

Division 32 Exterior Improvements

32 84 23 Underground Sprinklers

Standard for all replacement or new construction sprinkler installations on property owned or leased by the University. This standard is based on the Douglas County Extension Service requirements both minimum and maximum.

- Water requirements are 1" of water per week during the spring and autumn seasons
- Water requirements are 1½" of water per week during peak /hot summer months of July and August

The irrigation system design shall be based on the following factors:

1. Maximum water requirements during the peak months and four to six hour window of watering time (i.e. midnight to 6:00 a.m.)
2. The system shall have a minimum of head to head coverage
3. Shrub, turf areas and flower beds shall be irrigated separately
4. Consideration must be given for additional variables in order to maximize efficiency and water coverage. Such variables are but not limited to:
 - a. Geographical land contours (slope)
 - b. Sun exposure (south exposure typically requires additional water)
 - c. Soil content (sand, loam, silt, clay, etc. will absorb differently)
5. Ideal water pressure
 - a. 30 – 35 psi for irrigation spray heads
 - b. 45 – 60 psi for irrigation rotor heads
 - c. 60 – 70 psi for irrigation sports heads
6. All automatic controllers shall be Rainbird Satellite Central Communication.

32 90 00 Planting

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Design Considerations, Selection and Planting, Tree Care, Protection and Preservation, Tree damage assessment, and Prohibited practices

I. Design Considerations

- A. Tree species and/or cultivars included in the List of Recommended Trees shall be hardy to a minimum of USDA hardiness zone 5a and be pest resistant to minimize pesticide use and maintenance inputs. See Appendix at the end of this section for the lists of Recommended and Prohibited Trees
- B. Species and/or cultivars not on the list of Recommended Trees shall be approved on a case by case basis by the Arborist before specifying or planting.
- C. Once specified, no species/cultivar or form (single vs. multi-stem) substitutions shall be made without permission of the Arborist.
- D. Snow removal practices shall be considered when siting trees near walkways, parking lots, and other paved surfaces to avoid conflict between proper tree care practices and effective, efficient snow removal.
- E. Evergreen trees shall not be sited on the south side of paved areas or buildings where the shade cast by the tree will slow snow and ice melt or reduce warming of buildings in winter.

II. Security Considerations

- A. Maintain clearance under shade trees at eight feet (14 feet over vehicular pathways). Small ornamental trees should be maintained at a height appropriate for the species. Evergreen trees should not be limbed for clearance but rather be allowed to maintain branches to the ground.
- B. Tree canopies should be maintained to prevent diminishing light from fixtures that are intended for security or safety purposes.
- C. Maintain all plants to keep sight lines and physical access to emergency phones clear.

III. Selection and Planting

- A. All underground utilities shall be located and verified by the Contractor after the locations of new trees have been flagged and any conflicts reported to the Arborist before planting.
- B. All trees to be planted on campus shall be selected by the Arborist at the nursery and tagged.
- C. Trees shall be delivered to the site with the root ball and all its protection (container, burlap, wire basket, twine, etc.) intact and without damage to any part of the tree.
- D. Before digging the planting pit, the root flare shall be exposed, removing excess soil from the top of the root ball if necessary.
- E. The planting pit shall be dug such that the root ball sits on undisturbed soil and the root flare is at or less than two inches above the adjacent finish grade. The width of the pit should be at least twice the diameter of the root ball and have sloping sides.
- F. Once the tree is set plumb in the planting hole and the root ball is stabilized, all materials (burlap, twine, wire cage, etc.) shall be removed from the root ball to the greatest extent possible without compromising its integrity.
- G. Unamended soil shall be used to backfill the pit from which it was dug. Soil shall be backfilled around the set root ball in layers, watering thoroughly after the addition of each layer to settle the soil and eliminate large air pockets. No backfill shall be placed on the top of the root ball. Once backfilling is complete the tree shall again be thoroughly watered.
- H. Newly planted trees shall be mulched with three inches of hardwood mulch, keeping mulch away from the base of the tree.
- I. All single-stem trees less than five feet tall shall be staked with three wooden stakes (2"x2"x12") spaced equally around the tree. Chainlock strapping shall be used to support the tree at the point of lowest branching, taut enough that the main stem cannot move significantly but with enough slack that the upper part of the tree can move freely.
- J. Trees shall not be pruned upon planting except to remove broken, dead, rubbing, or damaged branches.

IV. Tree Care

A. Maintenance

- 1. Newly planted trees shall receive one inch supplemental water per week, in the absence of one (1) or more inches rainfall, for the first two years through the automatic sprinkler system or by hand-watering. Established trees in non-irrigated areas shall also receive supplemental water when conditions are unusually dry or when sprinklers are shut off during construction.
- 2. For five years following planting, trees shall be pruned only to remove dead, broken, crossing, or rubbing branches. Following the five year establishment period, trees shall be pruned to develop sound structure and branching that is appropriate for the species and site.
- 3. All trees shall be evaluated as often as is practical for pruning needs and pests, with a goal of assessing each tree annually and within 72 hours of any major or damaging weather event. Evaluations shall be done by a certified arborist.
- 4. Pruning shall only be done by a certified arborist or Groundskeepers working under their direct supervision.
- 5. Trees shall only be pruned to provide clearance for mower operators or avoid conflict with or repair damage from construction activities with the Arborist's approval.

6. Established trees shall be pruned as needed to develop or maintain structural integrity and maintain appropriate clearance over vehicular and pedestrian pathways and around buildings and light fixtures.
7. Six foot diameter mulch areas shall be maintained around all trees. Mulch shall be maintained at a depth of one to three inches.

B. Removal and Replanting

1. Trees shall not be removed without prior approval of the Arborist, Grounds Foreman, and Director of Facilities Management.
2. Trees shall only be removed in the event of death, infestation that cannot be controlled with practical means, severe damage or structural compromise, or conflicts with construction activity.
3. When possible, stumps of removed trees shall be ground to a level beneath finished grade that allows replanting in that location.
4. A tree that is removed shall be replaced with the same species or cultivar in the same location if:
 - a. the stump can be removed to the extent necessary to replant
 - b. there are no utility conflicts
 - c. the original tree was properly sited (not too close to a building, too big for its location, etc.)
 - d. the species is not on the list of Prohibited Trees
 - e. the above conflicts can be easily remedied, for example by properly siting a new tree in the same general area or selecting an appropriate species from the list of Recommended Trees.

C. Managing for Catastrophic events

1. All effort shall be made to minimize damage in the event of severe weather or other catastrophe by planting trees from the list of Recommended Trees, pruning trees to maintain health and structural integrity, and minimizing damage to trees, especially during construction.
2. Within 24 hours of a damaging weather event, a certified arborist shall begin assessing all trees on campus for damage. The assessment shall be completed within 72 hours.
3. Within 24 hours of a damaging weather event, cleanup shall be initiated by the Grounds and Landscape department. The initial effort shall include removal and disposal of downed trees and hanging and broken branches with priority given to debris that has fallen onto property (buildings, cars, fixtures, etc.) or is blocking pedestrian or vehicular pathways.
4. During the initial cleanup all Groundskeepers shall prune storm damaged trees. Groundskeepers shall leave enough of a stub, when possible, for the final cut to be made by a certified arborist.
5. Damage to trees that requires materials, equipment, or skills not possessed by the Grounds and Landscape department (such as cabling/bracing or pruning large trees) shall be contracted to a professional tree service.
6. If damage to a tree is such that the tree cannot be made structurally sound, or maintained as such through practical means, the Arborist shall recommend removal of the tree. The tree shall be removed immediately upon approval from the Grounds Foreman and the Director of Facilities Management.

D. Protection and Preservation

1. In the Design Phase of any outdoor construction the Project Manager, Architect/Engineer or Contractor, and Arborist shall meet on site to discuss the project's impact on the existing landscape and the details of protective measures.
2. If there is a conflict between existing trees and proposed construction, the Project Manager shall consult with the Director of Facilities Management to determine which trees shall be preserved. Whenever possible, desirable trees that conflict with construction and cannot be preserved shall be transplanted to an appropriate location on campus grounds.

3. During the Design Phase the Project Manager or Architect/Engineer shall identify protected trees and root protection zones, detailing the type and location of protective fencing, on the project drawing.
4. Protective fencing shall be put in place before demolition or land disturbance begins. Once installed, protective fencing shall not be removed, altered, or breached for any reason and shall remain in place and in good repair until completion of the project.
5. The Arborist shall be present at the pre-construction meeting.
6. Emergency construction projects shall be coordinated on a case-by-case basis by the Project Manager and the Arborist.

E. Tree damage assessment

1. The Arborist shall conduct site visits during construction and shall notify the Project Manager of any violation of the Plan. The Project Manager shall then contact the construction foreman or superintendent who shall immediately stop and correct the action that led to the violation. Likewise, the construction foreman or superintendent shall immediately contact the Project Manager if protected trees are knowingly compromised in violation of the Plan.
2. Any damage to existing trees that occurs from or by action of the Contractor shall be repaired by the Contractor at the Contractor's expense. The repair shall be made in full agreement with the University for both method and results. Contractors shall never prune or repair damaged trees without the Arborist's permission.

F. Prohibited practices include, but are not limited to:

1. cutting, breaking, skinning, and abrasion of roots, branches, and bark
2. nailing, bolting, or drilling into trees
3. using trees as a support in any way or to secure items, including using trees to anchor cables, ropes, chains, etc. to or around any part of the tree
4. filling, grading, excavating, trenching or auguring within root protection zones
5. storing construction equipment, materials, vehicles, waste, or excavated material; vehicular and/or excessive foot traffic; fires or burning; excess site runoff; and rinsate from construction materials and processes within root protection zones
6. disposing of liquid wastes or contaminants within or near root protection zones
7. damaging, breaching, or removing protective fencing prior to project completion
8. pruning, removing, or relocating/transplanting protected trees without the required permissions.

Definitions and Appendix: Lists of Recommended and Prohibited Trees

Definitions

Certified Arborist: a Groundskeeper who has passed the Nebraska Arborists Association's certification exam

Chainlock Strapping: slotted, rubber strapping used to support a small tree.

Cultivar: a tree produced by breeding that varies from its species in one or more specific traits, the designation for which follows the species name, is not italicized, and is bound by single quotation marks

Desirable Tree: a tree that is structurally sound, free of serious pests, and not included in the list of Prohibited Trees

Established Trees: trees that have been planted for five or more years

Evergreen: trees that retain leaves year-round

Finish Grades: the final elevation of the ground surface at the end of construction

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Pest: an insect, fungus, or other pathogen that causes damage to a tree

Pesticide: a chemical substance used to control pests

Protected Tree: a tree located within the limit of work of a construction zone that has been deemed valuable and for which protective measures have been put in place

Protective Fencing: a barrier constructed around a tree in order to protect it from construction activities

Prune: remove part of a tree

Root Flare: an area of widening where roots spread from the base of the main stem or trunk

Root Ball: the ball of earth containing the roots and the soil in which a tree was grown

Root Protection Zone: area around a tree containing the majority of the tree's root mass which is to be protected from construction activity or other disturbance; estimated at one foot per inch of trunk diameter

Species: a biological classification containing individuals that are naturally occurring, genetically alike, similar in appearance, and capable of interbreeding

Species Diversity: the number and frequency of species within a tree population

Steward/Stewardship: act to protect, conserve, and maintain

Stub: a short part of a branch, stem, or root that remains after the main part has been removed

USDA Hardiness Zone: a geographic area defined by its average minimum temperature

Appendix: List of Recommended and Prohibited Trees

Recommended Tree Species and Cultivars

City and Regional Streets, Formal Campus Areas

FORMAL AND BOULEVARD TREES

<u>Common Name</u>	<u>Botanical Name</u>
Red Maple	<i>Acer rubrum</i> 'Northwood'
London Planetree	<i>Platanus occidentalis</i>
American Planetree	<i>Platanus x acerifolia</i>
Callery Pear	<i>Pyrus calleryana</i> varieties
American Linden	<i>Tilia americana</i>
Littleleaf Linden	<i>Tilia cordata</i>
Elm hybrids	<i>Ulmus x</i> 'Accolade', 'Cathedral', 'Discovery', 'Frontier', 'New Harmony', 'New Horizon', 'Pioneer', 'Triumph', 'Valley Forge', 'Vanguard'

Campus Loop Road, Semiformal Campus Areas

SECONDARY AND STREET TREES

<u>Common Name</u>	<u>Botanical Name</u>
Western Hackberry	<i>Celtis occidentalis</i>
Swamp White Oak	<i>Quercus bicolor</i>
Bur Oak	<i>Quercus macrocarpa</i>
Northern Red Oak	<i>Quercus rubra</i>

Service Drives, Unprogrammed Campus Areas

INFORMAL SHADE TREES

<u>Common Name</u>	<u>Botanical Name</u>
Sugar Maple	<i>Acer saccharum</i> 'Green Mountain', 'Legacy', 'Table Rock'
Ohio Buckeye	<i>Aesculus glabra</i>
Shademaster Honeylocust	<i>Gleditsia triacanthos inermis</i> 'Shademaster'
Skyline Honeylocust	<i>Gleditsia triacanthos inermis</i> 'Skyline'
Kentucky Coffeetree	<i>Gymnocladus dioica</i>

Burt, Webster, California Streets, Major Campus Pedestrian Areas

PEDESTRIAN PATH TREES

<u>Common Name</u>	<u>Botanical Name</u>
Maple varieties	<i>Acer</i> varieties Shantung (<i>A. truncatum</i>), State Street (<i>A. miyabe</i>), Tatarian (<i>A. tataricum</i>)
Crabapple	<i>Malus</i> varieties *see list of adapted and disease resistant cultivars
London Planetree	<i>Platanus occidentalis</i>
American Planetree	<i>Platanus x acerifolia</i>
Callery Pear	<i>Pyrus calleryana</i> varieties
Japanese Tree Lilac	<i>Syringa reticulata</i>

City and Regional Streets, Campus Intersections, Special Areas

ACCENT TREES

<u>Common Name</u>	<u>Botanical Name</u>
Pagoda dogwood	<i>Cornus alternifolia</i>
Tulip Tree	<i>Liriodendron tulipifera</i>
Cucumbertree magnolia	<i>Magnolia acuminata</i>
Columnar English Oak	<i>Quercus robur</i> 'Fastigiata'

EVERGREEN TREES

<u>Common Name</u>	<u>Botanical Name</u>
Concolor Fir	<i>Abies concolor</i>
Rocky Mountain Juniper	<i>Juniperus scopulorum</i>
Larch	<i>Larix decidua</i>
Black Hills spruce	<i>Picea glauca</i> var. <i>densata</i>
Norway Spruce	<i>Picea abies</i>
Colorado Spruce	<i>Picea pungens</i>
Douglas Fir	<i>Pseudotsuga menziesii</i>

POTENTIAL ARBORETUM SPECIMEN TREES

<u>Common Name</u>	<u>Botanical Name</u>
Amur Maple	<i>Acer ginnala</i>
Paperbark Maple	<i>Acer griseum</i>
Serviceberry	<i>Amelanchier x grandiflora</i> , <i>A. arborea</i>
River Birch	<i>Betula nigra</i>
Asian White Birch	<i>Betula platyphylla</i>
Catalpa	<i>Catalpa speciosa</i>
Katsuratree	<i>Cercidiphyllum japonicum</i>

Updated December 2010

Eastern Redbud	<i>Cercis canadensis</i>
Yellowwood	<i>Cladrastis kentukea</i>
American Smoketree	<i>Cotinus obovatus</i>
Common Persimmon	<i>Diospyros virginiana</i>
American Beech	<i>Fagus grandifolia</i>
Ginkgo	<i>Ginkgo biloba</i>
Eastern Redcedar	<i>Juniperus virginiana</i>
Saucer Magnolia	<i>Magnolia x soulangiana</i>
Ironwood	<i>Ostrya</i>
Eastern Cottonwood	<i>Populus deltoides</i>
Flowering Plum	<i>Prunus cerasifera</i> varieties
Amur Chokeberry	<i>Prunus maackii</i>
Black Cherry	<i>Prunus serotina</i>
Sawtooth Oak	<i>Quercus acutissima</i>
White Oak	<i>Quercus alba</i>
Scarlet Oak	<i>Quercus coccinea</i>
Shingle Oak	<i>Quercus imbricaria</i>
Chinkapin Oak	<i>Quercus muehlenbergii</i>
Post Oak	<i>Quercus stellata</i>
Black Oak	<i>Quercus velutina</i>
Baldcypress	<i>Taxodium distichum</i>
Eastern Hemlock	<i>Tsuga canadensis</i>

***Adapted and Disease Resistant crabapple cultivars recommended by the Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln (from publication F97-1326-A ‘Crabapples for Nebraska Landscapes’)**

Species/Cultivar

S.C. baccata ‘Jackii’
‘Bob White’
‘David’
‘Dolgo’
‘Donald Wyman’
floribunda
S.C. halliani ‘Parkmanii’
‘Indian Magic’
‘Liset’
‘Mary Potter’
‘Molten Lava’
‘Ormiston Roy’
‘Prairifire’
‘Professor Sprenger’
‘Red Jade’
‘Sargentii’
‘Strawberry Parfait’
‘Sugar Tyme’
‘White Angel’
zumi ‘Calocarpa

Prohibited Trees

Updated December 2010

<u>Common Name</u>	<u>Botanical Name</u>	<u>Reason</u>
Ash species	<i>Fraxinus</i> species	emerald ash borer
Cockspur Hawthorn	<i>Crataegus crus-galli</i>	cedar rust, scale, twig aphids, leafminer
Pine species	<i>Pinus</i>	pine wilt, blight
Bradford pear		
Ailanthus, Mulberry, Siberian elm		weedy
Pin oak		intolerant of region's alkaline soil
Silver maple		
Crabs with poor disease resistance		
Canada Red Cherry		short-lived, disease problems