IUPUI Tree Care Plan - 2013

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." 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://www.masterplan.iupui.edu/
- 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 monthly 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

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. These characteristics play a role of the way that IUPUI handles the selection and planting of new trees as well as the maintenance of existing trees.

Tree selection – When possible, choose a tree variety 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.

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.

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.

There are also continued efforts to incorporate water friendly structures in our campus' new building projects. Some examples of these efforts can be found in the cisterns and rain gardens by the new Glick Eye Institute and the new 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.

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 Integrated Pest Management, and there is a draft policy under review, 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. This map showed that there are currently 3,454 trees on the campus with a current canopy coverage of 12.4%; 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 will 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.

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. Information regarding the history and future of Ball Gardens can be found at http://ballgardens.iupui.edu/history.html.

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, and the Green Generation Fair.

Establish an "Alumni Forest," on the quadrangle to the east of the Lecture Hall and North of Taylor Hall, which will have the same proportion of each native species as is found across the state of in Indiana. The forest would be an instructional tool, reduce energy costs for the four 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.

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.

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, Eskanazi (formerly Wishard) Hospital, the Indianapolis VA Medical Center, White River State Park, Indiana State Museum, the Indianapolis Zoo, and National Institute for Fitness and Support.

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*

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 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*
Paperback 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*
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*

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.*

Dedicated Annual Expenditures

For fiscal year 2013

Tree fertilization	$ 4,300
Pest protection	$ 15,725
Contracted trimming and tree removal	$ 22,250
IUPUI Ground Operations	
Tree fertilization	$ 0
Leaf removal	$ 28,250
Limb cleanup	$ 5,725
Misc. materials	$ 0
Mulching labor	$ 27,750
Mulch materials	$ 18,500
Pest control	$ 0
Watering	$ 2,000
Planting labor	$ 4,750
Plant materials	$ 10,000
*Donated trees	$ 0
Tree trimming	$ 10,500
Volunteer Labor	$ 1,200
TOTAL	**$ 150,950**

*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.

Appendix A

Additional Maintenance Procedures -

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. 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. The timing of the pruning should be to avoid bud break and leaf drop on live wood.
5. 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.
6. Unless approved by the campus manager, tree wrap will not be used.
7. Irrigation of newly planted trees will take place at least twice monthly, unless there is adequate rainfall, during the first three growing seasons.
8. Pest control should be done as needed.
9. Mulch will be maintained at a minimum depth of 1 inch and a maximum depth of 3 inches.
10. Trees will not be removed without prior approval of the campus manager. In some cases approval will be required by the university landscape architect. Removal of dead or badly damaged trees will take place in a manner that observes all standard safety practices.
11. Stumps of removed trees will be reduced to a level beneath the soil grade that allows replanting in that location.
12. Remove stump shavings and back fill hole immediately after stump grinding

Appendix B

From the Office of Indiana University Architects:

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.

Appendix C

SECTION 02110 SITE CLEARING

PART 1- GENERAL

1.01 RELATED WORK

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division - 1 Specifications Sections, apply to work of this Section.

B. Section 02200 - Earthwork

1.02 DESCRIPTION OF WORK

A. Provide site clearing work as shown and indicated.

B. Site clearing work includes, but is not limited to:

1. Protect existing or newly planted trees and plants as shown on drawings or as directed by Architect/Engineer.
2. Removal of trees and other vegetation.
3. Topsoil stripping.
4. Clearing and grubbing.
5. Removing above-grade improvements.
6. Removing below-grade improvements.
7. Installation of erosion control fabric.

1.03 JOB CONDITIONS

C. Erect protection prior to any disturbance associated with new construction on site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fence: Plastic mesh safety fence no less than 4' in height.

B. Stakes: Steel Channel Posts

C. Wire: Galvanized iron wire, 12 gauge.

PART 3 - EXECUTION

3.01 SITE CLEARING:

A. General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction. Remove such items elsewhere on the site or premises as specifically indicated. Removal includes digging out stumps and roots.

1. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

2. Clear all material collected at base of tree to original grade. Remove collected material and clear area from trunk to dripline.

Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.

D. Installation of Protection Fence: Drive stakes 6' o.c. along the line designated by the greatest reach of a branch from the trunk. Drive stakes 18" deep. Place fence outside the stakes and secure with wire. Overlap fence by 4' on the ends and secure with wire. Allow no gate for access into dripline area through snow fence.

E. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.

END OF
SECTION

B. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

2. Protect structures, utilities, sidewalks pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

a. Perform excavation within drip line of large trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

Finish Grading Section 02260

PART 3 - EXECUTION

3.02 PLACING TOPSOIL

A. Use topsoil in relatively dry state.weather. place during dry

B. Fine grade topsoil eliminating rough or low areas to ensure positive drainage. Maintain levels, profiles and contours of sub-grades.

C. Remove stone, roots, grass, weeds, debris and other foreign material while spreading.

D. Manually spread topsoil around trees to prevent damage which may be caused by grading equipment.

PLANT MATERIALS AND INSTALLATION

Landscape contractor will be pre-qualified with five years minimum experience in landscape installation of similar size projects.

- All plant material will conform to the current issue of the American Standard for Nursery stock published by the American Association of Nurserymen.

- Plant material must be selected from nurseries which are located in hardiness zones similar to the project's location. Nurseries must also be inspected and approved by state and federal agencies.

- Plant materials must be approved by the landscape architect prior to digging and delivery.
  Plant material inspections and approvals can be done at the nursery or by photographs. A minimum of two photographs per plant type with a front and side view is required. Photographs must indicate size, shape, color, and nursery growing conditions.

- Plant materials will have the following minimum sizes:

Deciduous shade type trees	2.5" caliper
Deciduous ornamental trees	1.5 "caliper
Deciduous shrubs, dwarf & semi-dwarf	15"-18"
Deciduous shrubs, medium Deciduous shrubs, large Evergreen Trees	18"- 24"
Evergreen shrubs, dwarf & semi-dwarf	24"- 30"
Evergreen shrubs, medium Evergreen shrubs, large Perennials, 2 year plants	7'-8' ht.
Roses, No. 1 grade	15" -18"
· Ground Covers, 2 year plants	18"-24"
Bulb	24"-30"
Annual flowers	2 gal.
	2 gal. No.1
	Top size
	18 pack flats

SECTION 02490 PLANT MATERIALS

PART 1 -GENERAL

1.01 WORK INCLUDED

A. Trees, shrubs, perennials, bulbs and flowers.

B. Topsoil bedding and mulching.

C. Maintenance

1.03 QUALITY ASSURANCE

A. Perform work with personnel experienced in the technical and construction tasks required of this section under the direction of a skilled foreman.

B. Plant materials will be approved by Landscape Architect prior to digging and shipping. Contractor will submit photos from at least two sides of material indicating size, shape and condition to the Landscape Architect for approval if material is located more than 50 miles from project site.

C. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials. Indiana Nurserymen's Association, American Association of Nurserymen's American Standard for nursery stock and Federal specifications Q-F-
241D and A-P-166E.

D. Do not make substitutions. If specified landscape material is unavailable, submit proof of non- availability and proposal for use of equivalent material to Landscape Architect.

E. Analysis and Standards: Packaged standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

1.04 DELIVERY, STORAGE AND HANDLING

A. Immediately before digging, all plant material shall be marked to indicate north side at time of digging. Provide freshly dug trees and shrubs. Do not prune prior to delivery. Do not bend or bind-tie trees or shrubs in such a manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery.

B. Root ball size: The minimum root ball diameter for trees and shrubs shall be as follows:

1. Trees

Caliper inches	Minimum Root Ball Diameter
1"-1-1/4"	18 times larger than caliper
1-1/2"- 2-1/4"	15 times larger than caliper
2-1/2"- up	13.5 times larger than caliper

2. The minimum root ball diameter for trees shall be 1/3 the tree height when tree size is specified by height, i.e.; 8ft. high tree will have a minimum root ball diameter of 32".
3. The minimum root ball diameter for shrubs (36" high and larger) shall be 1/3 their height. Shrubs less than 36" high shall have a minimum root ball size equal to their spread.
4. Root ball depths:
   a. Root balls with diameters less than 48" shall have a depth of not less than 75% of their diameter.
   b. Root balls with diameters 48" to 60" shall have a depth of not less than 66-2/3% of their diameter.
   c. Root balls with diameters over 60" will have the depth scaled down proportionately

C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, then store plant material in shade. Protect from weather and mechanical damage and keep roots moist. Provide cover if necessary.

D. Reject plants when ball of earth surrounding roots has been cracked or broken during delivery or planting process.

E. Reject plants when burlap, staves, and ropes required in connection with transporting have been displaced prior to acceptance.

1.05 WARRANTY

A. Provide one year warranty from plant material acceptance.

B. Replace dead, unhealthy, and misshapen plant materials.

C. Replacements: Plant materials of same size and species, with a new warranty commencing on date of replacement.

PART 2-PRODUCTS

2.01 MATERIALS

A. Trees and shrubs: Species and size as identified on landscape plan, grown in climatic conditions similar to those in locality of the project site.

H. Fertilizer: For trees and shrubs, provide slow release granular fertilizer with not less than 10% available phosphoric acid and 3-5% total nitrogen and from 3-5% soluble potash.

I. Mulch: Shredded native hardwood bark. 3" minimum layer, pieces shall not exceed Yz" x 1" x 4" and contain a minimum of 25% organic material.

PART 3-EXECUTION

3.01 PREPARATION

A. Verify topsoil and plant bed soil is ready for planting operations. Prepare planting areas and beds for plant installation.

3.02 INSTALLATION

A. Place plant materials or location stake for review and final orientation by Landscape Architect prior to installation.

B. Excavate for plant materials.

1. Plant pits shall be circular in outline and shall have vertical sides and flat bottoms. They must be excavated at least 6" deeper than the root balls. Their diameter shall be:
   a. At least 3' larger than plant root balls 5 feet larger in diameter.
   b. At least 2' larger than tree plant root balls 2 to 5 feet in diameter.
   c. A minimum of 18" larger than plant root balls less than 2 feet in diameter.

C. Set plant materials relative to grade as originally grown, after settlement, and orient north side of plant.

D. Set plants in pits partly filled with prepared topsoil mixture, at a minimum depth of at least 6" as indicated under each plant. Pull away burlap, ropes wires, etc. from top of root ball. All covering and ropes other than burlap and hemp shall be completely removed.

E. Backfill soil mixture in 6" layers. Maintain plant materials in vertical/plumb position. Dish top of backfill to allow for mulching.

F. Thoroughly water soil when the hole is half full, even if it is raining, and again when full. Water plant materials as indicated.

G. Mulch pits and plant beds. Provide 3" thickness of mulch and work into top of backfill and finish level with adjacent grades. Mulched tree pits shall be a diameter of 6 feet. Unless pit area is restricted by site elements.

H. If deciduous trees or shrubs are moved in full leaf, water root zone thoroughly and spray with anti- desiccant at nursery before moving and again two weeks after planting.

I. Pruning: Thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to required height and spread. Do not cut tree leaders, and remove only injured or dead branches. Prune shrubs to retain natural character. Do not shear.

3.04 TRANSPLANTING EXISTING PLANTS

A. Indicate north side of plants before digging. Before digging deciduous plants which are in full leaf, water root zone thoroughly and spray with anti-desiccant as per manufacturer's instruction and again two weeks after transplanting.

B. All transplanted plants shall be balled and burlapped. Minimum size and depth of root ball shall be as specified in paragraph 1.04B.

C. Temporary storage: Existing plants which have been removed and cannot be replanted immediately shall be "healed-in" with topsoil, mulch, or sawdust. "healed-in" plants shall be kept shaded and their root balls kept moist until they can be replanted. Replant according to specifications outlined in Part 3- Execution.

D. Warranty: Transplanted material in full leaf shall not be warranted. All other warranties apply.

3.05 INSPECTION OR INITIAL ACCEPTANCE

A. Maintenance and warranty shall begin after landscape inspection and acceptance. This inspection can be on all or partially completed work under this contract.

B. At the time of final inspection, the Landscape Architect and owner reserve the right to postpone final acceptance until that time in the future when positive acceptance or rejection can be determined.

3.06 MAINTENANCE AFTER INITIAL ACCEPTANCE OR INSPECTION

A. Begin maintenance of plant materials immediately after planting and continue until 30 days after initial acceptance.

B. Maintenance shall include measures necessary to establish and maintain plants in a vigorous and healthy growing condition. Include the following:

1. Cultivation and weeding tree pits. When herbicides are used for weed control, apply in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
2. Water sufficient to saturate root system.
3. Pruning, including removal of dead and broken branches, and treatment of prune wounds.
4. Disease and insect control.
5. Replumb trees and stake if required. Repair or replace accessories when required.

C. Job site will be kept neat and attractive during 30 day maintenance period.

END OF SECTION