IUPUI Tree Care Plan - 2018

The IUPUI (Indiana University-Purdue University Indianapolis) Tree Care Plan should serve as a guide to the University in its goal of carrying out the 2012 IUPUI Master Plan's proposal of creating "a green network that includes riparian corridors and tree cover forming a campus urban ecosystem; new memorable spaces; improvements to campus edges and greenways; and enhancements to the pedestrian realm." Increasing the tree canopy on campus will also help with storm water management, sequester carbon, and reduce the heat island effect of urban environments. Specifically, this plan supports the recommendation of the 2012 IUPUI Master Plan to "implement a…Tree Management Plan for the campus."

Objectives of the plan are to:

- Facilitate the achievement of at least a 28% tree canopy on campus, as recommended by the 2012 IUPUI Master Plan http://masterplan.indiana.edu/iupui/iupui.cfm
- Protect and maintain the campus urban forest by ensuring proper species selection and care, and by managing the impact of development and construction on campus trees.
- Educate campus community members to respect and value trees and their ability to make the campus a more beautiful, healthful and livable urban environment.
- Connect the IUPUI campus to its urban environment and help to establish IUPUI as a leader in urban sustainability initiatives.

Responsible Department

The responsibility of the IUPUI Tree Care Plan lies with the IUPUI Campus Facility Services – Grounds Operations, in collaboration with the IUPUI Office of Sustainability and Capital Projects.

Campus Tree Advisory Committee

A Campus Tree Advisory Committee was established November 2011. The committee is comprised of faculty, staff, and students from across campus, as well as community representatives. The committee meets quarterly and provides important input for the care and improvement of the campus landscape. The work of the committee is organized in an online confluence space (https://uisapp2.iu.edu/confluence-prd/display/tcusaiupui/Home).

Campus Arboriculture Practices

The IUPUI campus follows the General Site/Landscape Standards established by the Indiana University Office for Capital Planning and Facilities. (see appendix A)

Indianapolis has a temperate climate, and with an even distribution of rain throughout the year; there are no wet or dry seasons. The summers are very warm, and polar air from the north produces very cold, low humidity winters, although, we continue to experience diverse and unpredictable patterns. These characteristics play a role in the way that IUPUI handles the selection and planting of new trees, as well as the maintenance of existing trees. As a rule, IUPUI attempts to plant only native tree species on campus property.

During the summer of 2012, there was a severe drought, leading to a water ban. Due to the drought, there were added pressures to the groundskeepers, and they were unable to tend to all of the problems by themselves. A group of volunteers consisting of IUPUI students, faculty, and staff took it upon themselves to do some of the watering. They focused specifically on young trees, and by the end of the summer, they had contributed a combined total of 108 volunteer hours. We will continue to support these severe weather occurrences with volunteer assistance as needed.

Tree selection – When possible, choose a native tree species that fits into the vertical and horizontal space, environmental conditions, and exposures. Also, plan for adequate root zone space and conditions for long-term plant growth, keeping in mind any future development plans.

Planting – In most urban planting locations, soils are inadequate to provide proper nutrients, moisture, moisture retention, and drainage to promote a healthy tree. Consider the extra soil preparation and planting time, labor, and soil amendments (if applicable) that will contribute to a

long life for the tree. The tree structure above ground shall be inspected for damage to the limbs and trunk, the location of the root flare, and the root system if possible for bare root or container grown plants, or the integrity of the soil ball for ball and burlapped trees. If possible, remove the top 1/3-1/2 of the wire basket. The tree should be planted with the root flare at or just above the finished grade.

Watering - The soil conditions and weather/time-of-year will determine watering needs in the first two years, and possibly for 3-4 years of the tree's new life. Indiana rainfall cannot be relied on for the tree's water needs in the first few years of life. A scheduled regimen for inspection and watering is labor intensive, but is balanced by the initial cost of the investment and the long-term value of a mature tree. Knowing the soil type, drainage conditions, and moisture retention of the root environment will help in monitoring the water needs of the tree. To help alleviate some of the difficulty of a strict watering regimen, Grounds Operations will use "Gator bags" when possible to water new trees.

There are also continued efforts to incorporate water-friendly structures in IUPUI's new building projects. Indiana University has instituted a policy that all new buildings and major renovations will be required to be certified as Leadership in Energy & Environmental Design (LEED) Gold. Some examples of these efforts can be found in the cisterns and rain gardens by the Glick Eye Institute (LEED Gold) and the Science and Engineering Lab Building (SELB), dedicated in November 2013. The SELB site also contributes a number of sustainable design features, including a rain garden for storm water management and the use of native and adaptive plants in the landscaping. A recent addition is the Neuroscience Research facility (LEED Gold) that incorporates water efficient landscaping and the newly renovated Rotary Building certified LEED Silver in October, 2014. Other new sites include North Hall in 2017, and James J Fritts, DDS Clinical Care center in 2018. These two sites have incorporated rain gardens. Many of these new sites incorporated additional native landscapes and trees.

Mulch - 2-3 inches of mulch is adequate to aid as a barrier to protect the roots from extreme high temperatures and to conserve soil moisture. Keep mulch from being in contact with the tree trunk to prevent rot.

Tree pruning – After planting, only broken or damaged limbs should be pruned. When necessary due to sidewalk or road conditions, additional pruning may take place. These additional conditions are outlined in Appendix A.

Pest management program – IUPUI Grounds Operations follows the guidelines of an Integrated Pest Management Policy to monitor and react to insect and disease pests that affect the campus landscape. Through years of monitoring and treatment, IUPUI has developed a calendar and schedule for monitoring and treatment for the recurring pest cycles that affect the tree

populations.

For detailed description of the Arboricultural Practices and Guidelines of IUPUI, please see Appendix B.

Protection and Preservation Policies and Procedures

On the construction side, all projects must include a tree preservation plan and tree protection specification section. These require the site to be secured and inspected by the representative for the campus prior to the mobilization of the contractor. They also identify approved locations for staging, laydown, topsoil stockpile, and other associated realities of construction. Inevitably and appropriately in some instances, trees are taken during the construction process. There is a replacement ratio of three trees for every one that is taken, and the replacement location does not need to be the same as that where the tree was lost. See Appendix B for a more detailed policy.

Goals and Targets

This plan aims to help fulfill one of the overarching goals of the 2012 IUPUI Master Plan to "create a vibrant urban campus" by:

Goal 1) Increasing the tree cover from 10% to at least 28% on campus
IUPUI recently experienced a considerable amount of construction that caused a temporary relapse in the campus tree canopy. Because this was a municipal project, IUPUI did not have much control over the taking of trees. However, by the end of construction IUPUI will have a *net increase* of trees.

Since construction completed in fall 2018, IUPUI has started planting replacement trees. The Protection and Preservation section of the Tree Campus Plan requires a replacement ratio of three trees for everyone one tree taken. This year, IUPUI planted 276 trees, which brings the campus to an estimated total of 3269 trees, and the estimated tree canopy still sits at 12%. Now that the large construction projects are completed, it will be easier to attain this goal in years to come.

Goal 2) Protecting the current tree canopy by educating campus and community members of the benefits that trees can provide.

Rather than a static obtainable goal, this is an ongoing endeavor IUPUI has been working toward all year via plantings, events, and service days. Notable events include:

- Tree Care and ID Workshop - 15 participants
- Arbor Day - 35 volunteers
- GIS campus tree inventory - 109 volunteers
- Campus Sustainability Month tree planting - 30 volunteers
- Bulb planting - 20 Greek life volunteers
- Garden service days - 50+ volunteers
- Ronald McDonald House landscaping - donated materials and in-kind labor from IUPUI grounds management and affiliated vendors
- Beehive demonstrations - 75 participants
- Honey extraction - 5 participants
- Native landscape design - honors college project
- Total engagement - 340+ participants

Goal 3) Connecting the campus to its urban environment and local community, in the spirit of the campus' commitment to civic engagement, we will strive to collaborate with other Indianapolis partners.

Through a dual student fellowship position, IUPUI has collaborated with non-profit Keep Indianapolis Beautiful (KIB) and the IUPUI GIS analyst to create the interactive tree inventory map. KIB also provided a grant for the 35 trees planted in October 2018. IUPUI has also worked with non-profit Growing Places Indy to employ a garden manager throughout the growing months. Lastly, with help from a green initiative grant, IUPUI created Indianapolis's first commercial composting route with GreenCycle, a private soil a mulch company. The route currently serves Butler University, Marian University, Ivy Tech Community College, and IUPUI.

Goal 4) Update and maintain an accurate campus tree inventory

With help from the campus GIS analyst, IUPUI has created an interactive tree inventory and assessment map using ArcGIS software. Utilizing the ArcGIS smartphone application *Collector,* IUPUI can geotag new trees on site, record their species, features, native status, and more. This feature was primarily created to update and perfect the campus tree canopy, and secondly to utilize as an educational resource for geography students. This September, IUPUI began an annual service project for students to update the inventory in the field. This year, volunteers were able to survey about 1/5th of our campus. Once completely updated, IUPUI will be able to make informed data-based landscaping decisions, estimate carbon sequestration, and allow for a safer and more efficient maintenance system.

History of past initiatives

2013 – two student organizations developed an Outdoor Learning Space at one of the two Urban Garden locations. This space incorporates urban gardening, including fruit bushes and trees and can now be utilized for outdoor classes, meetings, and other outdoor educational opportunities.

2014 – IUPUI partnered with the Keep Indianapolis Beautiful Adopt-A-Block program, to display the campus' commitment to environmental and community stewardship. IUPUI also partnered with the Indiana Urban Forestry Council (IUFC) to support and host their 2014 Big Tree Giveaway and Workshop that was sponsored by ACTrees and CSX Transportation. The workshop provided education on proper tree planting and maintenance, ecological services, and information on Tree Campus standards. In November, IUPUI hosted a service workday for student Campus Ambassadors, which included a session on sustainability at IUPUI, a sustainability scavenger hunt, and a workday assisting with mulching one of our urban gardens on campus.

2015 – IUPUI coordinated with the Indiana Sports Corporation, NCAA, and KIB for each college and university in Indianapolis to participate in a tree planting opportunity on their respective campuses during the 2015 NCAA Men's Basketball Championships to be held in Indianapolis.

2016 – IUPUI restored Ball Gardens, a historic green space on IUPUI's campus that was designed by the creators of Central Park in New York. The new design adds a modern twist to fit with the downtown Indianapolis infrastructure. The project has been completed and provides a beautiful green space area that connects the IUPUI campus to the new Eskenazi Health Campus. Free Concert Events are hosted at the site throughout the summer months. IUPIU also hosted its first "Beekeeping Basics" workshop in coordination with the Indiana state apiarist and the new on campus beehives.

2017 – IUPUI hosted several service events to plant an on-campus pollinator garden, native cedar shrubs, and two native tree plantings, totaling 41 new native trees and over 100 native shrubs and flowers. IUPUI also earned accredited as a Bee Campus University because due to native plant and pollinator support efforts.

2018 - Adopt a Block Business Standards

In addition to service projects in 2018, IUPUI became a Keep Indianapolis Beautiful Adopt A Block Business. This is a beautification program for local businesses to engage with their community, keep clean streets, and beautify their neighborhood. Incentives such as free native trees and plants, trainings, and promotional signage are offered to successful participants. Each participating business requires a Captain, which is the Campus Facility Services Grounds Manager, Jesse Beck. Here is a link to the commitments for a Adopt a Block Business Captain.

Tree Damage Assessment, Enforcement and Penalties

CFS Grounds Operations will monitor and inspect trees for damage from construction projects. Prior to the start of a construction project, Capital Projects and Grounds Operations will inspect the site and desirable trees will be noted in construction documents and drawings. The contractor shall follow proper tree protection methods. All damaged trees shall be assessed to determine if corrective measures are possible, including pruning or fertilization to stimulate the growth and vigor of the tree. Severe root or structural damage to a tree may warrant complete tree removal. A report of damages shall be sent Capital Projects and the Construction Manager, and Capital Projects and Grounds Operations will determine compensation requirements.

Prohibited Practices

Prior to tree removal due to construction, detrimental tree health, or tree hazards that affect the tree's impact on a space, prior approval shall be received from Capital Projects. Beginning in 2013, IUPUI incorporates the consideration of harvested trees for potential repurposing and use by furniture and design department within our IUPUI Herron School of Art & Design.

Definitions

Caliper – *The diameter or thickness of a main stem of a young tree or sapling as measured at six inches (6") above ground level. This measurement is used for nursery-grown trees having a diameter of four inches (4") or less.*

Canopy Tree – *A tree that will grow to a mature height of at least 40 feet with a spread of at least 30 feet*

Critical Root Zone – *The minimum area surrounding a tree that is considered essential to support the viability of the tree and is equal to a radius of one foot per inch of trunk diameter (DBH)*

Diameter, breast height (DBH) – *The diameter width of the main stem of a tree as measured 4.5 feet above the natural grade at its base. Whenever a branch, limb, defect or abnormal swelling of the trunk occurs at this height, the DBH shall be measured at the nearest point above or below 4.5 feet at which a normal diameter occurs.*

GIS Base Map – *A geographically referenced electronic map of the campus site features and utility infrastructure that includes point data for some of the trees on campus*

Green space – *Any area retained as permeable, unpaved ground and dedicated on the site plan to supporting vegetation.*

Impervious surface – *A solid base underlying a container that is non-porous, unable to absorb hazardous material, free of cracks or gaps and is sufficient to contain leaks, spills and accumulated precipitation until collected material is detected and removed.*

Landscape plan – *A map and supporting documentation which describes for a particular site where vegetation is to be retained or provided in compliance with the requirements of this policy.*

Laydown area – *A space designated on a protection plan and on a construction site to allow contractor's to offload, store and manipulate products coming to and leaving the site.*

Native tree – *Any species that occurs naturally and is indigenous within the region*

Pre-bid meeting – *A mandatory meeting of all prospective bidders for any university construction project during which clarifications are made and addenda, if necessary, are identified*

Pre-construction meeting – *A mandatory meeting of the successful bidder and Owner representative prior to the start of work on any university construction project*

Tree protection plan – *A map and supporting documentation that describes for a particular site, where existing trees are to be retained in compliance with the requirements of the regulations, those tree types and their relationship to the overall reforestation plan.*

Tree inventory – *A service-learning intern's project that included a detailed tree survey of the IUPUI campus with species, DBH, and crown percentage dendrometrics.*

Preferred Trees - *a list of trees provided to outside design consultants to guide their plant palette so that their design is in keeping with the overall character of the campus canopy. Native trees will be given preference when all other aspects are equal. Other species will be considered but approval must be obtained from Capital Projects. The list includes:*

American Basswood – *Tilia americana*
American Beech – *Fagus grandifolia*
European Beech – *Fagus sylvatica*
Black Birch – *Betula nigra*
Cornelian Cherry – *Cornus mas*
Horse Chestnut - *Aesculus hippocastanum*
Crabapple – *Malus spp.*
Bald Cypress – *Taxodium distichum*
Flowering Dogwood – *Cornus florida*
Kousa Dogwood – *Cornus kousa*
Elm Tree - *Ulmus (hybrid)*
Douglas Fir – *Pseudotsuga menziesii*
White Fir – *Abies concolor*
Common Hackberry – *Celtis occidentalis*
Washington Hawthorn - *Crataegus phaenopyrum*
Eastern Hemlock – *Tsuga Canadensis*
Paperbarck Maple – *Acer griseum*
Red Maple – *Acer rubra*
Trident Maple – *Acer buergerianum*
Sugar Maple – *Acer saccharum*
Bur Oak – *Quercus macrocarpa*
Chinkapin Oak – *Quercus muehlenbergii*
Northern Red Oak – *Quercus rubra*
Scarlet Oak – *Quercus coccinea*
Shumard Oak – *Quercus shumardii*
White Oak – *Quercus alba*
London Planetree - *Platanus x acerifolia*
Eastern Redbud – *Cercis Canadensis*
Eastern Red Cedar - *Juniperus virginiana*
Canadian Serviceberry – *Amelanchier Canadensis*
Common Serviceberry – *Amelanchier arborea*
Black Hills Spruce – *Picea glauca var. densata*
Norway Spruce – *Picea abies*
Serbian Spruce – *Picea omorika*
Sweetgum – *Liquidamber styraciflua*
Maidenhair Tree – *Ginkgo biloba*
Tulip Tree – *Liriodendron tulipifera*
Bur Oak – *Quercus macrocarpa*
Chinkapin Oak – *Quercus muehlenbergii*
Northern Red Oak – *Quercus rubra*
Scarlet Oak – *Quercus coccinea*
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Sweetgum – *Liquidamber styraciflua*
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Local Native Nurseries

Cardno Native Plant Nursery -wholesale
Brehob Nursery -wholesale
Spence
EcoLogic in Bloomington
INPAWS
Bluegrass farms
Woody warehouse
Perennials plus

Communication Strategy

The Tree Care Plan, particularly the parts of it dealing with tree selection, care, protection, and replacement, will be distributed to Campus Facilities staff and all contractors whose work may have an effect on the trees on IUPUI's campus. Students, faculty, staff, and alumni will be made aware of the plan upon its adoption by announcements in/on the following:

- JAG News (electronic newsletter for students, emailed to entire campus community)
- Inside IUPUI (electronic newsletter for faculty and staff)
- IUPUI Facebook page http://www.facebook.com/IUPUI
- Facebook pages of various IUPUI schools and departments
- Student Sustainability Council's Facebook http://www.facebook.com/SustainIUPUI
    - Office of Sustainability website, Facebook, Twitter
      http://sustainability.iupui.edu/
      http://www.facebook.com/IUPUISustainability
      https://twitter.com/IUPUISustain
- NUVO, Indy Star, Indiana Living Green, Reconnecting to Our Waterways

The Campus Tree Advisory Committee will also strive to place a series of news stories in campus publications and in various city publications regarding the adoption of the plan and achievement of Tree Campus USA status, special tree planting and watering initiatives, coordination with Keep Indianapolis Beautiful, and other community partners, completion of the IUPUI GIS tree database, and other projects. Each of these instances will be used as an opportunity to refer to the Campus Tree Care Plan, the work of the committee, and Tree Campus USA certification.

Appendix A

Indiana University Campus Division

Landscape and Grounds Management Guidelines: Maintenance Standards

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Introduction

Maintenance Standards

Before performing any task, it is important to wear the proper personal protective equipment (PPE). It is the responsibility of the Campus Manager to inform the Area Supervisors of the necessary PPE for each task and to provide that equipment. It is the responsibility of the Area Supervisor to insure that they and their crew are wearing the PPE. If there are concerns about the availability of personal protective equipment contact your supervisor immediately. It is important that hearing protection and eye protection is used when performing most of our tasks, in particular those that involve machinery.

Integrated Pest Management (IPM)

Campus Division uses a complete IPM strategy to deal with any pest affecting the plants we maintain.

1. Only specific personnel are trained to apply certain pesticides.
2. We constantly monitor insects, diseases, weeds, etc., and only apply pesticides if necessary. We do many other control measures also, such as cultural practices, using resistant varieties of plants, biological control, mechanical control, rotating plants in certain beds, etc. In many situations certain levels of insects or diseases can be tolerated. We only apply chemicals when the health or life of the plant becomes endangered and other practices haven't been helpful in controlling the problem. We do not apply preventative chemicals like many lawn care companies do, unless we have perennial problems with certain insects, diseases or weeds. Each situation is evaluated and the campus manager or nursery manager makes the final decision if pesticides are to be applied.

Less toxic chemicals come out every year and we constantly look for the least hazardous chemicals to use in each situation. All federal, state and local regulations are strictly followed when any pesticides are applied. We always sign turf areas where insecticides have been applied to warn people not to be in these areas until they are dry.

I. Litter Control

1. Litter containers will be checked daily.
2. The campus will be checked daily for litter and picked up as needed.
3. Litter containers will be emptied when 1/2 full or when garbage scent is a nuisance.
4. Dumpster areas will be checked daily or by request.
5. Cigarette butts will be picked up from sidewalks and mulch beds at least once per week.

II. Turf Maintenance

1. Trash will be removed prior to mowing.
2. The personal protective equipment required for mowing in addition to regular work clothes will be: safety glasses and hearing protection of either ear plugs or ear muffs. Suggested equipment,

as appropriate to conditions, would include a hat, sunscreen, dust mask, and leather gloves. Am/fm radios, ipods, or headsets are prohibited. The safety equipment required for use of string trimmers or other grass trimmers are safety glasses/goggles, long pants. Trimming turf around trees, shrubs, mulched areas, buildings, signs, lights, fences, curbs, etc. will be performed no sooner than the day before and no later than the day after mowing or as weather permits.

3. The height of the riding mowers will be adjusted only with prior approval of the supervisor or the campus manager. The height of the mowers will fall within a range of 2.5" to 4" based on the current growing conditions.
4. Mowing will take place weekly in areas that are actively growing and when conditions allow. Some areas may need mowing two times per week if conditions warrant.
5. Irrigation will take place where automatic systems or quick couplers are available. Irrigation levels should meet the needs of the actively growing turf to prevent stress from weather conditions or pests. There are some high priority areas that are served with building hydrants and those areas will require watering.
6. Weed control should be performed to maintain the turf with few or no dandelions, plantain, crabgrass, or nutsedge. Other weeds should be controlled to prevent an infestation. All pesticide use will be done according to label instructions. All pesticide applications will be recorded in the pesticide application record book.
7. Insect and disease control will take place on an as needed basis.
8. Fertilization of cool season grasses (bluegrass, fescue blends, tall fescue) will take place in the spring (late April to early May) and the fall (Late September to Early October), one (1) pound of nitrogen/1000 sq. ft will be applied at each period. An additional .5 pound of nitrogen/1000 sq. ft can be applied to high priority areas in late summer, based on need. Fertilization of warm season grasses (buffalo grass, bermuda, zoysia, prairie grasses) will take place between June 15th and July 1st. The rate of nitrogen will be 1 pound/1000 sq. ft.
9. Fertilizer will be removed from sidewalks the day of the application.
10. Required personal protective equipment for applying fertilizer, granular pre-emergent, Roundup and 2-4, D are rubber boots or overshoes, rubber gloves, hard hat or other nonabsorbent hat required Campus, safety glasses/goggles, long sleeve shirt, and long pants. Suggested additional equipment one could use would be a full face shield, disposable spray suit, and a fitted pesticide respirator. The product MSDS and label will dictate what PPE is required. If you have questions, make sure you discuss them with the campus manager before applying pesticides.
11. Leaf litter will be mulched with mowers as needed throughout the fall and winter months. Large concentrations of leaves will require pickup using rakes or lawn vacs. Leaf litter will not be allowed to accumulate to the point that it will damage or kill turf.
12. Aeration of turf areas will take place every year in high traffic or high priority areas. In low priority turf aeration will take place every two years.
13. Renovation of turf will take place as needed. The appropriate seeding rate for the turfgrass mix will be determined by the degree of renovation.
14. Clippings will be removed from paved surfaces the day of the mowing. Clippings on lawn areas should be removed only when there is such a concentration of clippings on the turf that it might damage the live plants.
15. Sidewalks, streets, and driveways shall be edged annually or more often if necessary.
16. Plantings shall be edged every year or more often if necessary.

III. Tree Maintenance

When performing pruning on trees, shrubs and perennials, it is important to use the appropriate personal protective equipment. When using hand pruning saws, bypass pruners and loppers the required PPE you and your staff will use is safety glasses as well as complete training before attempting such a task. If the work might involve falling branches the hard-hat/faceshield combination and safety glasses or on Campus hard-hat and goggles are required as well as complete training before attempting such as task.

If the pruning is done on the high-ranger: long pants, hard-hat/faceshield combination and safety glasses or Campus hard-hat and goggles are required as well as complete training before attempting such a task.

If tree pruning is accomplished by climbing the tree: long pants, climbing saddle, lanyard, climbing rope, hard-hat/faceshield combination and safety glasses or on Campus hard-hat and goggles are required as well as complete arborist training before attempting such a task.

If a chainsaw is used to prune: long pants, chainsaw chaps, gloves, hard-hat/faceshield combination and safety glasses or Campus hard-hat and goggles are required as well as complete training before attempting such a task.

1. Tree limbs shall be removed to a height of 7 ft. over sidewalks and 14 ft. over roads and parking areas. Limbs will be removed from around area lights to prevent diminished light from the fixture. This should be typically done in June after full leaf out.
2. Young trees will receive annual pruning for up to five years after planting. The purpose of the pruning will be to direct the tree into the appropriate form for the species and the site.
3. All donor trees in the campus area should receive an evaluation three times annually. Additional evaluations may be required if there is severe weather. The "walk around" should help determine what maintenance the tree requires. Trees in close proximity to buildings, roads, parking lots, sidewalks, and high use areas should be evaluated for several conditions. Priority should be made for hazardous limbs or trees. The trees should also be checked for disease, insect infestations, dead branches, and anything that might contribute to the trees declining health. Once an evaluation is done a corrective action (if needed) will be decided and executed.
4. Trees will not be removed without prior approval of the campus manager. In some cases approval will be required by the university landscape architect.
5. The timing of the pruning should be to avoid bud break and leaf drop on live wood.
6. Corrective pruning will be performed to maintain the natural shape and characteristic of the species. Pruning should be targeted at dead branches, crossing branches, suckers, water sprouts, infested branches, etc. All pruning will be done using accepted arboriculture techniques and methods.
7. Unless approved by the campus manager, guying or staking and tree wrap will not be used.
8. Irrigation of newly planted trees will take place at least twice monthly, unless there is adequate rainfall, during the first three growing seasons.
9. Pest control should be done as needed.
10. Mulch will be maintained at a minimum depth of 1 inch and a maximum depth of 4 inches. A targeted effort will be made to control the uplift of shallow roots in tree lawn area trees.

11. Removal of dead or badly damaged trees will take place in a manner that observes all standard safety practices.
12. Stumps of removed trees will be reduced to a level beneath the soil grade that allows replanting in that location.
13. Remove stump shavings and back fill hole immediately after stump grinding
14. All tree dedication plaques shall be inspected yearly. Damage plaques should be reported immediately to the Campus Division office.

IV. Shrub Maintenance

1. Pruning of shrubs will be performed to retain their natural shape.
2. Shrubs should be pruned to: A) maintain a desired size or shape; B) control traffic or allow pedestrian clearance; C) thinned in order to promote plant health. Complete renovation of shrubs should only take place after consulting the campus manager and the university landscape architect. Pruning should be performed as necessary, taking into consideration time of year, plant species, environmental conditions, and effect on flowering.
3. Pest control should be done on an as needed basis.
4. Weeding of shrub beds will be done to prevent minor infestations of weeds. The use of pre-emergence herbicides and spot spraying with post emergent herbicides should be considered when developing a management strategy.
5. Shrubs will receive supplemental watering during the first year after planting.
6. Mulching of shrub beds will be done to maintain a minimum of one inch of mulch and a maximum of three inches.
7. All shrub bases should be inspected for litter accumulation.

V. Perennial Maintenance

1. Pruning of perennials shall take place in the spring prior to new growth. Some beds may require cutting back in the fall depending on the location and species of plants. Beds shall be cleaned and fresh mulch added to a maximum depth of two inches, including existing mulch.
2. Perennial beds should receive pre-emergent herbicides treatments as needed and will be fertilized each spring with the appropriate fertilizer.
3. Compost should be incorporated in the fall, winter or spring in areas that require soil amendment.
4. High priority perennial beds will require additional care as directed by the campus manager, or nursery manager.
5. Fencing may be necessary on pest susceptible species.
6. Caging should be done on species that may fall over.
7. Pest control should be done as needed.

8. Beds should be irrigated as needed.
9. Attempts should be made to berm beds to encourage drainage.

VI. Annual Flower Maintenance

Amending the soil:

1. Leaf mulch can be incorporated in the fall.

2. Add compost, preferably in the fall.

3. Mechanical tilling is ok.

4. Crown the soil for improved drainage and to alleviate low spots.

Fertilization:

1. Incorporate when working the soil; or broadcast after planting
2. Use slow release fertilizer as much as possible.
3. Fertilize again before the end of June.

Planting:

1. Gently break up a root bound ball or pot.
2. Planting depth: crown of plant even with soil surface.
3. Remove all twine burlap and wire baskets. (The only exception is if the basket root ball is too loose to allow removing the entire basket. (Leave bottom of the basket on.)
4. Don't plant too deep!
5. Water in gently to settle the soils around the roots - No stomping!
6. Nip any flowers off at planting time so all the energy goes into root production.
7. Plan to have all annuals planted and mulched by Graduation weekend.

Spacing:

1. If planting two different kinds of plants side-by-side, use the spacing of the bigger one. The Nursery Division will normally lay out and space new planting areas.

Mulch:

1. Use the best quality wood chips, or shredded bark mulch available.
2. Mulch should be clean and debris free.

Aftercare:

1. Water as often as needed.
2. Dead head plants as needed.

3. Make sure to check on Fridays so plants will make it through the weekend.
4. Keep beds weed free.
5. Notify the Campus Nursery Division if you notice plant problems.

VII. Snow Removal

Snow removal is an important winter responsibility of Campus Division. Since the campus never fully closes is due to weather, Campus Division staff works diligently to get the campus open in time for morning classes and remove snow as it accumulates during the day.

All Campus Division personnel are involved in snow removal; operating snowplows, sweepers, snow blowers or shoveling by hand to make the campus as accessible and as safe as possible. All parking lots, streets, and sidewalks on campus are mapped and assigned to an equipment operator or a crew of shovelers. Areas are prioritized so that snow removal can be done in an efficient and effective manner. Information on access routes for handicapped students on campus is provided by the Campus Division These areas of campus receive priority treatment for snow removal.

The snow removal process is initiated by a phone call from the Campus Manager or Construction Supervisor to the individuals on the top of the calling list, followed by all employees being called and told when to arrive for snow removal. Starting times are determined by the amount of snowfall and predicted weather forecast. Campus Division utilizes Doppler radar information available through the internet and also subscribes to Accu Weather for storm tracking and temperature forecasts.

Our goal is to have streets, parking lots, and sidewalks cleaned and accessible before students and staff begin to arrive on campus.

On a rotating basis, crews are assigned to be on call for evening and weekend events held at the various campus locations. Some large lots can be contracted to private contractors for snow removal for special events (e.g. evening or weekend sports events at Alumni Hall). Snow removal for the parking garages is principally handled by the parking division because it requires specialized snow removal equipment.

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Landscape and Grounds Management Guidelines: Environmental Stewardship

Introduction

These Guidelines are intended to provide a framework for environmental responsibility in how the Campus Division plans, designs, constructs, commissions, manages, and maintains the several thousand acres it oversees in green space, rights of way, and other landscaped areas. The focus of these Guidelines is on environmental stewardship of University-owned land. As such, they are not intended as comprehensive guidelines on all issues related to landscape planning and management.

The purpose of this document is to provide Campus Division staff and contractors:

- general guidance on implementing the Campus Division Landscape and Grounds Management Policy and other relevent policies contained in the Campus Division's Environmental Management Program; and,
- an inventory of environmental stewardship issues to evaluate in planning, managing, and maintaining open spaces owned by the University.

For more information contact the Campus Division Office at 812-855-2038.

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F. Lawn Maintenance
G. Automatic Irrigation Systems
H. Integrated Pest Management
I. Record Keeping
J. Training

A. Design Stage

A successful landscape requires comprehensive analysis and planning in a variety of areas. Many of these concepts are applicable to existing sites.

1. Assess and inventory physical site characteristics

- ❑ Soil stability
- ❑ Planting media
- ❑ Water table, existence of springs, sheet flow
- ❑ Grading and slope issues
- ❑ Construction staging issues
- ❑ Proximity to sensitive areas

2. Assess site usage characteristics

- ❑ Identify existing plants for retention and salvage.
- ❑ Sun /shade.
- ❑ Access and parking issues.
- ❑ Impacts on neighboring properties and vice versa.

3. Develop program theme

- ❑ Convene stakeholders including planning and construction team, program planning team, maintenance team and community representatives to form a vision of a design theme that meets expectations of all four interests.

- ❑ Assure stakeholder review with enough frequency to avoid significant mid-course correction.

- ❑ Specify monitoring milestones and responsible parties. Identify likely problem areas and budget for crucial monitoring at necessary levels.

- ❑ Specify that maintenance staff be properly represented in punch list development.

- ❑ Check with project manager to ensure that there are adequate staff and funds to support the degree of development and complexity of design.

4. Debrief completed project

   - ❑ Assess lessons learned, right and wrong.
   - ❑ Assist/coordinate solutions to unresolved issues

B. Drainage

Drainage systems are water collection devices to manipulate the movement of water. Components of drainage systems occur in various forms, such as swales (natural or paved), area drains, and subsurface pipes that direct concentrated surface runoff into an underground network connected to the university stormwater system. Other forms of drainage, including gullies and sediment basins, serve to recharge the groundwater table or aquifer.

Following are considerations in designing a site drainage plan.

- ❑ Minimize alteration of natural drainage patterns around existing vegetation that is to be preserved.

- ❑ Conform to natural drainage patterns.

- ❑ Provide opportunities for surface runoff of water to replenish the groundwater table.

- ❑ Minimize soil erosion by designing for even water flow across the ground surface.

- ❑ Reduce water velocity and increase soil permeability with plantings and mulch. On steep slopes avoid using plants that require supplemental irrigation.

- ❑ Implement erosion control devices as a form of preventative maintenance, e.g., slope protective material, protective berms, silt fences.

- ❑ Ensure plans for the drainage system include maintenance schedule and specifics.

C. Plant Selection

In the context of these Guidelines, plant selection should be guided by four criteria:

Aesthetic and thematic schemes

Plant culture and environmental conditions

Maintenance impacts

Environmental issues

Each of these criteria is discussed below.

1. Aesthetic and thematic schemes

   - Use of indigenous native plantings should be considered, especially in large areas.

   - The full range of horticultural species and cultivars may be appropriate for high use, high visibility landscapes.

2. Plant culture and environmental conditions. It is essential that the cultural and environmental requirements of the plants be matched with the site conditions.

3. Maintenance impacts

   Pruning. To avoid routine pruning, select plant cultivars based on their size and shape when mature. When specific site issues override pruning concerns and when associated resource impacts are identified, plant cultivars requiring frequent pruning may be considered. Plants such as forsythia and sheared hedges may be appropriate for specialty gardens and selected focal points.

Plant pest management. Species and cultivars that are resistant to insect infestations and plant disease should be specified. Only in limited situations like special garden areas should exceptions occur. Existing tree plantings may need pesticide applications.

Weed management. Plant selection should embrace weed management principles. Vigorous groundcovers, shade canopies, and plant spacing are factors that can reduce the need for weed control.

4. Environmental Issues

- Provide native wildlife habitat when conditions allow, such as when adjacent landscapes do provide habitat.

- Select plants with low water needs whenever feasible. Limit high water use plants to specialty plantings or where the natural water table will support the plants without supplemental irrigation; group plants with similar water needs together.

- Avoid plants that will require significant pest management. Select disease resistant cultivars and avoid insect prone species.

- Avoid plant species with invasive growth or seeding habits. Landscape designs and purchase plans should be checked against the State of Indiana lists of noxious weeds.

- Prevent surface soil erosion by covering soil with plants or mulch.

- Plants with similar horticultural needs should be grouped together.

- The University Landscape Architect will be consulted in selecting tree species intended for campus areas and public rights of way,

D. Plant Health

Following are guidelines for environmentally responsible maintenance of plant health.

- Plant in the fall, when feasible, to take advantage of fall and winter rains and to reduce the need for supplemental irrigation.
- Prior to planting, assess the soil conditions and amend the soil appropriately; include organic material.
- Test and monitor soil conditions regularly and modify practices accordingly.
- When replanting beds or turf areas, mature compost (about 20 percent by volume) should be incorporated to a depth of 8 to 12 inches or, preferably, the full rooting depth of the plants to be installed.
- Use only organic and slow-release fertilizers.
- Avoid over watering plants to conserve water and to improve plant health. Over watering is a primary cause of plant disease and demise.

E. Mulch

Use of organic material as a soil topping helps reduce evaporation; improves water infiltration; reduces run-off and erosion; enriches soil fertility and texture; and inhibits the growth of competing, nutrient-absorbing weeds. In addition, using wood chips generated on-site for mulch reduces the need to haul green-wastes, thereby saving energy. It should be noted that, where wood chips are used for mulch, nitrogen may need to be added (5 pounds/1000 square feet).

- Maintaining a 2-inch minimum layer of mulch in planted areas is recommended.

- A mulchless zone around the base of tree trunks is recommended to discourage root-rotting fungi.

- Wood chips should be used whenever appropriate. On-site chipping simplifies the maintenance process. Chips are effective, free, readily available, and have a natural look. Aesthetics may suggest other acceptable materials such as compost, or shredded bark mulch.

- Indiana University needs to develop an organic debris management program to effectively manage and re-utilize organic debris collected on the campus.

- When purchasing mulch materials, they should be specified to be “weed and disease free.”

- Unless disease problems are present, allow leaf litter to accumulate upon the soil within planted areas that are not intended to have a manicured appearance.

F. Turf Maintenance

Turf areas are a key element of the campus landscape and are used for a variety of purposes. Lawn maintenance practices significantly affect the environment. The intended use of a lawn or turf area will determine many of the maintenance specifics. Healthy lawns can resist disease and drought damage and out-compete most weeds without reliance on chemicals. Properly maintained lawns also require less supplemental irrigation.

1. Assess the condition of the lawn or turf. Look for turf density, percent weed cover, and color.

   ❑ Healthy lawns are a medium green color.

2. To identify what changes in lawn maintenance may be appropriate, start by assessing the effectiveness of the existing maintenance schedule, including an evaluation of the following practices:

   ❑ mowing and edging
   ❑ irrigating
   ❑ fertilizing
   ❑ hand weeding
   ❑ pesticide applications
   ❑ aerating
   ❑ de-thatching

   Consider whether acceptable results can be achieved at lower maintenance levels or significant improvements can be realized through minor program adjustments.

3. Develop maintenance schedules incorporating the results of the assessment of each of the elements of 2, above. Use the following maintenance practices:

   ❑ Mow high, mow often, and leave the clippings.
   - Set mowing heights to about 2.5-3 inches.

- Mow at least weekly in spring.

- ❑ Fertilize lightly in the fall and late spring with a natural-organic or slow-release fertilizer.

- ❑ Water deeply to moisten the root zone, but water infrequently. Lawns newly planted in spring need frequent watering.

- ❑ Avoid using pesticides, quick release fertilizers and weed-and-feed.

- ❑ Leave a natural vegetation buffer along streams and lakes to filter pollutants.

- ❑ Do not use pesticides or soluble fertilizers near streams, ditches, wetlands, or shorelines.

- ❑ Aerate annually, in the spring or fall, to improve root development; high-use turf should ideally be aerated two to three times a year.

- ❑ In late summer, avoid irrigating areas that are browned out. Seriously degraded turf can be improved with aeration, overseeding and top dressing with compost.

No-Mow Areas

- ❑ No-Mow Areas should be mowed periodically to control invasive vegetation and noxious weeds.

- ❑ Cutting height of no-mow areas should be a minimum if 6” inches to protect the crowns in native forb specie.

- ❑ Invasive specie such as Canada Thistle should be controlled either by spot cutting or herbicide spot treatment.

- ❑ Informational signage should explain the purpose regarding no-mow areas.

- ❑ Cutting of No-Mow areas should take place during the late fall to minimize the hazard to wildlife.

- ❑ During dry spells No-Mow areas need to be evaluated for potential fire hazard.

G. Automatic Irrigation Systems

Using irrigation water efficiently conserves water and reduces run-off. Irrigating University landscapes is one of the most publicly-visible landscaping activities, reinforcing the need for effective water management by departments.

- ❑ Develop a water budget for the site by identifying site irrigation needs based on use, plant needs, soil permeability, and topography.

- ❑ To achieve maximum efficiency, perform system maintenance and repairs.
  - use check valves to eliminate low head drainage
  - troubleshoot controller and field wire
  - Check for the following:
    - ✓ misaligned heads
    - ✓ sunken heads
    - ✓ broken heads; repair bad seals, which cause flow-by
    - ✓ proper valve function

- ❑ Set irrigation controllers based on Water Budget. Avoid irrigating in the heat of the day.

- ❑ Initially, monitor weekly to adjust scheduling to the most efficient regimen; observe for run-off.

- ❑ Once an effective schedule is established, it should be monitored bi-weekly to avoid "brown outs." Clean heads at least once a year and preferably more often.

- ❑ Cut back on irrigation as weather indicates.

- ❑ Reduce irrigation in increments in late summer.

- ❑ Inspect backflow preventors annually consistent with state law.

- ❑ Conduct a complete system audit every *five* years.

- ❑ Create a permanent record system to allow resources to be used to “fine tune” the system rather than recreate it each year.

H. Integrated Pest Management (IPM)

IPM is a decision making process to determine *if, where, when, and how* pest control practices should be applied ("pests" include insects, diseases, weeds, and animals.) IPM protects pests' natural enemies to help keep pests in check, and it avoids unnecessary chemical use that may endanger human health and the environment.

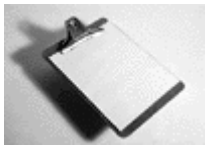
- ❑ Routinely monitor populations of potential pests and their natural enemies to determine if and when pest control treatments are needed.
- ❑ Determine the acceptable aesthetic or economic injury levels.
- ❑ Employ physical, mechanical, cultural, biological, and educational tactics to keep pest numbers low enough to prevent intolerable damage or annoyance.
- ❑ Use chemical controls as a last resort, and use the least toxic chemicals.
- ❑ Any form of treatment should avoid disrupting natural pest controls present and should aim to suppress the pest population, not eliminate it. A portion of the pest population must remain to sustain natural enemies.
- ❑ If treatment is needed, treat only the area where the problem occurs.
- ❑ Only treat when information from monitoring shows that natural controls are not adequately suppressing the pest populations.
- ❑ Only treat when the pest is most vulnerable and natural enemies are in their least susceptible life stage.
- ❑ Use the most selective treatment possible to avoid initiating outbreaks of other pests and negative impacts on beneficial organisms.
- ❑ Evaluate treatment results.
- ❑ When pesticides are applied, signage should be prominently posted for at least 24 hours indicating the following: what area is affected, when the pesticide was applied, the specific pesticide used, and a phone number to call with questions.

I. Record Keeping

Effective landscape management includes good record keeping. In time, the Campus Division will move to a database system to track landscape maintenance practices. In the interim, the following landscaping records should be kept:

- Pesticide and fertilizer applications: chemical name, brand name, area of application, amount and rate of application, and dates
- Pruning schedule
- Stump inventory
- Automatic irrigation clock settings, location of important structures such as main water shutoffs, and irrigation controllers
- Equipment inventories
- Specific area maintenance time logs

J. Training



Training permanent and seasonal employees on the basics of these Guidelines will help ensure that the Guidelines are understood and consistently followed.

1. All staff associated with the design, construction, and maintenance of the University, rights-of-way, and other landscaped areas should receive an orientation to these Landscape Guidelines.

2. Gardeners and laborers (i.e., workers responsible for planting and maintaining plant beds, lawns, etc.) should receive training on:

   - ❑ An overview of Integrated Pest Management
   - ❑ Basic lawn care
   - ❑ Basic plant care
   - ❑ Identifying weeds
   - ❑ Hazard identification
   - ❑ Problem reporting procedures

3. Staff responsible for maintaining irrigation systems should receive training on:

   - ❑ Irrigation system maintenance and how to conduct audits

   - ❑ Basic lawn care

Appendix B

SECTION 02231

TREE PROTECTION AND TRIMMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes tree protection for existing trees indicated to remain. List below only construction that the reader might expect to find in this Section but is specified elsewhere.

B. Related Sections include the following:
   1. Division 2 Section "Site Clearing" for removal limits of trees, shrubs, and other plantings affected by new construction.
   2. Division 2 Section "Earthwork" for building excavation, backfilling, compacting and grading requirements, and soil materials.
   3. Division 2 Section "Landscape Material" for tree and shrub planting, tree support systems, and soil materials.

1.2 DEFINITIONS

A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For tree service firm and arborist.

C. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

D. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.4 QUALITY ASSURANCE

A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.

B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.

B. Topsoil: As specified in Division 2 Sections “Lawns and Grasses” and “Exterior Plants.”

C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

D. Chain-Link Fence: Metallic-coated steel chain-link fence fabric of 0.120-inch-diameter wire; a minimum of 48 inches high; with 1.9-inch- diameter line posts; 2-3/8-inch- diameter terminal and corner posts; 1-5/8-inch- diameter top rail; and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

E. Organic Mulch: As specified in Division 2 Section “Landscape Material.”

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.

1. Install chain-link fence according to ASTM F 567 and manufacturer's written instructions.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Mulch areas inside tree protection zones and within drip line of trees to remain and other areas indicated.

1. Apply 2-inch average thickness of organic mulch. Do not place mulch within 4 inches of tree trunks.

D. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.

E. Maintain tree protection zones free of weeds and trash.

F. Do not allow fires within tree protection zones.

3.2 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
   1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.
   2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.3 REGRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.
   1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.4 TREE PRUNING

A. Prune trees to remain that are affected by temporary and permanent construction.

B. Cut branches with sharp pruning instruments; do not break or chop.

3.5 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.

B. Remove and replace trees indicated to remain that die or are damaged during construction operations that arborist determines are incapable of restoring to normal growth pattern.

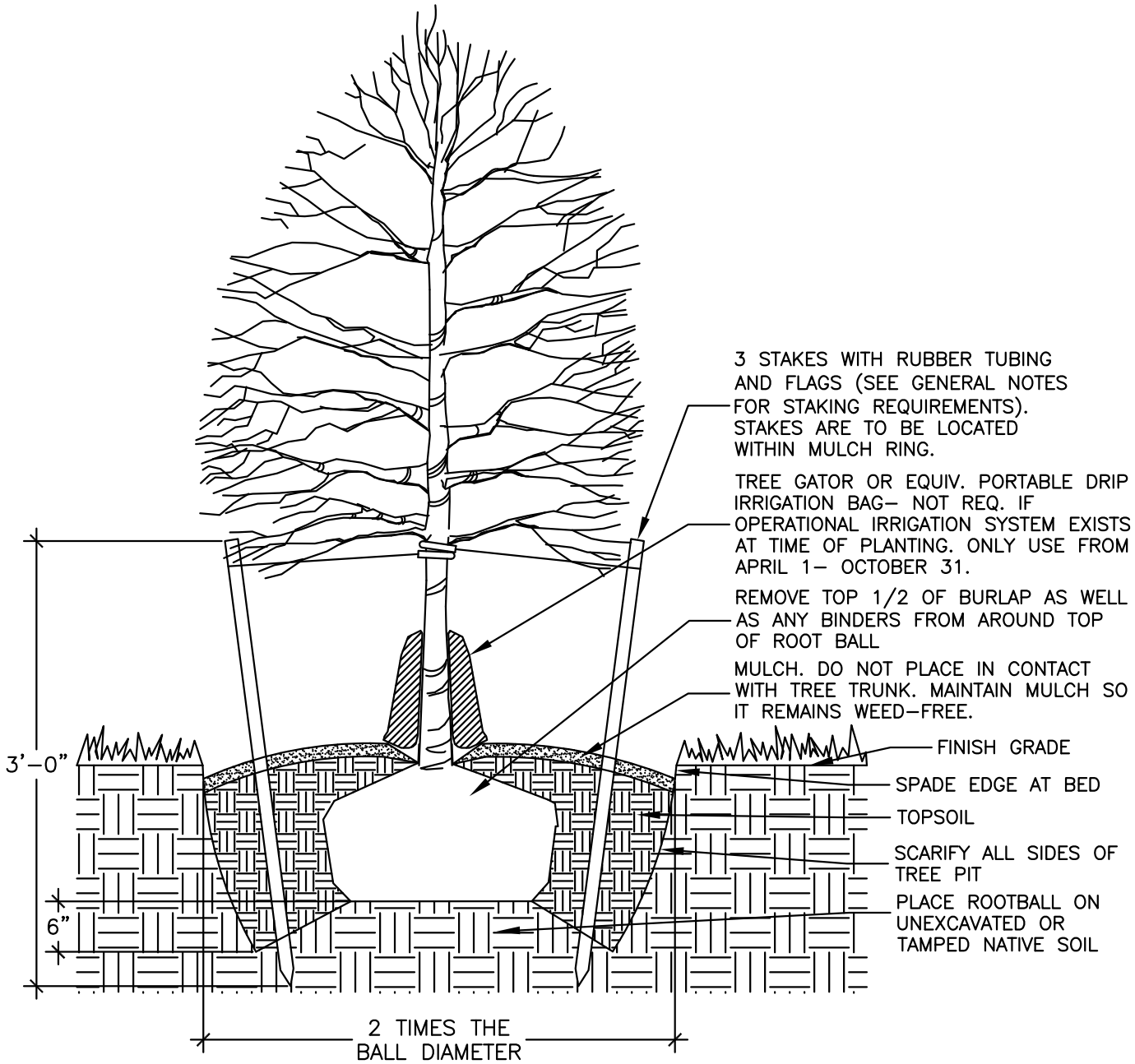
1. Provide new trees of same size and species as those being replaced; plant and maintain as specified in Division 2 Section "Exterior Plants."

3.6 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted.

B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF SECTION



GENERAL NOTES

1. STAKE TREES ONLY IF THEY DO NOT REMAIN PLUMB.

2. DO NOT HEAVILY PRUNE TREES AT 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.

3. TREES MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. DO NOT COVER THE TOP OF THE ROOT BALL WITH SOIL. AFTER INSTALLATION, FINISH GRADE OF ROOT BALL SHOULD BE AT OR ABOVE SURROUNDING FINISH GRADE

NEW TREE PLANTING

SCALE: 1/2" = 1'–0"