

INTRODUCTION

In May, 2012, Salve Regina University in Newport, RI retained Bartlett Tree Experts to perform an inventory of trees on the Salve Regina University campus. Team members Nicholas Martin and Jarod Faas visited the site from May 21st-25th to conduct the inventory.

The inventory included:

- identifying trees and attaching to each tree a tag with assigned tag number. (Tags 1-1194);
- identifying the trees' condition, health, and vigor;
- recommending risk evaluations and removals of appropriate trees;
- recommending pruning, soil management, and pest management treatments to promote tree safety, health, appearance, and longevity; and
- mapping the trees using GPSr hardware and Geographic Information System (GIS) software.

The methods and procedures we used to make the above determinations and recommendations are detailed in the following sections.

GOALS & OBJECTIVES

An effective management plan communicates clear goals and the specific objectives designed to carry out those goals. We intend "goal" to mean the overall aim or result we expect to achieve for the client in producing the inventory and management plan. The objectives are the specific actions taken or recommended to support goal completion. Table 1 below describes each goal and its corresponding objective(s).

Table 1: GOALS & OBJECTIVES

GOAL	OBJECTIVES TO ACCOMPLISH GOAL
Establish the tree inventory (per numbers agreed) at Salve Regina University.	Using Trimble GeoXT GPSr hardware and ArgGIS 9.3 software, collect data such as tree name, location, size, age class, and condition class. Place tag on each tree inventoried.
Provide mechanism for managing inventory, recommendations, and related budget planning.	Provide map or maps of the inventoried trees to assist the client in managing property areas. Submit a comprehensive management plan that documents and organizes findings and provides other resources to assist the client in efficient use of the information.
Maximize client understanding and implementation of management plan.	Include in management plan specific explanations and visuals related to plan recommendations. Provide appended resources that address health, procedures, and standards related to tree care. Make periodic contact with client to follow up and answer any questions about the management plan's contents.
Maximize immediate and long-term tree health and aesthetics.	Implement recommended plant-health-care program that uses <ul style="list-style-type: none"> • integrated pest management • soil management • maintenance pruning
Manage immediate and long-term risk associated with trees in high-use areas.	Implement recommended risk-management measures that include <ul style="list-style-type: none"> • risk-reduction pruning • required removals • tree structure evaluations

DATA COLLECTION & TREE INSPECTION METHODOLOGY

In conducting the inventory, we used specialized equipment and software and followed specific procedures to determine tree characteristics, risk evaluations, and recommendations. The following explanation will assist the reader in interpreting the findings of this management plan.

Data Collection Equipment & Attribute Data

The BIS team used the Trimble GeoXT global positioning system receiver (GPSr) hardware unit and accompanying ArgGIS 9.3 software. The attribute data we collected on site are listed below.

- botanical name and regional common name according to local ISA Chapter Tree Species List
- tree location based on GPS coordinate system
- tag number
- diameter at breast height (DBH)
- canopy radius
- age class
- height class

- condition class
- root zone infringement, based on **dripline** and estimated **grayscale** (e.g., sidewalks) impact on root zone
- infrastructure interaction (between trees and grayscale that may cause an undesirable condition)
- priority of general tree work (based on 3-year management plan)
- pruning
- need for and inspection of existing cables and braces
- need for and inspection of existing lightning protection
- need for tree hazard evaluations
- tree removals
- soil management recommendations
- pest management recommendations

Specifications/Definitions

Age Class

New Planting	Tree not yet established
Young	Established tree but not in the landscape for many years
Semi-mature	Established tree but has not yet reached full growth potential
Mature	Tree within its full growth potential
Over-mature	Tree that is declining or beginning to decline due to its age

Height Class

Small	Less than 15 feet
Medium	15 to 40 feet
Large	Greater than 40 feet

Condition Class

Dead	
Poor	Most of the canopy displays dieback and undesirable leaf color, inappropriate leaf size or inadequate new growth. Tree or parts of tree are in the process of failure.
Fair	Parts of canopy display undesirable leaf color, inappropriate leaf size, and inadequate new growth. Parts of the tree are likely to fail.
Good	Tree health and condition are acceptable.

Priority of General Tree Work

Priority class recommendations are based on a three-year management plan that takes into consideration tree species, condition, location, age, and proximity to infrastructure. We intend that this rating system assist decision makers in prioritizing tree pruning, cabling and bracing, and tree lightning protection recommendations. *Trees with a priority of 1 and an Overall Risk Rating of Extreme or High (see definitions in the next section) should be addressed immediately.* Prioritization does not take into account any budgetary or financial considerations.

Recommendations for Priorities 1, 2, and 3 are all based on observations by the inventory arborist. The following additional information clarifies each priority class:

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|-------------------|---|
| Priority 1 | To be addressed in years 1 or 2 of the management cycle. Priority 1 may include trees with large dead wood, structural defects, located in exposed sites, high aesthetic value, and/or parts that are currently negatively interacting with infrastructure, such as branches that touch buildings, interfere with signage or lighting, or obstruct pathways. |
| Priority 2 | To be addressed in years 2 or 3 of the management cycle. Priority 2 may include trees with small dead wood, developing structural defects, located in semi-exposed sites, moderate esthetic value, and/or parts that are anticipated to negatively interact with infrastructure, such as branches that touch buildings, interfere with signage or lighting, or obstruct pathways. |
| Priority 3 | To be addressed in year 3 of the management cycle. Priority 3 may include trees with small dead wood, developing structural defects, located in lesser used sites, and/or parts that are anticipated to negatively interact with infrastructure, such as branches that rub on buildings, interfere with signage or lighting, or obstruct pathways. |

Pruning

Each of the following is a selective pruning technique to achieve the pruning goal described:

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|------------------|--|
| Clean | Remove one or more of dead, diseased, and/or broken branches |
| Raise | Provide vertical clearance |
| Thin | Reduce density of live branches |
| Reduce | Reduce height or spread |
| Structure | Select live branches and stems to influence orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems |

ISA Tree Risk Assessment & Risk Rating System

The International Society of Arboriculture (ISA) developed a Tree Risk Assessment Protocol and Risk Rating System that Bartlett employs while conducting tree inventories and basic tree risk assessments. When categorizing tree risk the factors considered are the Likelihood of Tree Failure Impacting a **Target** and the Consequence of the Failure (Smiley *et al.* 2011). Examples of targets are people, vehicles, buildings, and other valuable objects. After assessing any targets the BIS team looks for any defects or conditions in the roots, stem, and crown that may impact a target. The team then estimates the Likelihood of a Tree Failure Impacting a Specified Target. The Consequence of Failure is then categorized. An Overall Risk Rating is then estimated by entering the Likelihood of Failure and Impact and Consequences into the Risk Rating matrix.

The categories for Likelihood of Failure and Impact are: *Unlikely, Somewhat likely, Likely, and Very likely.*

The categories for Consequence of Failure are: *Negligible, Minor, Significant, and Severe.*

The categories for the Overall Risk Rating are: *Low, Moderate, High, and Extreme.*

The following tables describe the Overall Risk Rating in more detail:

Table 2: CONSEQUENCES OF FAILURE DEFINITIONS

Consequences of Failure	
Negligible	Low value property damage that can be replaced or repaired, and do not involve personal injury.
Minor	Low to moderate property damage, small disruptions to traffic and communications or very minor injury.
Significant	Moderate to high value property damage, considerable disruption, or personal injury.
Severe	Involves serious personal injury or death, high value property damage, or disruption of important activities.

*(Smiley *et al.* 2011)

Table 3: OVERALL RISK RATING DEFINITIONS

Overall Risk Rating	
Low	Some trees with level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required.
Moderate	Mitigation and/or retaining and monitoring may be recommended. The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager.
High	Mitigation measures should be taken. The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or risk manager.
Extreme	Failure is imminent and there is a high likelihood of impacting the target. Mitigation measures should be taken as soon as possible which may include immediate restriction or access to the target zone area to avoid injury to people.

*(Smiley *et al.* 2011)

Table 4: ISA MATRIX USED TO ESTIMATE THE OVERALL RISK RATING

Likelihood of Failure and Impact	Consequences			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

*(Smiley *et al.* 2011)

Pruning and structural support system procedures will reduce the risk of branch and leader failure. We emphasize, however, that *all large trees pose a certain degree of inherent risk and this evaluation does not preclude all possibility of failure especially during severe storms.*

For those trees that the client considers hazardous and representing an immediate safety concern, we recommend placing a sign, tape, or other warning indicator near those trees until such time as the hazard can be remedied.

Trees inherently pose a certain degree of risk from breakage, failure, or other causes and conditions. Recommendations that are made by the Bartlett Tree Experts Company are intended to minimize or reduce hazardous conditions that may be associated with trees. However, there is and there can be no guaranty or certainty that efforts to correct unsafe conditions will prevent breakage or failure of a tree. Our recommendations should reduce risk of tree failure but they cannot eliminate such risk, especially in the event of a storm or any other act of God. Some hazardous conditions in landscapes are apparent while others require detailed inspection and evaluation. While a detailed inspection and evaluation should and normally does result in the detection of potentially hazardous conditions, there can be no guaranty or certainty that all hazardous conditions will be detected.