

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Trees.
 - 2. Shrubs.
 - 3. Perennials.
 - 4. Ground Cover.
 - 5. Soil Amendments
 - 6. Initial Maintenance of Landscape Materials.
- B. Related Sections:
 - 1. Standard details.

1.02 REFERENCES

- A. American National Standards Institute
 - 1. ANSI Z60.1, American Standard for Nursery Stock.

1.03 SYSTEM DESCRIPTION

- A. Wastewater and Reclaimed Water Facilities and/or sites may require special plantings due to zoning or aesthetic requirements of the Authority. Consult with the Authority for planting requirements prior to finalization of the project design.
- B. Aboveground facilities shall be as contextual as reasonably possible.

1.04 QUALITY ASSURANCE

- A. Work shall be completed by a single firm specializing in landscape work.
 - 1. The Contractor shall have been actively and directly engaged in contracting, installing and maintenance of planting, landscapes and lawns for a period of five (5) years or more, and provide proof of five (5) or more installations completed by them which have been in use for three (3) or more years.
- B. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
 2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to the Authority, together with proposal of use of equivalent material.
 3. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
 4. Topsoil: If topsoil from off site is proposed, furnish a written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past two (2) years.
 5. Trees, Shrubs and Plants: Provide trees, shrubs, and plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.
 6. Label each tree and shrub with securely attached waterproof tag bearing legible designation of botanical and common name.
 - a. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
 7. Inspection: The Authority may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. Authority retains right to further inspect trees and shrubs 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.
- C. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report 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 the soil.
1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three (3) representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 3. Report suitability of tested soil for plant growth.
 - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000

sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

- b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.05 SUBMITTALS

- A. Submit in accordance with requirements of Section 01 33 00.
- B. Plant and Material Certifications:
 - 1. Certificates of Inspection as required by governmental authorities.
 - 2. Manufacturer's or vendor's certified analysis for soil amendments and fertilizer materials.
 - 3. Label data substantiating that plants, trees, shrubs and planting materials comply with specified requirements.
- C. Planting Schedule: Proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- D. Maintenance Instructions: Typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one (1) full year. Submit prior to expiration of required maintenance period(s).

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.
- B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Authority. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.
- C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than six (6) hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap, or other acceptable means of retaining moisture.
- D. Do not remove container-grown stock from containers until planting time.

1.05 JOB CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Authority before planting.

1.06 SEQUENCING AND SCHEDULING

- A. Planting Season: Planting shall be done only within the following dates specified or as on the Drawings. If special conditions exist which may warrant a variance in the planting dates, a written request shall be submitted to the Authority stating the special conditions and the proposed variance. Permission for the variance will be given if, in the opinion of the Authority, the variance is warranted. Planting installed outside the given dates shall remain under the Contractor's one-year warranty.
 - 1. Deciduous Trees and Shrubs: March 1 to May 15, or September 1 to December 1.
 - 2. Evergreen Trees and Shrubs: March 1 to May 15, or September 1 to Nov. 15.
 - 3. Perennials and Groundcovers: Plant frost-tender perennials and groundcover only after danger of frost is past or at least six weeks before frost season to allow for establishment before first frost. Do not plant in frozen ground.
- B. Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Authority. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.07 SPECIAL PROJECT WARRANTY

- A. Warranty trees and shrubs, for a period of one (1) year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Authority, abuse or damage by others, or unusual phenomena or incidents which are beyond Contractor's control.
- B. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Authority, it is advisable to extend warranty period for a full growing season.
 - 1. Another warranty inspection will be conducted at end of extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. Topsoil may be stockpiled for re-use in landscape work. If quantity or quality of stockpiled topsoil is insufficient, provide additional topsoil as required to complete landscape work.
- B. New Topsoil:

1. Provide topsoil which is fertile, friable, naturally loamy, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter and free of roots, stumps, stones larger than one inch (1”) in any dimension, and other extraneous or toxic matter harmful to plant growth. Topsoil to be a loam or sandy loam soil consisting of fifty to eighty (50 - 80%) sand, fifteen to fifty percent (15 - 50%) silt, ten to twenty percent (10 – 20%) clay.
2. Obtain topsoil from local sources or from areas having similar soil characteristics to those found at site of work. Obtain topsoil from naturally well-drained sites where topsoil occurs in depth of not less than six inches (6”), do not obtain from bogs or marshes. Before delivery of topsoil, furnish the Authority with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, crops grown and herbicide applications during past two (2) years. Submit a sample for review and approval. Contractor will be responsible to test new topsoil to determine the soil amendments necessary for lawns or planting areas. Copies of test results are to be submitted to the Authority for review and approval.

2.02 SOIL AMENDMENTS

- A. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve.
- B. Aluminum Sulfate: Commercial grade.
- C. Peat Humus: Composed of mosses (other than sphagnum) or reed-sedge peat of a coarse fibrous texture and with pH of 6.0 to 7.5.
 1. For acid-loving trees and shrubs, provide moss peat with pH of 3.2 to 4.5, coarse, fibrous texture, medium-divided sphagnum moss peat or reed-sedge moss peat.
- D. Bonemeal: Commercial, raw, finely ground; 4 percent nitrogen and 20 percent phosphoric acid.
- E. Superphosphate: Soluble mixture of treated minerals; 20 percent available phosphoric acid.
- F. Sand: Clean, washed sand, free of toxic materials.
- G. Perlite: Conforming to National Bureau of Standard PS 23.
- H. Vermiculite: Horticultural grade, free of toxic substances.
- I. Fertilizers: Provide complete commercial controlled release fertilizer, of neutral character, with some elements derived from organic sources, containing at least 10 percent available phosphoric acid, 3 percent to 5 percent total nitrogen, and 3 percent to 5 percent soluble potash.
- J. Compost: The Authority produces UAJA Compost that has been observed to improve soil structure, reduce soil compaction, increase water infiltration, increase soil aeration, increase moisture holding capacity, and to provide a slow release of nutrients. Consult with the Authority for analytical data, availability and pricing.

2.03 PERENNIAL/GROUNDCOVER BED SOIL MIX

- A. Soil mix shall consist of, but necessarily be limited to the following ingredients in proportions determined from a soil test analysis by a qualified agronomist or soil testing agency.

1. Topsoil as specified in paragraph 2.1 above.
2. Organic matter of well rotted vegetative material.
3. Ground limestone.
4. Complete fertilizer, 5-10-5

2.04 PLANT MATERIALS

- A. Quality: Provide trees, shrubs, and other plants of size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1.
- B. Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.a for type and species required. Provide single stem trees except where special forms are shown or listed.
 1. Provide balled and burlapped (B&B) deciduous trees.
 - a. Container grown deciduous trees will be acceptable in lieu of balled and burlapped deciduous trees subject to specified limitations of ANSI Z60.1 for container stock.
- C. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.
 1. Provide balled and burlapped (B&B) deciduous shrubs.
 - a. Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to specified limitations for container grown stock.
- D. Coniferous and Broad-leafed Evergreens: Provide evergreens of sizes required. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types, such as globe, dwarf, cone, pyramidal, broad upright, and columnar. Provide normal quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension shown.
 1. Provide balled and burlapped (B&B) evergreens.
 - a. Container grown evergreens will be acceptable, subject to specified limitations for container grown stock.
- E. Container Grown-Stock: Where specified as acceptable, provide healthy, vigorous, well-rooted trees, shrubs or perennials established in container in which they are sold. Provide balled and burlapped stock when required trees or shrubs exceed maximum size recommended by ANSI Z60.1 for container-grown stock.
 1. Established container stock is defined as a tree, shrub or perennial transplanted into container and grown in container for a length of time sufficient to develop new fibrous roots, so that root mass will retain its shape and hold together when removed from container.

2. Containers: Use rigid containers that will hold ball shape and protect root mass during shipping. Provide trees, shrubs and perennials established in containers of not less than minimum sizes recommended by ANSI Z60.1 for kind, type, and size of trees, shrubs or perennials required.
- F. Ground Cover: Provide plants established and will rooted in removable containers or integral peat pots and with not less than minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.
- G. Perennials: Provide healthy, vigorous, well rooted container grown or field potted plants of sizes indicated in accordance with ANSI Z60.1. Plants shall be free of disease, mildew, mold and insects.

2.05 MISCELLANEOUS LANDSCAPE MATERIALS

- A. Anti-Desiccant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
- B. Pre-emergent herbicide: Provide granular herbicide, snapshot or equal. EPA registered and approved.
- C. Mulch: Organic mulch free of deleterious materials and suitable for top dressing of trees, shrubs, or plants and consisting of one of the following:
 1. Double shredded hardwood.
 2. Pine Bark Mini-nuggets (1/2" to 1" size).
- D. Non-woven Fabric: Non-woven polypropylene fabric. Product No. 1120N as manufactured by Nicolon MIRAFI Group or equivalent.

PART 3 - EXECUTION

3.01 PREPARATION - GENERAL

- A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Authority's acceptance before start of planting work. Make minor adjustments as may be required.

3.02 PREPARATION OF PLANTING SOIL

- A. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
 1. For planting areas, all mulched beds shall be treated with herbicide such as Treflan, Snapshot or equal. All topsoil to be used for planting shall be thoroughly and uniformly rototilled with peat humus in the proper proportion by volume of one part peat humus to six (6) parts topsoil. Fertilize each plant with nursery recommended started fertilizer.
- B. Cooperate with other contractors and trades working in and adjacent to landscape work areas. Examine drawings that show development of entire site and become familiar with scope of other work required.

- C. Layout individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Authority's acceptance before start of planting work. Make minor adjustments as may be requested by Authority.
- D. Layout location of trees and shrubs as directed by Authority.
- E. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
- F. Excavation:
 - 1. Excavate pits, beds, and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.
 - a. For balled and burlapped trees and shrubs, make excavations approximately 1-1/2 times as wide as ball diameter and equal to ball depth.
 - b. For container-grown stock, excavate as specified for balled and burlapped stock, except conform to container width and depth.
 - c. Where drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.
- G. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill.
- H. Obstructions: If rock, underground construction, or other obstructions are encountered in excavation for planting of trees or shrubs, notify Authority. New locations may be selected by Authority, or change order may be issued to direct removal of obstructions at least 6 inches below required planting depth.
- I. Hardpan Layer: Drill 6-inch diameter holes into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with 1/2 inch stone (AASHTO No. 8).
- J. Drainage: If subsoil conditions indicate retention of water in planting areas, as shown by seepage or other evidence indicating presence of underground water, notify Authority before backfilling. A change order may be issued to direct installation of drain tile or other measures beyond drainage requirements indicated.
- K. Fill excavations with water and allow to percolate out before setting trees and shrubs.
- L. Before mixing, clean topsoil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
 - 1. All topsoil to be used for planting shall be thoroughly and uniformly rototilled with peat moss and Perlite in the proper proportion by volume of one part peat, and one part Perlite to six (6) parts topsoil. Fertilize each plant with nursery recommended started fertilizer.
- M. Mix soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
- N. For pit or trench backfill, mix planting soil before backfilling and stockpile at site.

3.03 PREPARATION OF PERENNIAL PLANT BEDS

- A. General: Preparation of perennial plant beds shall be included for all perennial plants and ground cover.

- B. Combine topsoil and organic material specified in Paragraph perennial bed soil mix, and thoroughly mix 1 part organic material to 6 parts topsoil.
- C. Install Perennial soil mix to a uniform depth of 15" upon scarified subgrade (3").
- D. Spread limestone over surface of perennial bed at rate required for specified pH of soil mix and thoroughly till into full depth of prepared mix.
- E. Apply fertilizer to prepared bed at rate required by soil test and thoroughly incorporate into soil.
- F. Soil pH shall range from 5.5 to 7.5
- G. Adjust quantities of soil mix ingredients as necessary to achieve desired pH level.

3.04 PLANTING TREES AND SHRUBS

- A. Set balled and burlapped (B&B) stock on undisturbed subgrade, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets.

When excavation is approximately two-thirds (2/3) filled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.
- B. Set container grown stock, as specified, for balled and burlapped stock, except cut root ball on four (4) sides with a sharp knife; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.
- C. Dish top of backfill to allow for mulching. Apply pre-emergent herbicide.
- D. Mulch pits, trenches, and planted areas. Provide not less than following thickness of mulch, and work into top of backfill and finish level with adjacent finish grades.
 - 1. Provide three compacted inches (3") thickness of double shredded hardwood mulch.
- E. Apply anti-desiccant, using power spray, to provide an adequate film over trunks, branches, stems, twigs and foliage.
 - 1. If deciduous trees or shrubs are moved when in full-leaf, spray with anti-desiccant at nursery before moving and spray again two (2) weeks after planting.
- F. Prune, thin out, and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Authority, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character.
- G. Remove and replace excessively pruned or misformed stock resulting from improper pruning.
- H. Do not guy/stake trees.

3.05 PLANTING GROUNDCOVER AND PERENNIAL PLANTS

- A. Space groundcover and plants as indicated in a uniform manner.
- B. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.06 MAINTENANCE

- A. Begin maintenance immediately after planting.
- B. Maintain trees, shrubs, and other plants until final acceptance, but in no case, less than following period:
 - 1. Sixty (60) days after substantial completion of planting.
- C. Maintain trees, shrubs, and other plants by pruning, cultivating, and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

3.07 CLEANUP AND PROTECTION

- A. During landscape work, keep pavements clean and work area in an orderly condition.
- B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.08 INSPECTION AND ACCEPTANCE

- A. When landscape work is completed, including maintenance, the Authority will, upon request, make an inspection to determine acceptability.
 - 1. Landscape work may be inspected for acceptance in portions as agreeable to Authority, provided each portion of work offered for inspection is complete, including maintenance.
- B. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by Authority and found to be acceptable. Remove rejected plants and materials promptly from project site.

END OF SECTION