# SECTION 32 90 00

# PLANTING

## PART 1 - DESIGN DIRECTIVES

### 1.1 SUMMARY

A. It is the intent of Dartmouth College that the consultant incorporates the requirements contained herein with the consultant's specifications to produce a document that is a cohesive, coordinated, non-conflicting project specific specification. Deviations from these standards shall be discussed with the appropriate DC-FO&M representative.

### 1.2 QUALITY ASSURANCE

A. Engage an experienced Landscape Contractor. Landscape Contractor must maintain an experienced full-time supervisor on the Project site during times that lawn, tree, and shrub planting is in progress.

B. Pesticide application shall be made by experienced workmen under supervision of a licensed applicator approved by Facilities Operation and Maintenance, Dartmouth College. Coordinate all pesticide application activities with the Dartmouth Grounds Supervisor.

C. Furnish a soil analysis made by a qualified independent soil-testing agency. Soil analysis must state.

1. Percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, and pH levels
2. Sieve analysis and mineral and plant nutrient content of topsoil.
3. Test for herbicide contamination and provide report certifying that no herbicides are present.
4. State quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce satisfactory topsoil.

### 1.3 COORDINATION AND SCHEDULING

A. Prior to initiating the design process, the designer shall identify landscape design objectives and discuss management and maintenance concerns with the Dartmouth Grounds Supervisor.

B. The College Architect and the Dartmouth Grounds Supervisor shall review design drawings to ensure compliance with campus design guidelines and construction standards.

C. At the direction of the College Architect or Owner Representative, Dartmouth Safety & Security, the Dartmouth Landscape Committee or other parties may further review the drawings.

D. Consult the Dartmouth Grounds Supervisor for a list of preferred Landscape Contractors for landscape construction projects.

E. Landscape Contractors are required to attend a Mandatory Pre-Bid Conference to be held at the project site. The College Architect, the Dartmouth Grounds Supervisor, the Dartmouth Campus Arborist and the designer shall review all drawings and specifications with potential bidders.

F. The Landscape Contractor shall supply the Dartmouth Grounds Supervisor with the name and address of the nursery(s) supplying plant material for all projects.

G. The College reserves the right to send a representative of their choosing to the nursery(s) to select and tag specific plant material for use on the project.

H. Sixty days prior to the scheduled installation date, the Landscape Contractor shall notify the College in writing, that all plant material specified for the project has been located and secured for use on the project.

## PART 2 - PRODUCTS

### 2.1 TOPSOIL

A. Provide fertile, friable, naturally loamy with a pH range of 5.5 to 7.0 and 4 percent organic material minimum.

B. Topsoil shall be free of stones 1/2 inch (12 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

C. Topsoil shall meet the following sieve analysis criteria:100% by weight will pass ½" mesh sieve 97% - 100% will pass ¼" mesh sieve. In material passing ¼" mesh sieve there will not be less than 20% or more than 65% passing No. 200 mesh sieve as determined by wash test.

D. Reuse surface soil stockpiled on the site. Verify suitability of surface soil stockpiled to produce topsoil that meets basic requirements. If stockpiled soil does not meet requirements, amend as necessary.

E. If required, import topsoil from off-site sources. Clean imported topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

F. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.

### 2.2 SOIL AMENDMENTS

A. Lime: Provide dolomitic limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.

B. Aluminum Sulfate: Commercial grade, unadulterated.

C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Peat Humus: Finely divided or granular texture.

1. For acid-sensitive trees and shrubs provide moss peat with a pH range of 6.0 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
2. For acid-tolerant trees and shrubs, provide moss peat with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.

F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. Mix sawdust with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cu. ft. (cu. m) of loose sawdust or ground bark.

G. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

H. Compost Tea: Formulation and application rates as approved by Dartmouth Campus Arborist and/or Turf Manager

I. Herbicides: EPA registered and approved, of type by manufacturer and as approved by Dartmouth College Campus Arborist and/or Turf Manager.

J. Water: Potable.

## 2.3 FERTILIZER

A. Bonemeal: Finely ground Commercial grade with a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial grade phosphate mixture, soluble with a minimum of 20 percent available phosphoric acid.

C. 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-form, 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.

D. Slow-Release Fertilizer: Granular 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 soil-testing agency.

## 2.4 MULCHES

A. Provide shredded hardwood bark mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs unless directed otherwise by the Dartmouth Grounds Supervisor.

## 2.5 SUGGESTED PLANT MATERIALS

A. The Dartmouth Grounds Supervisor shall approve all plants specified for use on the Dartmouth Campus. The following lists of plants can be expected to perform well on campus. Designers are encouraged to select from this list but are not obligated to do so. Plants listed, as Highly Invasive shall not be used on the Dartmouth campus; plants listed as moderately invasive shall be used only with the Dartmouth Grounds Supervisor’s written permission.

## 2.6 SUGGESTED TREES

A. Evergreen Trees

| Botanical Name | Common Name |
|---|---|
| Abies balsamea | Balsam fir |
| Abies concolor | White fir |
| Abies fraseri | Fraser fir |
| Chamaecyparis pisifera | False cypress |
| Chamaecyparis thyoides | Atlantic white cedar |
| Juniperus virginiana | Eastern red cedar |
| Larix spp | Larch and tamarack |
| Metasequoia glyptostroboides | Dawn redwood |
| Picea abies | Norway spruce |
| Picea glauca | White spruce |
| Picea omorika | Serbian spruce |
| Picea orientalis | Oriental spruce |
| Picea pungens | Colorado spruce |
| Pinus cembra | Swiss stone pine |
| Pinus flexilis | Limber pine |
| Pinus parviflora | Japanese white pine |
| Pinus resinosa | Red pine |
| Pinus strobus | White pine |
| Pinus sylestris | Scotch pine |
| Thuja occidentalis | Arborvitae |
| Tsuga canadensis | Canadian hemlock |

B. Deciduous Trees

| Botanical Name | Common Name |
|---|---|
| Acer Freemani | Freeman maple group |
| Acer rubrum | Red maple |
| Acer saccharum | Sugar maple |
| Aesculus octandra | Buckeye |
| Amelanchier spp | Serviceberry |
| Betula alleghaniensis | Yellow birch |

| | |
|---|---|
| Betula papyrifera | White birch |
| Betula populifolia | Grey birch |
| Carpinus betulas | European hornbeam |
| Carpinus caroliniana | American hornbeam |
| Cercidiphyllum japonicum | Katsura |
| Chionanthus retusus | Chinese fringe |
| Chionanthus virginicus | Fringe |
| Cladrastis kentukea | Yellowwood |
| Cornus mas | Cornelian cherry dogwood |
| Crataegus spp | Hawthorn |
| Fagus grandifolia | American beech |
| Ginkgo biloba | Ginkgo |
| Gleditsia triacanthos | Honeylocust |
| Gymnocladus dioicus | Kentucky coffee tree |
| Liriodendron tulipfera | Tulip tree |
| Maackia amurensis | Maackia |
| Magnolia lilliflora | Magnolia hybrids |
| Magnolia spp | Magnolias various |
| Malus | Crabapple cultivars |
| Nyssa sylvatica | Tupelo |
| Ostrya virginiana | Hophornbeam |
| Oxydendron arboreum | Sourwood |
| Platanus acerifolia | Planetree |
| Prunus sargentii | Sargent cherry |
| Quercus alba | White oak |
| Quercus bicolor | Swamp white oak |
| Quercus coccinea | Scarlet oak |
| Quercus palustris | Pin oak |
| Quercus robur | English oak |
| Quercus rubra | Red oak |

| | |
|---|---|
| Sorbus ainifolia | Korean mountain ash |
| Syringa reticulata | Japanese tree lilac |
| Tilia cordata | Littleleaf linden |
| Tilia tomentosa | Sterling linden |
| Ulmus americana | American elm (“Valley Forge” discouraged) |
| Zelkova serrata | Zelkova (“Greenvase” or similar) |

## 2.7 SUGGESTED SHRUBS

A. Evergreen Shrubs

| Botanical Name | Common Name |
|---|---|
| Abies balsamea “Nana” | Dwarf balsam fir |
| Buxus “Green Gem” | Boxwood |
| Catawbiense | Catawba rhododendron |
| Chamaecyparis pisifera | Sawara false cypress |
| Chamaecyparis obtusa | Hinoki false cypress |
| Iliex glabra | Inkberry |
| Juniperus chinensis | Sargent juniper |
| Juniperus communis | Common juniper |
| Juniperus horizontalis | Bar Harbor juniper |
| Juniperus sabina | Savin juniper |
| Kalmia augustifolia | Sheep laurel |
| Kalmia latifolia | Mountain laurel |
| Microbiota decussata | Russian cypress |
| Myrica pensylvanica | Northern bayberry |
| Pinus banksiana “Shoodic” | Prostrate jack pine |
| Taxus spp | Yew, various |
| Tsuga canadensis | Hemlock |
| Tsuga “Coles Prostrate” | Cole’s Prostrate |

| Botanical Name | Common Name |
|---|---|
| Aesculus parviflora | Bottlebrush buckeye |
| Aronia abutifolia | Red chokecherry |
| Aronia melanocarpa | Black chokecherry |
| Ceanothus americanus | New Jersey tea |
| Clethra alnifolia | Summersweet |
| Comptonia peregrina | Sweet fern |
| Cornus alba | Red twig dogwood |
| Cornus amomum | Silky dogwood |
| Cornus racemosa | Grey dogwood |
| Cornus sericea | Red osier dogwood |
| Corylus americana | American hazelnut |
| Cotoneaster apiculatus horizontalis | Cotoneaster |
| Deutzia gracilis | Deutzia |
| Diervilla spp | Diervilla |
| Enkianthus spp | Enkianthus |
| Forsythia | “North Gold” and “North Sun” hybrids |
| Fothergilla spp | Fothergilla |
| Hamamelis vernalis | Vernal witchhazel |
| Hamamelis virginiana | Common witchhazel |
| Hydrangea arborescens | Smooth hydrangea |
| Hydrangea paniculata | Panicle hydrangea cultivars |
| Ilex verticillata | Winterberry |
| Ilex glabra | Inkberry |
| Myrica pensylvanica | Bayberry |
| Parthenocissus spp | Virgina creeper, Boston ivy |
| Physocarpus opulifolius | Ninebark |
| Potentilla spp | Potentilla |
| Rhus aromatica | Fragrant sumac |
| Sambucus canadensis | American elderberry |

| | |
|---|---|
| Syringa spp | Lilac, various |
| Viburnum spp | Viburnum, various |
| Weigela florida | Weigela, various cultivars |

## 2.8 SUGGESTED VINES

| Botanical Name | Common Name |
|---|---|
| Clematis sp. | Clematis |

## 2.9 SUGGESTED PERENNIALS FOR GROUNDCOVERS

| Botanical Name | Common Name |
|---|---|
| Ajuga reptans | Bluebugle |
| Armeria maritima | Common Thrift |
| Asarum canadense | Wild Ginger |
| Bergenia cordifolia | Heartleaf Bergenia |
| Cerastium tomentosum | Snow-in-Summer |
| Convallaria majalis | Lily-of-the-valley |
| Epimedium x rubrum | Red Barrenwort |
| Gazania x splendens | Gazania |
| Geranium sanguineum | Cranesbill |
| Hemerocallis hybrids | Daylilies |
| Hosta sp. | Hostas |
| Iberis sempervirens | Perennila Candytuft |
| Lamiastrum galeobdolon | Yellow Archangel |
| Lamium maculatum | Spotted Dead Nettle |
| Polemonium retans | Jacob's-ladder |
| Pulmonaraia angustifolia | Blue Lungwort |
| Sedum sp. | Stonecrop |

## 2.10 SUGGESTED SHRUBS FOR GROUNDCOVERS

| Botanical Name | Common Name |
|---|---|
| Arctostaphlos uva-ursi | Bearberry |
| Calluna vulgaris | Scotch Heather |
| Cornus canadensis | Bunchberry |
| Cotoneaster horizontalis | Rock Spray |
| Euonymus fortunei | Winter Creeper |
| Juniperus communis | Common Juniper |
| Juniperus horizontalis | Creeping Juniper |
| Juniperus sabina 'Tamariscifolia | Savin |
| Micrbiota decussata | Russian Cypress |
| Taxus canadensis | Canadian Yew |
| Spiraea albiflora | Japanese White Spirea |
| Sprirea bullata | Crispleaf Spirea |
| Vinca minor | Periwinkle |
| Xanthorhiza simplicissima | Yellowroot |

## 2.11 INVASIVE PLANTS

A. Highly Invasive Plants – (prohibited from use on the Dartmouth campus)

1. Trees

| Botanical Name | Common Name |
|---|---|
| Acer platanoides | Norway Maple |
| Populus alba | White Poplar |

2. Shrubs

| Botanical Name | Common Name |
|---|---|
| Berberis thunbergii | Japanese Barberry |
| Elaeagnus angustifolia | Russian Olive |
| Elaeagnus umballata | Autumn Olive |
| Ligustrum sinense | Chinese Privet |
| Lonicera maackii | Amur Honeysuckle |
| Lonicera morrowii | Morrow Honeysuckle |
| Lonicera tatarica | Tartarian Honeysuckle |
| Lonicera x bella | Bella Honeysuckle |
| Rhamnus cathartica | Common Buckthorn |
| Rhamnus frangula | Glossy Buckthorn |

3. Perennials

| Botanical Name | Common Name |
|---|---|
| Alliaria petiolata | Garlic Mustard |
| Butomus umbellatus | Flowering Rush |
| Daucus carota | Queen Anne's Lace |
| Leucan-themum vulgare | Ox-eye Daisy |
| Lythrum salicaria | Purple Loosestrife |
| Verbascum thapsus | Common Mullein |

4. Vines

| Botanical Name | Common Name |
|---|---|
| Ampelopsis brevipedunculata | Porcelain-berry |
| Celastrus orbiculatus | Oriental Bittersweet |
| Lonicera japonica | Japanese Honeysuckle |

B. Moderately Invasive (used only with permission of the Dartmouth Grounds Supervisor)

1. Trees

| Botanical Name | Common Name |
|---|---|
| Juniperus virginiana | Eastern. Red Cedar |
| Populus tremuloides | Quaking Aspen |
| Robinia pseudo-acacia | Black Locust |
| Ulmus pumila | Siberian Elm |

2. Shrubs

| Botanical Name | Common Name |
|---|---|
| Berberis vulgaris | Common Barberry |
| Cornus racemosa | Gray Dogwood |
| Cornus sericea | Red Osier Dogwood |
| Euonymus alatus | Winged Euonymus |
| Physocarpus opulifolius | Ninebark |
| Ligustrum vulgare | European Privet |
| Rhus glabra | Smooth Sumac |
| Rosa multiflora | Multiflora Rose |
| Viburnum opulus | European Cranberry-bush |

3. Perennials

| Botanical Name | Common Name |
|---|---|
| Hesperis matronalis | Dame's Rocket |
| Hydrilla verticillata | Hydrilla |
| Iris pseudacorus | Yellow Iris |
| Lysimachia nummularia | Moneywort |
| Najas minor | Naiad |
| Nasturtium officinale | Watercress |
| Nymphoides peltata | Yellow Floating Heart |
| Valeriana officinalis | Garden Heliotrope |

4. Vines

| Botanical Name | Common Name |
|---|---|
| Euonymus fortuni | Wintercreeper |
| Vinca minor | Periwinkle |

## PART 3 - EXECUTION

### 3.1 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations, operations by other contractors and trades, and trespassers.

C. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

### 3.2 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the College's property.

### 3.3 DESIGN DETAILS

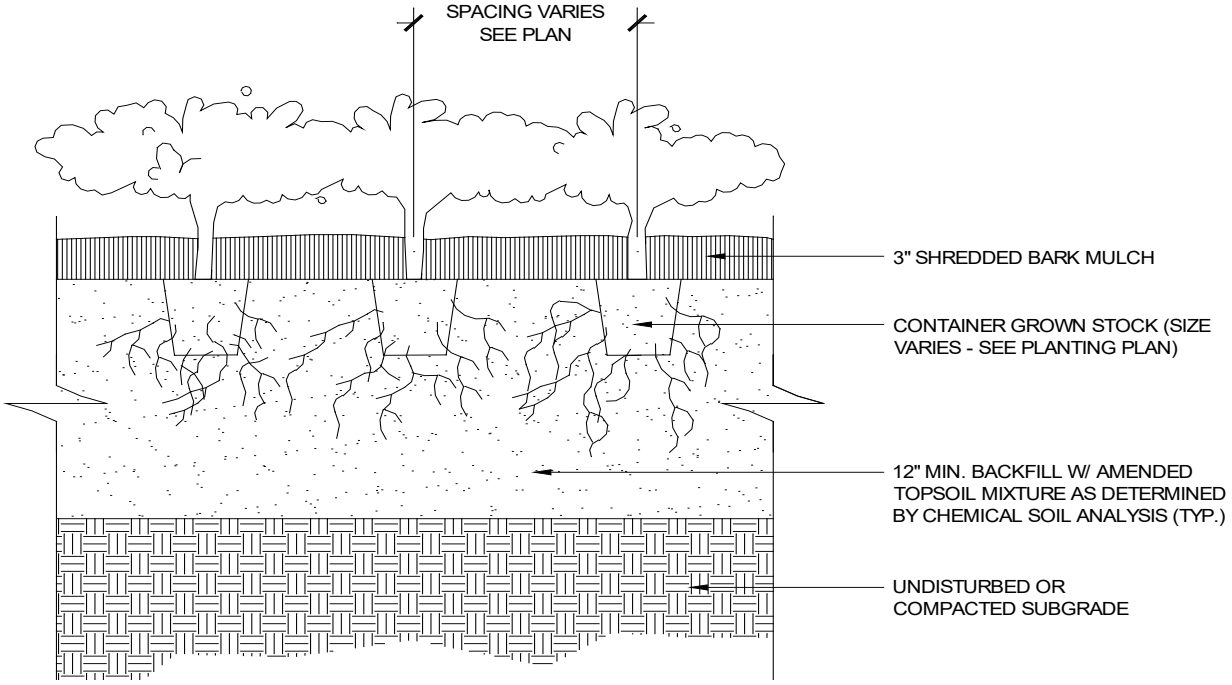
A. This section consists of AutoCad drawings depicting typical landscape details governing the installation of plant materials on the Dartmouth Campus. The following is an index of standard landscape details contained in this section.

1. Typical Groundcover Planting
2. Typical Evergreen Tree
3. Typical Deciduous Tree
4. Typical Shrub Planting
5. Typical Hedge Planting
6. General Planting Notes

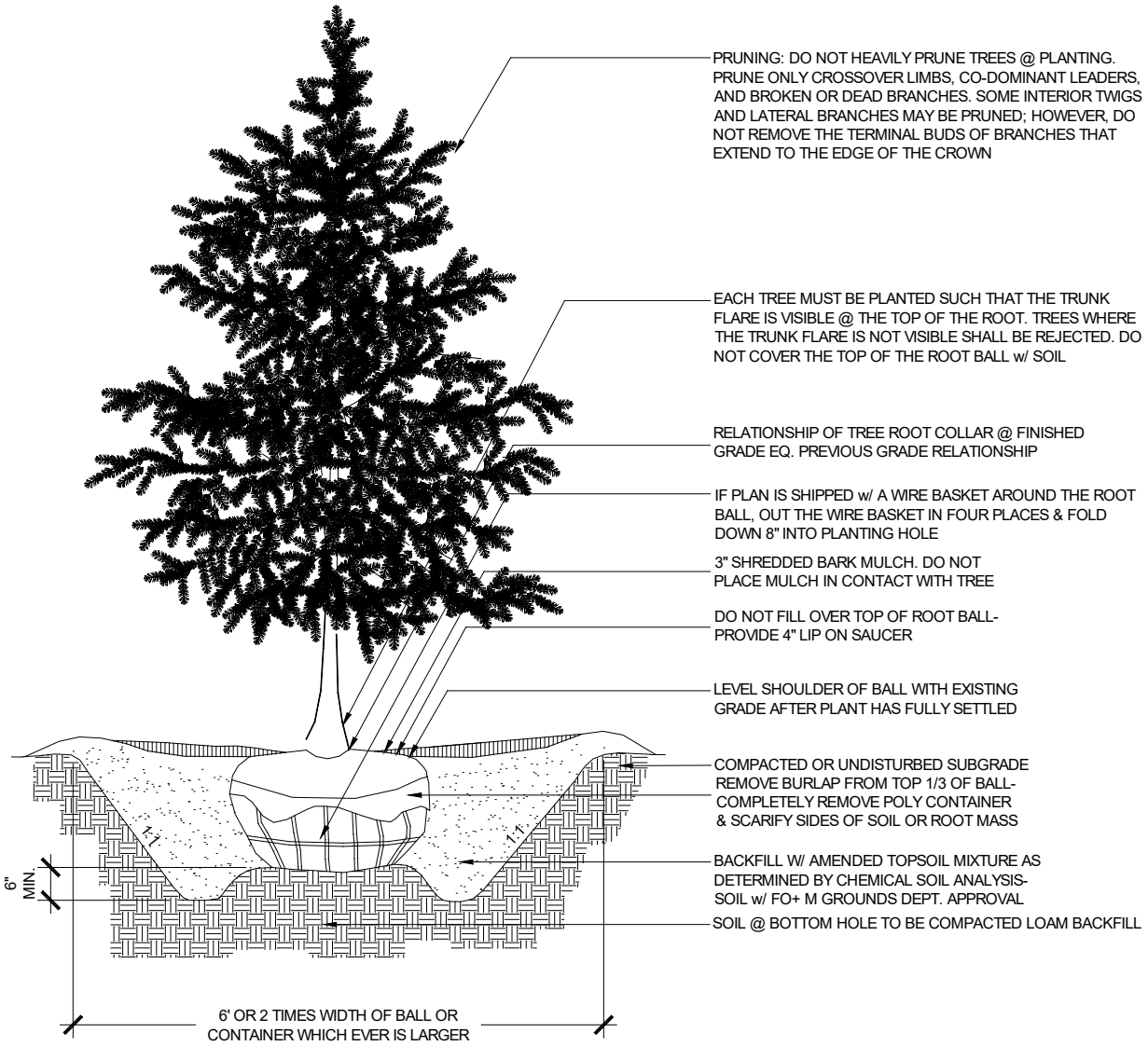
B. Definitions

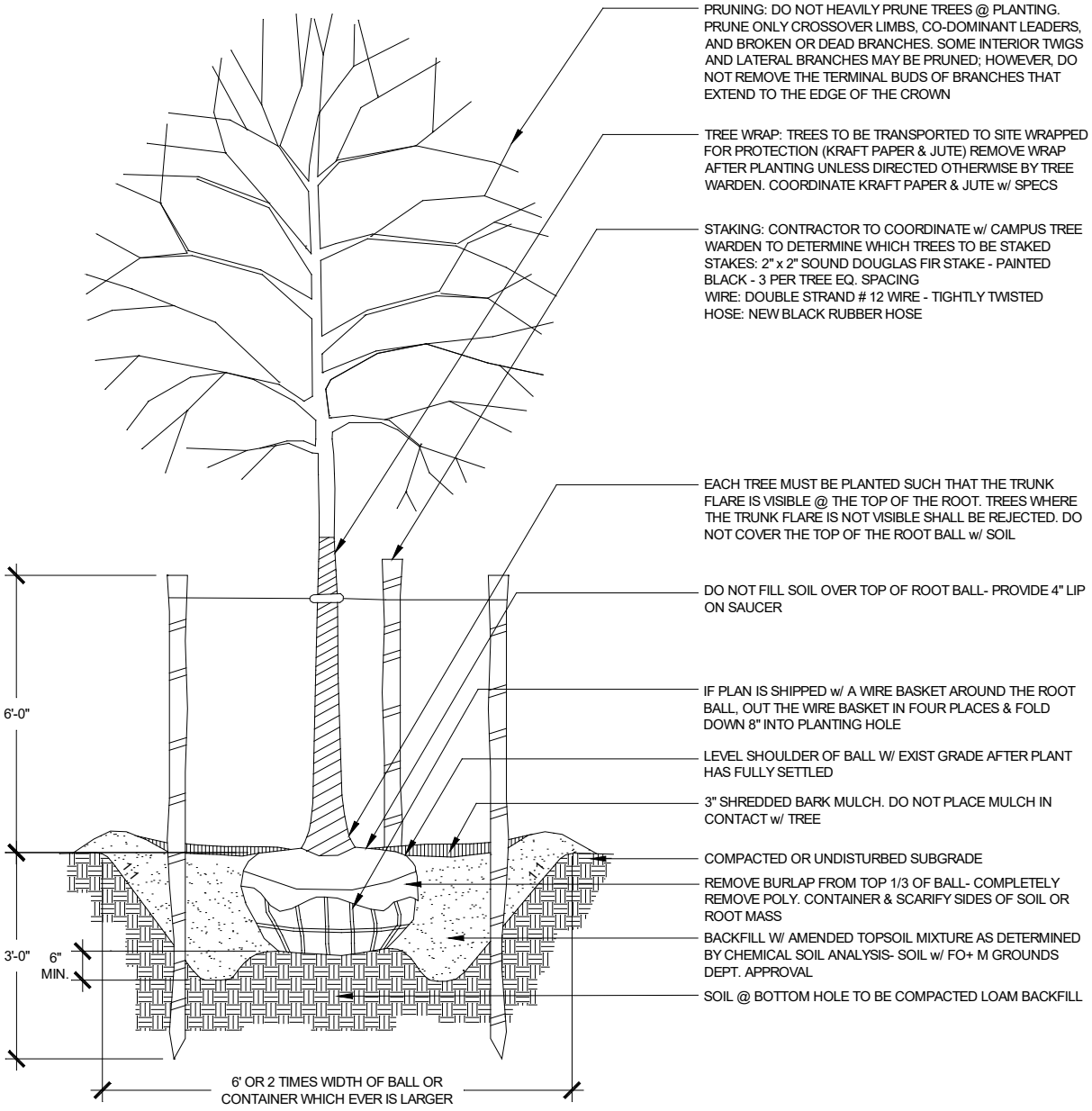
1. 3″ bark mulch is defined as being no less than 2″ nor greater than 4″.

C. TYPICAL GROUNDCOVER PLANTING



E. TYPICAL EVERGREEN TREE

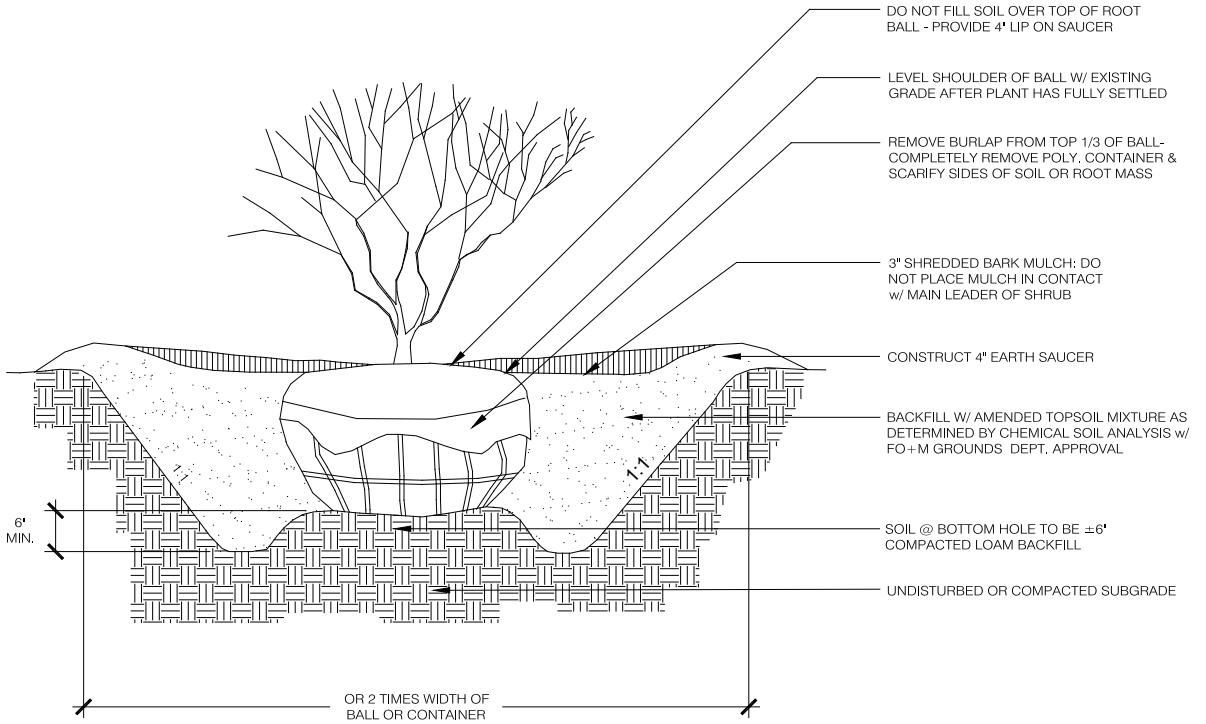


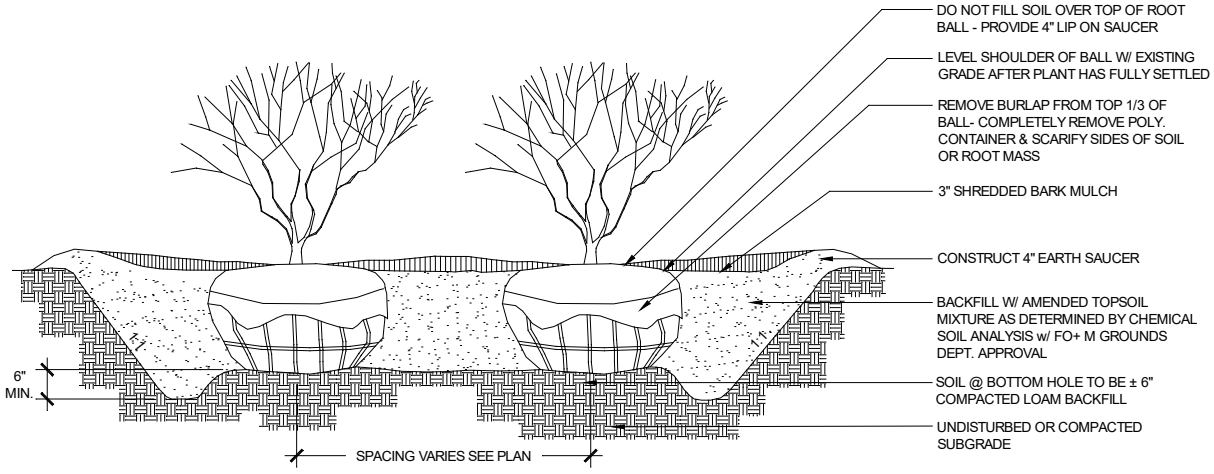

PRUNING: DO NOT HEAVILY PRUNE TREES @ PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN
TREE WRAP: TREES TO BE TRANSPORTED TO SITE WRAPPED FOR PROTECTION (KRAFT PAPER & JUTE) REMOVE WRAP AFTER PLANTING UNLESS DIRECTED OTHERWISE BY TREE WARDEN. COORDINATE KRAFT PAPER & JUTE w/ SPECS
STAKING: CONTRACTOR TO COORDINATE w/ CAMPUS TREE WARDEN TO DETERMINE WHICH TREES TO BE STAKED
STAKES: 2" x 2" SOUND DOUGLAS FIR STAKE - PAINTED BLACK - 3 PER TREE EQ. SPACING
WIRE: DOUBLE STRAND # 12 WIRE - TIGHTLY TWISTED
HOSE: NEW BLACK RUBBER HOSE
EACH TREE MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE @ THE TOP OF THE ROOT. TREES WHERE THE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED. DO NOT COVER THE TOP OF THE ROOT BALL w/ SOIL
DO NOT FILL SOIL OVER TOP OF ROOT BALL- PROVIDE 4" LIP ON SAUCER
IF PLAN IS SHIPPED w/ A WIRE BASKET AROUND THE ROOT BALL, OUT THE WIRE BASKET IN FOUR PLACES & FOLD DOWN 8" INTO PLANTING HOLE
LEVEL SHOULDER OF BALL W/ EXIST GRADE AFTER PLANT HAS FULLY SETTLED
3" SHREDDED BARK MULCH. DO NOT PLACE MULCH IN CONTACT w/ TREE
COMPACTED OR UNDISTURBED SUBGRADE
REMOVE BURLAP FROM TOP 1/3 OF BALL- COMPLETELY REMOVE POLY. CONTAINER & SCARIFY SIDES OF SOIL OR ROOT MASS
BACKFILL W/ AMENDED TOPSOIL MIXTURE AS DETERMINED BY CHEMICAL SOIL ANALYSIS- SOIL w/ FO+ M GROUNDS DEPT. APPROVAL
SOIL @ BOTTOM HOLE TO BE COMPACTED LOAM BACKFILL
6'-0"
3'-0"
6" MIN.
1:1
1:1
6' OR 2 TIMES WIDTH OF BALL OR CONTAINER WHICH EVER IS LARGER

F. TYPICAL DECIDUOUS TREE

G. TYPICAL SHRUB PLANTING

H. TYPICAL HEDGE PLANTING



## 3.4 GENERAL PLANTING NOTES

A. The Contractor shall coordinate this work with other contractors performing work on the site.

B. The Contractor shall verify all grades, dimensions, and existing conditions and report any discrepancies to the Landscape Architect.

C. The Contractor shall locate and verify all existing and newly installed underground utilities prior to any lawn work or tree and shrub planting and shall immediately report and conflicts to the Landscape Architect.

D. The Contractor shall supply all plant material in quantities sufficient to complete the planting shown on the drawing. Quantities in Plant Schedule are for reference only.

E. No plant or cultivar substitutions will be acceptable without written approval of the Landscape Architect.

F. Owner's Representative shall inspect plant material for acceptance prior to planting.

G. Locations of new plant material shall be staked or set out by the Contractor and approved and faced by the Landscape Architect prior to planting.

H. Refer to Planting details and Specifications for information relating to planting pit dimensions and extent and composition of backfill material.

I. The trees shall bear the same relationship to tree pit finish grade as to the original grade prior to digging.

J. The Contractor shall remove all plastic materials from around the root balls of the plants after positioning in the plant pits. Remove burlap, rope, and wire entirely unless doing so will causes the root ball to crack or otherwise fail. If this is the case, then burlap and wire may be folded down below the upper half of the root ball.

K. Contractor shall exercise extreme care in working in areas of existing trees. Existing plants to remain and be protected, which are injured or destroyed during construction shall be replaced by Contractor with plants of equal size and species at no cost to the Owner.

L. All areas that have been disturbed by planting activity shall be restored to a neat condition. Areas with bare soil shall be topsoiled and seeded as specified.

M. The Contractor shall water trees and shrubs twice during the first 24 hours.

END OF SECTION 32 90 00