erosion Control Matting materials are required and specified for these areas.

#### 12. STAKES AND GUYS

- a. Trees are not required to be staked unless called out on plans or if environmental conditions require them to keep a tree straight and upright. If CONTRACTOR sees the need for stakes due to environmental conditions, consult OWNER prior to installing stakes.
- b. Trees are to be planted straight. During the maintenance period if, trees have not maintained trueness, CONTRACTOR is to stake trees as needed.
- c. Cable, Wire, Eye Bolts: Noncorrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.

### 13. 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. Tree guard: High density, UV stabilized polyethylene with heavy duty 3/8-inch by 3/8-inch mesh by Tenax (product: Hardware Net) or approved equal. Tenax Hardware Net is available from Eads Fencing Company, [www.eadsfence.com](http://www.eadsfence.com).

## C. WORKMANSHIP

### 1. DELIVERY, STORAGE, AND HANDLING

- a. Deliver exterior plants freshly dug from nursery. Deliver trees and shrubs after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants and trees in shade, protect from weather, wildlife and mechanical damage, and keep roots moist.
  - 1. Bare root material shall be harvested and handled according to American Nurseryman Standards, which include but are not limited to: Maintain moist root mass at all times, deliver and store in a manner to retard bud development until time of planting.
  - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
  - 3. Do not remove container-grown stock from containers before time of planting.
  - 4. Water root systems of exterior plants stored on-site with a fine-mist spray and as often as necessary to maintain root systems in a moist condition.
- b. Do not prune trees and shrubs before delivery, except as approved by OWNER. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape.

Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.

- c. Handle planting stock by root ball while supporting the stem.
- d. Package Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

## 2. PROJECT CONDITIONS

- a. Coordinate excavation and plant installation with location of above grade and underground utilities, which will avoid damage.
  - 1. Hand excavate as required.
  - 2. Maintain grade stakes until removal is mutually agreed upon by parties concerned. CONTRACTOR is liable for the repair of any utility damaged by his work at no additional costs to OWNER.
- b. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify project OWNER before planting.
- c. Erosion Control: All erosion control matting to be installed immediately after seed is placed. See drawings and specification for all sediment and erosion control.
- d. Utilities: Determine location of above ground and underground utilities and perform work in a manner which will avoid damage. Hand excavate as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned. CONTRACTOR is liable for the repair of any utility damage by CONTRACTOR's work at no additional cost.
- e. Landscaped areas shall be kept free of trash, litter, and weeds at all times during construction.

## 3. ENVIRONMENTAL CONDITIONS

- a. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.
- b. Do not install plant life when ambient temperatures may drop below 35°F or rise above 90°F.

## 4. COORDINATION

- a. Planting Installation Schedule: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required

maintenance until date of Substantial Completion.

1. Deciduous and Evergreen Material: April 1 to May 30 or August 15 to November 15.
  2. Herbaceous Material: April 1 to May 30 or August 15 to October 15.
  3. Bulbs: October 15 to November 15.
  4. Plugs: April 1st to May 30 and August 15 to October 15.
  5. Other planting times may be considered with prior approval; if the plant material is dormant, or if plant material has been dug during dormancy and has been maintained in a holding area for at least 2 weeks and not more than 6 weeks without signs of wilting, scorching or other signs of stress.
- b. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. Planting will not be permitted if sufficient soil moisture is absent or if ground is frozen.
- c. Coordination with Seeding: Plant trees and shrubs after finished grades are established and before installing turf-sod and seeded areas, unless otherwise acceptable to OWNER. When planting trees and shrubs after turf-sod and seeded areas, protect turf-sod and seeded areas and promptly repair damage caused by planting operations.
- d. Coordination with Erosion Control Material (ECM): Plant plugs after finished grades are established and after ECM has been placed and installed over planting beds. Plugs are not to be planted before placement of ECM.
- e. Coordinate planting operations with the locations of underground utilities; CONTRACTOR is to contact the utility location service. CONTRACTOR is to coordinate work with other trades and with the general contractor to protect private underground utilities in the area. CONTRACTOR is responsible for the repair or replacement of any utilities.
- f. CONTRACTOR is responsible for verifying all required topsoil is in place before the planting operation commences. Plant material may have to be removed due to insufficient topsoil for no additional cost.
- g. Special Requirements for Plug Installation in Biosoil Areas: All seeded areas or disturbed areas outside of the biosoil footprint must have sufficient coverage prior to planting vegetation in biosoil.
- h. Unless noted, tree locations, shrub, groundcover and plug bed locations are approximate. CONTRACTOR shall stake as indicated below:
1. Trees: Stake out all tree locations in field using colored flags for each different tree species for review by OWNER prior to excavation. OWNER reserves the right to adjust plants to exact location in the field.
  2. Shrubs, groundcover and plug beds: Bed layouts shall be staked for review by OWNER prior to installation. OWNER reserves the right to

adjust plants to exact location in the field. Do not disturb root zones or existing trees for planting bed preparation.

5. EXAMINATION

- a. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

6. SITE PREPARATION

- a. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- b. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- c. Lay out individual tree and shrub locations and areas for multiple exterior planting. Stake locations, outline areas, adjust locations when requested, and review with OWNER before planting. Make minor adjustments as required. Unless noted, tree locations on drawings are approximate. CONTRACTOR shall stake out all tree locations in the field using colored flags for each different tree species for review by OWNER prior to excavation. OWNER reserves the right to adjust plants to exact location in field.
- d. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

7. PREPARATION OF TREE, SHRUB AND PERENNIAL AREAS

- a. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- b. Remove foreign materials, weeds and undesirable plants and their roots. Ensure weeds are non-existent before any planting occurs. Remove contaminated subsoil. Remove stones larger than 1 inch in any dimension. Remove sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the OWNER's property.
- c. Scarify subsoil to a depth of 8 inches where plants are to be placed. Repeat

cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

- d. Finish grades of all landscape areas shall be 1 inch below adjacent curb or pavement. In areas where 2 inches of mulch are to be applied, finish soil grades shall be 2 inches below adjacent curb or pavement, mulch surface shall be flush with adjacent curb or pavement.
- e. Spread topsoil to the depth indicated on drawings and not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy or excessively wet. Spread approximately one-half the thickness of topsoil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of topsoil.
- f. After topsoil is spread, apply soil amendments and fertilizer on surface and thoroughly blend topsoil.
  - 1. Delay mixing fertilizer with topsoil if planting will not proceed within a few days.
  - 2. Mix lime (if needed) with dry soil before mixing fertilizer.
- g. Apply pre-emergent herbicide to all planting beds prior to plant installation. Follow manufacturer's recommendations on application. Do not apply pre-emergent herbicide to areas where plugs or seeding will be installed.
- h. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.
- i. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

## 8. PREPARATION OF PLANT PLUG AREAS

- a. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas. Rake, remove ridges, and fill depressions to meet finish grades.
- b. Completely remove foreign materials, existing vegetation, and the existing soil seed bank prior to planting plugs. Remove contaminated subsoil. Remove stones larger than 1 inch in any dimension. Remove sticks, roots, rubbish, and other extraneous matter and legally dispose of them off OWNER's property.
- c. Scarify subsoil outside of rain gardens to a depth of 8 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

- d. In areas outside of the biosoil, spread topsoil to the depth indicated on drawings and not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
    - 1. Do not apply pre-emergent herbicide to areas where bioretention soil mix is installed.
  - e. If vegetation exists after soil preparation, apply a 2% glyphosate herbicide at least four weeks prior to installation on all actively growing vegetation. Verify that a good kill has resulted from the herbicide application prior to planting.
  - f. Do not apply any fertilizer other than compost.
  - g. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.
  - h. Erosion Control Material (ECM) as specified and shown on drawings must be placed after finish grading and before plug planting.
  - i. Special Requirements for Plug Installation in Biosoil Areas: All seeded areas or disturbed areas outside of the biosoil footprint must have sufficient coverage prior to planting vegetation in biosoil.
9. TREE AND SHRUB BALLED AND BURLAPPED AND CONTAINER STOCK INSTALLATION
- a. Excavation
    - 1. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
      - a. Excavate approximately three times as wide as ball diameter for balled and burlapped and/or container-grown stock.
      - b. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
      - c. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.
    - 2. Subsoil removed from excavations may be used as backfill if it meets specified requirements for topsoil.
    - 3. Obstructions: Notify OWNER if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
    - 4. Drainage: Notify OWNER if subsoil conditions show evidence of unexpected water seepage or retention in tree or shrub pits.
  - b. Planting
    - 1. Plant Placement: Plant spacing is as indicated on drawing unless



otherwise noted. It is the CONTRACTOR's responsibility to provide full coverage in all planting areas as specified in the plant schedule remarks. Align and equally space in all directions all trees, shrubs, groundcover, bulbs and plugs as noted in the drawings.

2. Set balled and burlapped stock and container stock plumb and in center of pit or trench with top of root crown 2 inch (50 mm) above adjacent finish grades.
  - a. Remove burlap, rope, container and/or wire baskets from top one-third of root balls and partially from sides, but do not remove from burlap from under root balls.
  - b. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
  - c. Place topsoil around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of topsoil.
3. Dish and tamp top of backfill to form a 3 inch high saucer around the rim of the pit. Do not cover top of root ball with backfill.
4. Plants will be rejected if the rootball has been disturbed or damaged prior to or during planting.

- c. Pruning: Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by OWNER, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

## 10. PLUG INSTALLATION

- a. Install Erosion Control Material (ECM) as specified prior to plug installation in all areas as indicated on plan.
- b. Install plugs by slitting ECM 6 inches in a north/south/east/west pattern to install plug into soil below mat. Plant plugs 18 inches on center (or as indicated in Plant Schedule) as shown on detail.
- c. Plant plugs level with existing soil grade. Be certain that soil is placed around the plugs and firmed into place. Do not fill around plugs with mulch.
- d. Thoroughly soak plugged area with water until soil is moist to a depth of 4 inches.
- e. Plugs to be installed in all areas indicated on plans and planting schedule.
- f. Early post planting, once plants have had the opportunity to be watered and begin new root establishment, apply Barricade pre-emergent (or approved

equal) per label instructions.

#### 11. CLEANUP AND PROTECTION

- a. During exterior planting, keep adjacent paving and construction work area clean and in an orderly condition.
- b. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Protect exterior plants from wildlife damage. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting. Install tree guards immediately after tree installation to protect from deer damage.

#### 12. OBSERVATION AND ACCEPTANCE

- a. Observation: Field observation may be completed by the OWNER for performance of landscape work defined by Contract Documents. Observation visits may be made by OWNER at any time throughout the landscape installation.
- b. Plant Plugs Acceptance:
  - 1. Plugs shall exhibit vigorous growth and be thoroughly rooted by the end of first growing season.
  - 2. Maximum acceptable loss is 10% of total number of installed plugs. Replace plugs that are dead or in an unhealthy condition at end of warranty period as determined by OWNER.

#### 13. DISPOSAL

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

#### 14. MAINTENANCE

- a. Trees and Shrubs: Maintenance for trees and shrubs shall be through the growing season and up until Substantial Completion as specified below. OWNER will accept responsibility for maintenance at Substantial Completion.
  - 1. Watering: watering and rainfall shall supply a minimum of 1 inch of water per week.
  - 2. Weeding: monthly or more frequently as needed to remove invasive or exotic plants.
  - 3. Pruning: once at initial planting or as needed
  - 4. Spraying: monthly or as needed to keep trees and shrubs free of insects and disease.
  - 5. Tightening/ Repairing Tree Stakes and Vertical Adjustment: as needed

- to maintain trees and shrubs growing in an upright vertical position
  - 6. Replanting/ Replacement: as needed to replace dead or damaged plant material
  - 7. Trash/ Litter Removal: weekly or as needed to remove trash and litter
- b. Special Landscape Areas: Maintenance for special landscape areas shall be through the growing season and up until Substantial Completion as specified below. Maintenance must be on an approximate monthly basis or more frequently if needed for certain tasks like watering. Contractor to submit maintenance schedule to OWNER before acceptance of initial planting by OWNER. OWNER will accept responsibility for maintenance at Substantial Completion.
- 1. Special Landscape Areas include:
    - a. Bioretention Areas.
    - b. Plug Areas.
    - c. Perennials and Grasses Areas.
  - 2. Maintenance items during this period are as specified below:
    - a. Watering: watering and rainfall shall supply a minimum of 1 inch of water per week.
    - b. Weeding: monthly or more frequently as needed to remove invasive or exotic plants to less than 5% of vegetative cover.
  - 3. Pruning/ Cut-back Perennials: as needed
  - 4. Replanting/ Replacement: as needed to replace dead or damaged plant material
  - 5. Control of Erosion or Gullies: monthly or as needed
  - 6. Trash/ Litter Removal: weekly or as needed to remove trash and litter
- c. All plant material shall be maintained in a healthy and growing condition and must be replaced with plant material of similar variety and size if damaged, destroyed or removed.
- d. Plug Maintenance: In addition to the general requirements above for plant material, the following maintenance requirements are specific to plug installations: Pull weeds of the following species deemed detrimental to native plug plantings. The species include but are not limited to: Canada Thistle, Queen Anne's Lace, Sweet Clover, Johnson Grass, Nutsedge, Barnyard Grass.
- e. For all maintenance areas, CONTRACTOR is responsible for watering. Watering and rainfall shall supply a minimum of 1 inch of water per week.
- f. After the specified period for which CONTRACTOR is responsible for maintenance as specified above, OWNER will assume maintenance responsibility. CONTRACTOR to provide OWNER with 30-day notice before the end of the period for which their maintenance will end.

## 15. WARRANTY

- a. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth.
  - 1. Warranty Period for Trees and Shrubs: Two years from date of Substantial Completion.
  - 2. Warranty Period for Plugs and Perennials: Two years from date of Substantial Completion.
- b. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
- c. Replacement plants shall be the same size and species as specified with a new warranty commencing on date of replacement.
- d. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
- e. There will be no exceptions to the warranty. CONTRACTOR accepts responsibility for all materials specified.

D. PAYMENT

Furnishing and installation of exterior plants are paid for at the unit price bid per item. Payment will be made at the unit prices stated in the Bid. The unit prices shall constitute full compensation for all labor, equipment, materials, and incidentals necessary for the satisfactory completion of the work.

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