



IUPUI Tree Care Plan - 2017

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 and in collaboration with the IUPUI Office of Sustainability and the University Architect's Office.

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.

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 & burlaped 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 our campus' new building projects. Indiana University has instituted a policy that all new buildings and major renovations will be required to meet the minimum Leadership in Energy & Environmental Design (LEED) Gold standards. 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. 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.

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, we have developed a calendar and schedule for monitoring and treatment for the recurring pest cycles that affect the tree populations.

For complete details on the Arboricultural Practices of IUPUI, please see Appendix C.

Protection and Preservation 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:

1) Increasing the tree cover from 10% to at least 28% on campus.



In 2012, the IUPUI Department of Geography led a student service-learning project, developing a campus tree inventory analysis, with financial support from the Offices of Sustainability and Student Employment, with matching grant funds provided with Venture Funds through the IUPUI Solution Center. A campus tree inventory was performed, identifying species, health, DBH, and crown coverage. From this data, a GIS map was created to

outline the IUPUI campus. We now have approximately 3,500 trees on the campus with an estimated canopy coverage of 13.0%; increasing the canopy cover to 28% would come with significant benefits in providing a natural insulator on the edge of downtown Indianapolis to reduce energy consumption, carbon dioxide release, and stormwater runoff. We plan to use and enhance the data and tools of the GIS inventory project in the campus maintenance program, with the intention of developing a dynamic, online campus map or phone app.

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

Continue having annual events that promote sustainability and tree care: specifically, Arbor Day, Earth Month activities, Beautify IUPUI, Campus Sustainability Day, the Green Generation Fair, past years have partnered with the IUFC to host a Tree Giveaway workshop, host BeeKeeping Basics sessions, add Pollinator Gardens.

Establish an “Alumni Grove,” somewhere on campus such as Taylor Courtyard, Ball Gardens, or an area near the NCAA/White River Park area to act as a “Tree Walk” or promenade connector. The grove will have the same proportion of each native species as is found across the state of Indiana. The grove would be an instructional tool, reduce energy costs for surrounding buildings during the summer, and would, as the 2012 IUPUI Master Plan states, “improve the quality of campus life by creating a vibrant outdoor space for formal and informal gatherings which enhance casual interaction and provide opportunities for outdoor events. Increase awareness and contributions to the IUPUI Campus Beautification Fund for further support and development of tree projects

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 such as Keep Indianapolis Beautiful, Reconnecting to Our Waterways, Indiana Urban Forest Council, Indianapolis Downtown, Inc., and our “peninsula neighbors” including IU Health, Eskenazi Health, the Indianapolis VA Medical Center, White River State Park, Indiana State Museum, the Indianapolis Zoo, the NCAA, and the National Institute for Fitness and Support. We also participate in an Indianapolis Higher Education Sustainability Roundtable that includes; IUPUI, Butler University, Marian University, Ivy Tech, Franklin College, UIndy, and Martin University.

History of past initiatives

In **2013**, two of our student organizations developed an Outdoor Learning Space at one of our 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.

In **2014**, we partnered with the Keep Indianapolis Beautiful [Adopt-A-Block program](#), to display our commitment to environmental and community stewardship. We 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, we also hosted a service workday for our student Campus Ambassadors, that included a session on sustainability at IUPUI, a sustainability scavenger hunt, and a workday assisting with mulching one of our urban gardens on campus.

2016 – There are ongoing efforts to raise money for the renewal of Ball Gardens, a green space on IUPUI's campus that was designed by the creators of Central Park in New York. The new design will add a modern twist to fit with the downtown Indianapolis infrastructure. Phase I has been completed and provides a beautiful greenspace area that connects the IUPUI campus to the new Eskenazi Health Campus. Free Concert Events are hosted at the site throughout the summer months. Information regarding the history

2016 – We coordinated with the Indiana Sports Corporation, the NCAA and KIB, for each campus to participate in a tree planting opportunity on our respective campuses during the 2015 NCAA Men's Basketball Championships that were held in Indianapolis.

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, University Architects 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 to University Architects and the Construction Manager, and University Architects 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 the University Architect's Office. Beginning in 2013, we will now incorporate the consideration of harvested trees for potential repurposing and use by our 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 the University Architect's Office. The list includes:

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

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

Local Native Nurseries

[Cardno Native Plant Nursery](#) -
wholesale

[Brehob Nursery](#) -wholesale

[Spence](#)

[EcoLogic in Bloomington](#)

[INPAWS](#)

Bluegrass farms

Woody warehouse

Dedicated Annual Expenditures

For fiscal year 2017

Tree Planting and Initial costs - \$19590.00

Management Costs - \$131366.00

Total- **\$150,956.00**

*There is an IUPUI Campus Beautification Fund where donated funds are used strictly for the purchase of bulbs, plants, trees and shrubs and other products necessary to landscape the IUPUI campus including mulch, various forms of ground cover, flower bedding soil, decorative stone, edging, etc.

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 other 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 new Campus Tree Care Plan, the work of the committee, and Tree Campus USA certification.

Indiana University Bloomington Campus Tree Care Plan

December, 2016

I. Purpose of the Plan

The Indiana University Bloomington campus's identity is intimately tied to its beautiful and diverse landscape character. The existing tree canopy is the essential building block of that character as it denotes the stability of the institution and the ideals for which it stands.

To help ensure this resource, whether in the form of street trees, park areas, or true woods, is available for generations to come, this plan strives to provide the framework of policies, practices, and strategies to retain and sustain a healthy woodland canopy.

II. Responsible Authority

Responsibility for the care of campus trees resides with the Department of Capital Planning and Facilities, specifically the certified arborists within the Campus Division Grounds Maintenance Department therein. The administration of the Tree Care Plan is the responsibility of the University Landscape Architect, a function housed within the University Architect's Office.

In addition to these two offices, the Campus Tree Advisory Committee (CTAC) functions to advise the University Landscape Architect and the Department of Capital Planning and Facilities on all aspects of the campus canopy. The CTAC is composed of student, faculty, staff, and community representatives who meet monthly to advance the sustainability of the woodland canopy on the Indiana University Bloomington campus. The development and monitoring of implementation of the Tree Care Plan is a primary responsibility of the group to ensure the document reflects the latest best management practices and is an effective resource.

The CTAC was established in 2008, to meet a qualification of the Tree Campus USA program application procedure. Its mission is to ensure the sustainability of campus woodlands and trees and to provide the direction and vision for the future woodland campus. Members of the CTAC were invited by the University Landscape Architect and are appointed for a two-year term, unless graduation or other need to leave the institution or community makes

that impossible. New members will be recommended by the CTAC as they are identified. A chair will be elected by the members at the first meeting of each calendar year.

III. Tree Care Policies

Most of the current university policies regarding tree care provide for management in a very broad sense, valuing them as one element of the greater landscape character. These policies are documented in the IU Campus Division Landscape and Grounds Maintenance Guidelines document, see appendix A. Additionally, contractual and specification language for construction on campus requires that all necessary and approved tree work be executed by a certified arborist with preference toward the university's own crew of certified arborists.

While very few formal written policies exist, a culture of every tree being sacred has become the basic understanding of the campus community. During his 25 year tenure as president, Herman B Wells spoke often of the import of the campus canopy. Two of his most often referenced quotes include his stance against the indiscriminate taking of trees, calling out that "to cut a tree unnecessarily has long been an act of treason against our heritage and the loyalty, love, and effort of our predecessors who have preserved it for us." And perhaps his most famous quote, from his 1962 commencement speech identifies the campus's "precious islands of green and serenity" as it's "most important physical asset, transcending even classrooms, libraries, and laboratories in their ability to inspire students to dream long dreams of future usefulness and achievement." It is the intent of the Campus Tree Advisory Committee in the coming years to formalize this understanding through the development of policies and of documents such as this one.

In 2011 the CTAC developed policy to govern the named tree program. Named trees have taken multiple forms on the campus over the years. Class trees have been identified since the founding of the university at its current location in 1883. Limestone markers with the year of dedication engraved on them have been placed at the base of the individual trees. Other stone monuments have found their way into the campus landscape over the years and they have varied in size, material, content, and longevity. Finally, an organized program of naming trees was begun with the construction of the Cox Arboretum Center. Plaques with tree identification information and personalized content were installed at each tree within the Arboretum. The program was so well received that once the 389 trees within the Arboretum were named, the program was expanded to the entire campus property.

The resources to maintain this program grow as the number of named trees grow and a need for a formal policy became apparent. The CTAC developed the policy that can be found as appendix C.

IV. Protection and Preservation Policies

Protection of existing trees has always been a primary objective of the stewards of the Bloomington campus. This valuing of the woodland resource began with the earliest leaders and found its most iconic champion in the person of Herman B Wells. As previously mentioned, his writings on the value and meaning of trees and the larger campus landscape are legendary and equally well documented physically, in the landscape by the mature trees populating the campus today, many due specifically to his keen appreciation of the resource.

His understanding and emphasis on preservation is echoed in the fact that the removal of any tree on the campus requires notification and approval from a specific office prior to any work being done. To carry on this tradition, new open areas of campus have been identified as future woodland areas, with tree plantings and no-mow practices being initiated, beginning in the fall of 2007. The campus nursery has also been re-established with the necessary investment made in fencing to protect the investments from deer that populate the area.

On the construction side, all projects include a tree preservation plan and tree protection specification section, see appendix B. 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.

V. Goals and Targets of Plan

The goals and targets of this plan are just now being identified in specific terms as we have recently completed a comprehensive tree inventory for the campus. The historic goals of preserving as much woodland as possible and creating what President Herman B Wells called the “islands of green” are beginning to be articulated in more quantitative terms including, increasing species diversity, maintaining percentage canopy cover, reforesting the mature canopy to perpetuate its health and diversity, and increasing ecosystem benefits provided by healthy trees.

The university as a whole has completed a physical master plan that was completed early in 2009. Among the many goals and guidelines this plan provides are landscape specific objectives like increasing the current canopy cover from 20% to 40%. Reaching this goal will

include increasing the number of trees within parking areas, filling in gaps in the street tree grid and creating more, large canopy areas along the riparian corridors of the campus.

VI. Tree Damage Assessment Strategies

Currently, the university has no formal penalties for damage of trees due to negligence, vandalism, etc. but the University Architect's Office (UAO) is pursuing the establishment of a monetary value for each tree on campus. The newly completed tree inventory will help make this possible and the purpose of this exercise is to subsequently make those values known, primarily to contractor's working in the area, and establishing their responsibility for them as well as their liability, if their activities impact them adversely. Work to establish the detail is ongoing with Purdue University's policy being used as a reference.

In the few cases where negligence or vandalism to trees have taken place on campus and a responsible party has been determined that person has been assessed a fine corresponding to the tree's assessed value. The Campus Landscape Architect is responsible for determining that value.

If trees, not approved for removal are damaged during construction activities, the contractor is required to provide new trees, in exchange for the damage caused to the existing. The magnitude of the compensation is determined by the Campus Landscape Architect and does not require the complete destruction of a tree but can be required for the taking of a limb or damage to a trunk as well.

VII. Prohibited Practices

As mentioned earlier in this document, no tree on campus can be taken without prior approval from the University Architect's Office and specifically the Campus Landscape Architect. The arborists are constantly monitoring the campus trees and when they encounter one that they believe is in need of significant pruning or removal, they first complete a Tree Hazard Evaluation Form. The form is then submitted with recommendation to the Dir. of Landscape Architecture for their approval or request for further consultation with arborist's group. The forms are logged and the point file of the campus GIS base map is updated to reflect the action that is ultimately taken.

This is not yet a completely closed system since we do not yet possess accurate survey data for all the points that currently populate our GIS base map. We are currently working with an intern selected to continue the process of collecting the data. The success to date of the project has been tied to the Urban Forestry classes currently offered in the university's

School of Public and Environmental Affairs curricula and the financial support of the Sustainability Task Force.

The campus has a preferred palette of trees and while it is not exhaustive and additional species are always considered, they do not include trees identified to be invasive or otherwise undesirable per nursery industry standards. All tree selections are either made or reviewed by the University Architect's Office. Once selections are approved, selections are also tagged by UAO personnel in the field prior to digging. See list of preferred trees in the Definitions section.

VIII. 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 which 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.

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. Other species will be considered but approval must be obtained from the University Architect's Office. The list includes,

- Abies concolor
- Acer buergerianum, griseum, rubra, saccharum
- Aesculus hippocastanum
- Amelanchier arborea, canadensis
- Betula nigra
- Celtis occidentalis
- Cercis canadensis
- Cornus florida, kousa, mas
- Crataegus phaenopyrum
- Fagus grandifolia, sylvatica
- Ginkgo biloba
- Malus spp.
- Liquidambar styraciflua
- Liriodendron tulipifera
- Picea abies, glauca var. densata, omorika
- Platanus x acerifolia
- Pseudotsuga menziesii
- Quercus alba, coccinea, macrocarpa, muehlenbergii, rubra, shumardii
- Taxodium distichum
- Tsuga canadensis
- Ulmus (hybrid)

Sustainability Task Force – A group of university staff, faculty, and students selected to advance the mission of sustainability on the Bloomington campus of Indiana University.

Tree protection plan – A map and supporting documentation which 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 project for Sustainability Task Force interns that advances the data originally captured simply as point data for some trees on campus.

IX. Communication Strategy

The university does not currently have a communication strategy that specifically targets the college community. Contactors working on the campus are informed of the importance of campus trees and the need for tree protection vigilance in both pre-bid and pre-construction meetings scheduled through the University Architects Office, Construction Management Division. Tree Protection plans are utilized on all site construction projects and agreed to prior to commencement of construction activities.

The university is currently completing a master plan study process that will also produce formal design guidelines for the campus landscape. Currently the existing tree canopy for the Bloomington campus is 20.4% of the total land area. The goal identified in the guidelines at this time is to increase that to 40%.

Other metrics are being studied with respect to storm water and open space and these will also be formalized within in the master plan submittal, currently scheduled for final release in April 2009. The university has recently established a Sustainability Task Force which has served its purpose in developing a set of recommendations to the President. One such recommendation was the creation of an Office of Sustainability, which has been established and is now serving a crucial role on campus.

X. Dedicated Annual Expenditures for Campus Tree Care

Indiana University Landscape Services
2016 Campus Tree Maintenance Expenditures

Totals spent on tree maintenance and labor:
\$173,626.53

Total spent on tree materials:
\$4,507.20

2016 New Tree Plantings

In 2016, 210 trees were planted by outside contractors on the IUB campus. Our in house Landscape Services crews planted another 371 trees on the campus over the course of the last year. Plant stock was mixed with B&B, container, and bare root plantings. The total number of trees planted on IUB campus was 581 in 2016.

Total Materials and Labor Costs, approximately: \$262,133

Other Costs:
Arborist Management
Cost of trees purchased

Tree Planting
Stakes
Mulch
Nursery Operations
Tree Watering
New Tree Pruning
Fertilizer
Stump grinding
Membership in the International Society of Arboriculture
Landscape Architects time
Equipment expenditures

Appendix A

Indiana University Campus Division

Landscape and Grounds Management Guidelines:

Maintenance Standards

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.

Introduction

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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.

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 relevant 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.

Contents

- A. Design Stage
- B. Drainage
- C. Plant Selection
- D. Plant Health
- E. Mulch

- 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 of 6" inches to protect the crowns in native forb species.
- ☐ Invasive species 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.

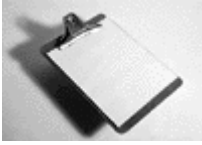
I. Record Keeping



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

Appendix C



INDIANA UNIVERSITY

OFFICE OF THE VICE PRESIDENT FOR CAPITAL PLANNING AND FACILITIES

Memorial Tree Planting Policy

FULL POLICY CONTENTS

Scope

Policy Statement
Reason for Policy

Procedures

ADDITIONAL DETAILS

[Additional Contacts](#)
[Web Address](#)
[Forms](#)
[Related Information](#)

Effective: *Date*

Last Updated: *Date*

Responsible University Office:

*Office of the Vice President for Capital Projects and
Facilities*

Responsible University Administrator

***Thomas Morrison, Vice President for Capital Planning
and Facilities***

Policy Contact:

Mia Williams, University Landscape Architect

Scope

The Memorial Tree Planting Policy pertains to all individuals or organizations that wish to plant a tree on Indiana University's campus in honor of an individual.

Policy Statement

Purpose of Memorial Trees

Memorial trees are planted in honor (memorial, but also celebratory) of any individual with a significant connection to the university, including students, alumni, current and retired staff and faculty or members of the University community who have made significant contributions to the life of the University. All proposals for trees to be planted for such purposes must be proposed to the Indiana University Campus Tree Care Committee and Landscape Architect via the procedures outline in the Procedures Section of this document. Ultimately, Indiana University's Landscape Architect and Tree Care Committee are responsible for determining the appropriateness and approval of proposed memorial trees to be planted on campus.

Tree Species, Size, and Location

Working with applicants, Indiana University's Landscape Architect and the Campus Tree Advisory Committee will help choose the species, location, and planting date of any approved memorial tree requested. This is imperative in order to comply with tree management outlined in the University's Master Plan. In general, approved memorial trees are new saplings (from 1.5 to 2.5 inch caliper trees); new plantings may be located within the campuses' arboretums, memorial tree groves, or in areas of campus where increasing tree canopy cover is a specified goal.

The following is a suggested list of trees available:

Sugar Maple, Serviceberry, River Birch, Redbud, Dogwood, Hawthorn, Gingko, Spruce, Red Oak, White Oak, Bur Oak, Bald Cypress, Hybrid Elm or other species appropriate for the campus location and environment.

Not every tree on the list works in every location on campus. If donors feel strongly about the **location** of a memorial tree, then greater flexibility of the species of tree is required. Donors concerned with having a **specific tree** will also need flexibility with regard to location.

Records of Memorial Trees

Memorial trees will be publically identified via standardized plaques on or near the tree or via monuments located near memorial tree groves. A record of memorial trees (the Memorial Tree Register) will be housed in a single location—in the office of Indiana University’s Landscape Architect. Records of the memorial tree plantings include: the location, tree species, date of planting, the memorialized person’s name, and donor’s name and contact information.

Memorial Tree Maintenance

Once planted, Indiana University grounds maintenance is responsible for the day-to-day care of a memorial tree. While all care is taken, Indiana University cannot guarantee the perpetuation of a memorial tree. If the tree dies or requires relocation, grounds maintenance will manage the replacement of the tree and the associated relocation of the plaque. The details of the date of the replacement, the species of tree, and its location will be recorded in the Memorial Tree Register. The donor will be advised of the new location and replacement action via the contact information provided.

Memorial Tree Costs

The cost for planting one memorial tree on an Indiana University campus is \$1500.00 [US]. Cost reflects the price of obtaining the tree itself as well as the maintenance cost of the average university tree over its lifetime.

Reason for Policy

The rationale for the Memorial Tree Policy is to structure and communicate clearly the purpose and procedure for memorial tree plantings and maintenance. The policy is meant to ensure the program’s stability and to utilize it to its fullest potential in order to help meet the goals and objectives of tree management outlined in the University Master Plan.

Procedures

To propose a memorial tree planting, a donor must complete a Tree Donor Information form which can be accessed via the following website:

<http://www.indiana.edu/~uao/assets/multimedia/treedonorform.pdf>.

A form must be completed and a contact person must be identified for each individual tree a donor wishes to donate. The contact person can be the same for multiple trees if desired.

The university will notify a donor of an approved planting request within 6 months of the submission of a proposal. In order to ensure the university is able to meet this commitment, there are designated cut-off dates for the submittal of donor forms for each planting season:

- Spring Planting – March 1st
- Fall Planting – Sept. 1st [skm1]

[b2]

Please make checks payable to: **Arboretum Fund Account No. 32-PP00-03-5**

Submit your donation along with a copy of the Tree Donor Information form to:

Mia Williams
Indiana University Office of the V.P. for Capital Planning & Facilities
1800 North Range Road
Bloomington, IN 47408

Additional Contacts

<i>Subject</i>	<i>Contact</i>	<i>Phone</i>	<i>Email</i>
General questions	Debbie Freeman	(812) 855-4271	ddebaun@indiana.edu

Forms

Tree Donor Information Form is located online at:
<http://www.indiana.edu/~uao/assets/multimedia/treedonorform.pdf>.

Web Address for this Policy

|
[http://www.abcdefghijklmnopqrstuvwxyz\[skm3\]](http://www.abcdefghijklmnopqrstuvwxyz[skm3])

Related Information

If you would rather support the care and planting of all trees on the Bloomington campus, please contact the IU Foundation (1-800-558-8311) for information about the **Bloomington Campus Tree Restoration Fund** or click this link: https://apps2.iuf.indiana.edu/og-prd/SelectAccounts.do?method=enter&account=I32IU03192&campaignCode=BGA0987-11&utm_campaign=