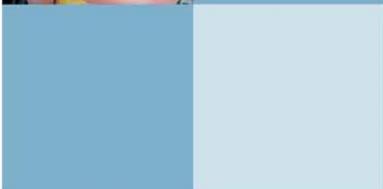
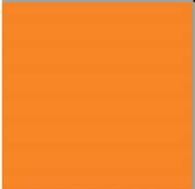
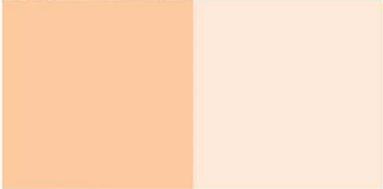
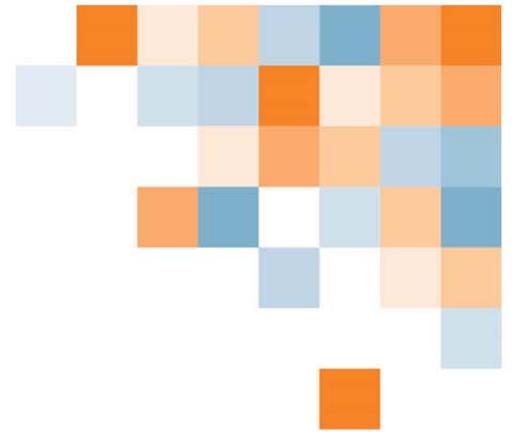


**ita**  
**YOUR TICKET.**



## PROGRAM OUTLINE

Field Arborist



The latest version of this document is available in PDF format on the ITA website  
[www.itabc.ca](http://www.itabc.ca)

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# **FIELD ARBORIST PROGRAM OUTLINE**

**APPROVED BY INDUSTRY**

**November 2010**

**Developed By  
Industry Training Authority  
Province of British Columbia**



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# Section 1

## INTRODUCTION

### Field Arborist



## FOREWORD

The Arboriculture Trade for British Columbia includes three distinct and progressive Apprenticeship Training Programs – Arborist Technician, Climbing Arborist and Field Arborist. The three separate Arboriculture Trade Provincial Certificates of Qualification (C of Q's) have been defined as follows:

### Arborist Technician

In this entry level training the apprentice is primarily performing work on the ground or within 3 meters of the ground on ladders. Successful completion of training and assessments will result in Arborist Technician C of Q.

### Climbing Arborist

In Climbing Arborist training the focus is on the climbing and technical skills used while working in trees. Successful completion of training and assessments will result in Climbing Arborist C of Q.

### Field Arborist

The Field Arborist training covers the skills involved in advanced tree management, including: development of pest management plans, tree and site assessment and office management skills. Successful completion of training and assessments will result in Field Arborist C of Q.

**Note 1:** *The Arborist Technician and the Climbing Arborist Apprenticeship Training Programs recommend the apprentice obtain their Level 1 First Aid certification.*

**Note 2:** *Falling and Bucking is a separate endorsement from the Arboriculture Training Programs. The Arborist Technician technical training, as outlined in that program, covers the required knowledge and practical requirements of the WorkSafeBC Faller Training Standard.*

**Note 3:** *To obtain certification as a Climbing Arborist the Apprentice must successfully complete the Climbing Arborist Standardized Practical Assessment which may only be taken after successful completion of the Apprenticeship Training Program, the ITA written exam, and the required workplace hours.*

This Program Outline details the new **Field Arborist** Apprenticeship Training Program for British Columbia.

The Outline is to be used as a guide for all Instructors in classroom, field and work experience components of **Field Arborist** Apprenticeship Training Program. It also provides direction for the written and practical evaluations conducted during the technical training and workplace based training components of the program.

The Outline includes training provider standards, equipment and materials, and the facility requirements. The Outline is based on a 6 week training delivery program run with 1 Instructor and 16 students per class.

The development team for the **Field Arborist** Apprenticeship Training Program has collectively an extensive background in all arboriculture workplaces, including private sector climbing and consulting, municipal/urban tree management, utility arboriculture, and botanical gardens. Organizations and individual subject matter experts involved are listed on the proceeding pages.



## Safety

The development team recognized that safety is of paramount importance in the arboriculture industry and that trained arborists are critical in ensuring workplace safety. It is imperative that arborists are aware of circumstances that may lead to injury to themselves, others, and surrounding trees or properties. It is generally recognized that a safety conscious attitude and work practices contribute to a healthy, safe and accident free working environment, and it is the responsibility of the Arborist to ensure the safety culture on the job site. It is imperative that Arborists are very familiar with and apply occupational health and safety rules and best practices as an integrated part of their job functions. As well, it is essential to identify hazards and take necessary measures to protect oneself, coworkers, the public, property, and the environment. The Program Outline provided incorporates safety as a thematic element through all competency areas, to reinforce the need and value of safe work practices in this trade.

## Field Arborist Job Description

A Field Arborist is a certified tradesperson who is able to provide knowledge and expertise in arboricultural science and tree work, including, but not limited to:

- Tree Risk Assessments
- Arborist Reports/tree appraisals
- Planning and documentation for tree work projects
- Identifying tree pests and diseases and implementing pest management strategies
- Developing and implementing soil remediation strategies

This trade engages in a range of outdoor work activities in varying weather conditions.

Arborists work year round, however longer hours may be required in spring and summer or following storms and other weather emergencies.

To perform the work of a Field Arborist, the tradesperson must be able to:

- Interpret reference materials such as regulations and technical documentation
- Have knowledge of soil chemistry and tree biology
- Identify and diagnose common pests and diseases in woody plants and devise management plans to combat them
- Be able to initiate and support emergency response procedures from the ground
- Have effective written and verbal communication skills
- Manage jobs
- Train and mentor others

These workers may be employed by:

- Government departments dealing with environment, lands, and parks
- Institutions or facilities with extensive grounds (public and private)
- Private firms providing services in tree care and landscape management
- Utilities and private utilities contractors
- Tree nurseries
- Orchards
- Golf courses
- Private estates

**General Aptitudes and Skills:**

Field Arborists must enjoy working outdoors, have an interest in natural environments, trees and tree sciences. They must be physically fit and have good physical coordination. They must work well with minimal supervision and have good problem solving and critical thinking skills. They must have a high level of written and verbal communication skills.

**Pre-requisites:**

- Arborist Technician – Certificate of Qualification
- Climbing Arborist – Certificate of Qualification
- Ability to obtain driver's license
- Ability to obtain Level One First Aid

**SAFETY ADVISORY**

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



## ACKNOWLEDGEMENTS

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the HortEducationBC training organization. Members include:

- Kyle Banks Davey Tree Expert Company of Canada
- Paul Buikema Progress Landscaping
- Mark Brown District of North Vancouver
- Thor Clausen Arbortech Tree Services
- Heath Czypionka City of Vancouver
- Rupert Evans The Butchart Gardens
- Wes Hawley Hawleyscape Tree Service Ltd.
- Clifford Hoegler BC Plant Health Care Inc.
- Anne Kadwell HortEducation BC
- Kerin Matthews Mountain Maple
- Pat Perry Davey Tree Expert Company of Canada
- Jason Timmis Cedar Ridge Tree Care
- Gareth Tudor-Jones Bartlett Tree Experts Company of Canada
- Noah Violini Bartlett Tree Experts Company of Canada
- Bill Wilde Arbor Vitae Tree Consultants

Industry subject matter experts retained to assist in the development of Program Outline content:

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- Ken Bell VanArbor Vegetation Consulting Ltd
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- Mark Brown District of North Vancouver
- Paul Buikema Progress Landscaping
- Andrew Caines City of Surrey
- Thor Clausen Arbortech Tree Services
- Hud Elwood Branching Out Tree Service
- Rupert Evans The Buchart Gardens
- Reid Hardman BC Plant Health Care
- Duncan Isberg BC Hydro
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- Cory Manton District of Saanich
- Dan Marzocco City of Victoria
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- Pat Perry Davey Tree Expert Company of Canada
- Aidon Pyne Davey Tree Expert Company of Canada



- Brent Ritson                      District of Saanich
- Ryan Senechal                    Bartlett Tree Experts Company of Canada
- Trevor Smith                     Arbor Pro Tree Services
- Amit Gandha                     City of Vancouver Parks Board
- Jason Timmis                     Cedar Ridge Tree Care
- Gareth Tudor-Jones             Bartlett Tree Experts Company of Canada
- Alex Thorburn                    City of Richmond
- Blair Veitch                     Davey Tree Expert Company of Canada
- Steve Whitton                    City of Surrey
- Bill Wilde                        Arbor Vitae Tree Consultants
- Russel Wilson                    Davey Tree Expert Company of Canada

Funds for the development of this Program Outline were provided by Service Canada.

The Industry Training Authority would like to acknowledge the dedication and hard work of these and other industry representatives in identifying the training requirements of the Field Arborist occupation.



## HOW TO USE THIS DOCUMENT

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
<b>Program Credentialing Model</b>	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
<b>OAC</b>	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
<b>Training Topics and Suggested Time Allocation</b>	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
<b>Program Content</b>	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
<b>Training Provider Standards</b>	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment



# **Section 2**

## **PROGRAM OVERVIEW**

### **Field Arborist**

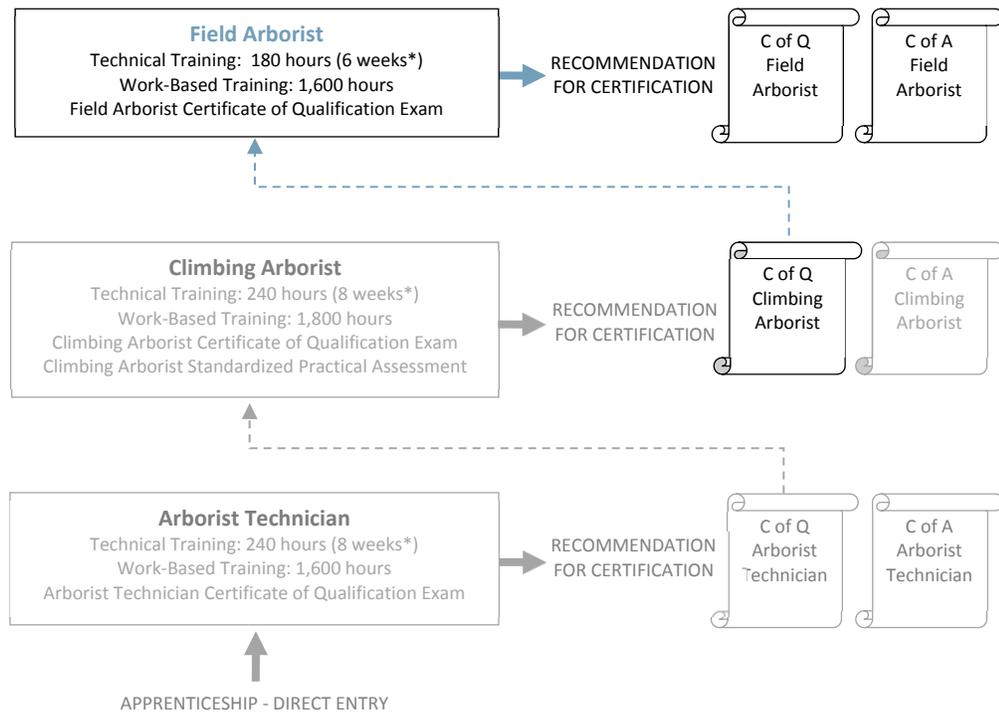


## PROGRAM CREDENTIALING MODEL

### Apprenticeship Pathway

This graphic provides an overview of the Field Arborist apprenticeship pathway.

*C of Q = Certificate of Qualification*  
*C of A = Certificate of Apprenticeship*



*\*Suggested duration based on 30-hour week*

**CROSS-PROGRAM CREDITS**

*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

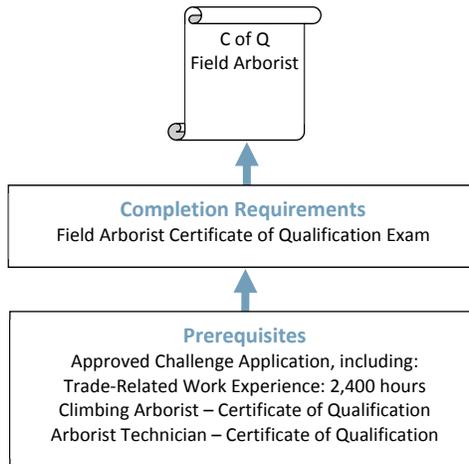
None



### Challenge Pathway

This graphic provides an overview of the Field Arborist challenge pathway.

*C of Q = Certificate of Qualification*




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**CREDIT FOR PRIOR LEARNING**

*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

*None*



## Occupational Analysis Chart

### ARBORICULTURE TRADE – ARBORIST TECHNICIAN, CLIMBING ARBORIST & FIELD ARBORIST

**Occupation Description:** An Arborist is a certified tradesperson working in the Arboriculture trade. Arborists manage and maintain trees and shrubs in the urban forest, focusing on the health and safety of trees and the urban landscape. Typical duties include identifying trees and shrubs; pruning trees and shrubs (both on the ground and aloft); implementing Integrated Pest Management methods; and operating equipment such as chainsaws and chippers.

<b>Regulations and Other Occupational Skills</b> <span style="float: right;">A</span>	Identify relevant legislation and regulations <span style="float: right;">A1</span>	Explain Musculoskeletal Injury (MSI) and Repetitive Strain Injury (RSI) <span style="float: right;">A2</span>	Describe electrical systems and hazards <span style="float: right;">A3</span>	Identify work site hazards and develop and implement safe work plan <span style="float: right;">A4</span>	Apply regulations to the job site <span style="float: right;">A5</span>	Describe workplace leadership and communication <span style="float: right;">A6</span>																																			
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<b>Power Equipment</b> <span style="float: right;">B</span>	Use chipper in a safe and effective manner <span style="float: right;">B1</span>	Work safely and effectively on ground operations while using an aerial lift truck <span style="float: right;">B2</span>	Operate a single axle non-air brake dump truck <span style="float: right;">B3</span>	Operate a stump grinder <span style="float: right;">B4</span>	Work safely and effectively during aerial operations with aerial lift device <span style="float: right;">B5</span>																																				
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<b>Hand Tools and Small Power Tools</b> <span style="float: right;">C</span>	Use and maintain hand tools <span style="float: right;">C1</span>	Operate a variety of small power tools <span style="float: right;">C2</span>	Use and inspect ladders <span style="float: right;">C3</span>																																						
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<b>Tree Work and Management</b> <span style="float: right;">D</span>	Identify common trees in British Columbia <span style="float: right;">D1</span>	Identify common shrubs in British Columbia <span style="float: right;">D2</span>	Describe basic tree biology and its importance to good arboriculture practices <span style="float: right;">D3</span>	Safely prune trees to appropriate Industry standards <span style="float: right;">D4</span>	Safely prune shrubs to appropriate Industry standards <span style="float: right;">D5</span>	Safely plant trees to Industry standards <span style="float: right;">D6</span>																																			
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## Program Overview

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	Inspect, assess and identify a variety of risks to trees <div style="text-align: right;">D19</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">3</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		3				Inventory trees <div style="text-align: right;">D20</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">3</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		3				Preserve and retain trees <div style="text-align: right;">D21</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">3</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		3				Examine tree value appraisal <div style="text-align: right;">D22</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">3</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		3															
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<b>Falling and Bucking</b> <div style="text-align: right;">E</div>	Demonstrate safe chain saw use <div style="text-align: right;">E1</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Describe and demonstrate the process of falling <div style="text-align: right;">E2</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Practice falling a tree <div style="text-align: right;">E3</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Manage falling hazards <div style="text-align: right;">E4</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Recognize hazardous weather conditions <div style="text-align: right;">E5</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Recognize dangerous falling practices <div style="text-align: right;">E6</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1				
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	Identify special falling techniques <div style="text-align: right;">E7</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Plan for limbing and bucking <div style="text-align: right;">E8</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1																												
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<b>Rigging</b> <div style="text-align: right;">F</div>	Describe rigging concepts including selection and use of ropes <div style="text-align: right;">F1</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Select and use knots, hitches and slings in rigging <div style="text-align: right;">F2</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Use various types of hardware in rigging systems <div style="text-align: right;">F3</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Select and use friction control devices for rigging <div style="text-align: right;">F4</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">1</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>	1					Select and use appropriate rigging techniques <div style="text-align: right;">F5</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">2</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		2				Perform cuts for various situations <div style="text-align: right;">F6</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">2</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>		2			
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<b>Climbing</b> <span style="float: right;">G</span>	Select and inspect basic climbing gear <span style="float: right;">G1</span>	Conduct pre-climb assessment <span style="float: right;">G2</span>	Select and inspect climbing gear <span style="float: right;">G3</span>	Climb using various techniques <span style="float: right;">G4</span>	Conduct advanced post-climb job and gear inspection <span style="float: right;">G5</span>
	1	2	2	2	2
<b>Emergency Response</b> <span style="float: right;">H</span>	Evacuate worker <span style="float: right;">H1</span>	Review and describe First Aid certification requirements <span style="float: right;">H2</span>	Describe precautions and procedures to prevent and suppress fires <span style="float: right;">H3</span>	Implement spill response <span style="float: right;">H4</span>	Perform aerial rescue <span style="float: right;">H6</span>
	1	1	1	1	2
<b>Job Planning and Risk Assessment</b> <span style="float: right;">I</span>	Conduct site inspections. <span style="float: right;">I1</span>	Develop and communicate safe job plan <span style="float: right;">I2</span>	Conduct pre- job preparation <span style="float: right;">I3</span>	Ensure regulatory compliance <span style="float: right;">I4</span>	
	2	2	2	2	
<b>Arboriculture Soil Science</b> <span style="float: right;">J</span>	Examine soil chemistry and biology <span style="float: right;">J1</span>	Examine soil physics and hydrology <span style="float: right;">J2</span>	Develop and implement soil remediation strategies <span style="float: right;">J3</span>		
	3	3	3		



# Occupational Analysis Chart

## FIELD ARBORIST

**Occupation Description:** A “Field Arborist” is a certified tradesperson who prunes and performs other work of Climbing Arborists on trees from a ground and aerial situation, including climbing and aerial bucket work. In addition, Field Arborists develop and implement Integrated Pest Management and Plant Health Care plans, develop tree preservation strategies, inspect sites and trees for damage and hazards, perform job estimating, tree inventories, and tree appraisals. They also prepare reports in the technical areas described above and perform supervisory duties.

<b>Regulations and Other Occupational Skills</b> <span style="float: right;">A</span>	Write a variety of technical reports <span style="float: right;">A7</span>					
			3			
<b>Tree Work and Management</b> <span style="float: right;">D</span>	Identify common trees in British Columbia <span style="float: right;">D15</span>	Identify common quarantine pests of trees in Canada <span style="float: right;">D16</span>	Develop and implement integrated pest management plans for trees in urban setting <span style="float: right;">D17</span>	Diagnose and treat insects and diseases <span style="float: right;">D18</span>	Inspect, assess and identify a variety of risks to trees <span style="float: right;">D19</span>	Inventory trees <span style="float: right;">D20</span>
			3			
	Preserve and retain trees <span style="float: right;">D21</span>	Examine tree value appraisal <span style="float: right;">D22</span>				
			3			
<b>Arboriculture Soil Science</b> <span style="float: right;">J</span>	Examine soil chemistry and biology <span style="float: right;">J1</span>	Examine soil physics and hydrology <span style="float: right;">J2</span>	Develop and implement soil remediation strategies <span style="float: right;">J3</span>			
			3			



## Training Topics and Suggested Time Allocation

### FIELD ARBORIST

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line A</b>	<b>Regulations and Other Occupational Skills</b>	<b>11%</b>	<b>80%</b>	<b>20%</b>	<b>100%</b>
A7	Write a Variety of Technical Reports		✓	✓	
<b>Line D</b>	<b>Tree Work and Management</b>	<b>67%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
D15	Identify Common Trees in British Columbia		✓	✓	
D16	Identify Common Quarantine Pests of Trees in Canada		✓	✓	
D17	Develop and Implement Integrated Pest Management Plans for Trees in Urban Setting		✓	✓	
D18	Diagnose and Treat Insects and Diseases		✓	✓	
D19	Inspect, Assess and Identify a Variety of Risks to Trees		✓	✓	
D20	Inventory Trees		✓		
D21	Preserve and Retain Trees		✓	✓	
D22	Examine Tree Value Appraisal		✓	✓	
<b>Line J</b>	<b>Arboriculture Soil Science</b>	<b>22%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
J1	Examine Soil Chemistry and Biology		✓	✓	
J2	Examine Soil Physics and Hydrology		✓	✓	
J3	Develop and Implement Soil Remediation Strategies		✓	✓	
<b>Total Percentage for Field Arborist</b>		<b>100%</b>			





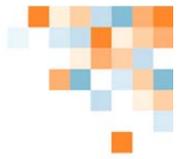
# **Section 3**

## **PROGRAM CONTENT**

### **Field Arborist**



# FIELD ARBORIST



**Line A:                    A        REGULATIONS AND OTHER OCCUPATIONAL SKILLS**

**Competency:            A7        Write a Variety of Technical Reports**

The Field Arborist will often write technical reports on a wide variety of arboriculture technical issues.

<b>Importance 1 (minimally) to 5 (extremely)</b>	<b>Frequency of use 1 (rarely) to 5 (daily)</b>
5	3

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to accurately and efficiently write technical reports on a wide variety of technical arboriculture subjects, according to Industry standards.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Examine the requirement for writing an Arborist report</p> | <ul style="list-style-type: none"> <li>• Elements of a booklet style report:               <ul style="list-style-type: none"> <li>○ Summary</li> <li>○ Introduction:                   <ul style="list-style-type: none"> <li>- Background</li> <li>- Assignment</li> <li>- Limits of assignment</li> <li>- Purpose and use of report such as:                       <ul style="list-style-type: none"> <li>▪ Identify trees with high hazard risks</li> <li>▪ Prioritize hazard tree mitigation work</li> <li>▪ To accompany a building permit application</li> <li>▪ Others</li> </ul> </li> </ul> </li> <li>○ Observations</li> <li>○ Analysis</li> <li>○ Discussion</li> <li>○ Conclusions</li> <li>○ Recommendations</li> <li>○ Supporting information</li> <li>○ Assumptions and limiting conditions</li> <li>○ Qualifications of author</li> </ul> </li> <li>• Common topics contained within Arborist reports may include:               <ul style="list-style-type: none"> <li>○ Tree valuation</li> <li>○ Damage assessment</li> <li>○ Tree risk assessment</li> <li>○ Accident investigations</li> <li>○ Tree inventory</li> <li>○ Plant health care assessments</li> <li>○ Tree mitigation prescriptions</li> <li>○ Tree preservation plans</li> </ul> </li> </ul> |
|--|--|



- 2. Write and edit technical reports
  - Spelling
  - Grammar
  - Punctuation
  - Footnoting
  - Bibliographies
  - Four C's – clear, concise, complete, and correct
  - Proof reading
  - Editing
  - Articles
  - Copyrights and protecting intellectual property
- 3. Draft routine business correspondence
  - Memos
  - Letters
  - E-mails
  - Contract documents
  - Tenders, RFQs and RFPs
  - Quotations and proposals

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on writing a variety of technical reports, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

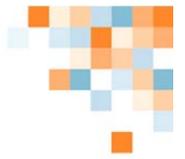
Evaluation content to include, but not limited to:

1. Requirements for writing an Arborist report
2. Writing and editing technical reports
3. Drafting routine business correspondence

***Performance evaluation***

- Performance The apprentice should be able to write a report:
1. Utilizing appropriate report format
  2. Using correct spelling, grammar, punctuation, footnotes and bibliographies (if used)
  3. Including sufficient technical content
  4. Demonstrating a clear understanding of topic

Conditions Given a real site scenario.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D15 Identify Common Trees in British Columbia**

A Field Arborist has a working knowledge of a variety of different tree species and can identify them using a variety of different methodologies. They use this knowledge to make decisions on a variety of arboriculture tasks, such as promoting plant health pruning, site selection, and disease and pest management.

<b>Importance 1 (minimally) to 5 (extremely)</b>	<b>Frequency of use 1 (rarely) to 5 (daily)</b>
<b>5</b>	<b>5</b>

**Objectives:**

To be competent in this area, the individual must be able to:

- Have working knowledge of a variety of different tree species and identify them using a variety of different methodologies, according to Industry standards.

**LEARNING TASKS**

1. Identify trees during all seasons of the year
2. Describe the characteristic parts of trees to help correctly identify them
3. Use of dichotomous keys for field study purposes

**CONTENT**

- Binomial nomenclature and general tree taxonomy to Family
- Morphological characteristics of a variety of common trees, including buds, leaf scar, stems, bark, inflorescences, leaf arrangement and growth habit
- Common trees of British Columbia including conifer and deciduous dichotomous key for tree identification

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on identifying common trees in British Columbia, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Identify common trees
2. Describe growth habit
3. Describe morphological characteristics
4. Match tree species to site conditions

***Performance evaluation***

**Performance** The apprentice should be able to correctly identify 20 woody plants (at Instructor's discretion and / or as availability dictates).

**Conditions** Given samples of twigs, leaves and or photos.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D16 Identify Common Quarantine Pests of Trees in Canada**

The Field Arborist will regularly have to identify common and uncommon plant pests, including quarantine pests in trees. This is an important task as pests can increase risk while in the trees, and the Field Arborist must make decisions on effective means to deal with pest issues and report any findings of quarantine pests to the Canadian Food Inspection Agency.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to identify common quarantine pests of trees in Canada, according to Industry standards and the authorities having jurisdiction.

**LEARNING TASKS**

1. Identify quarantine pests for Canadian trees

**CONTENT**

- Most common quarantine pests of trees based on the most up to date list as published by the Canadian Food Inspection Agency (CFIA), including but not limited to:
  - Gypsy moths
  - Asian long-horn beetle
  - Emerald Ash borer
  - Brown spruce beetle
  - European and Asian gypsy moth
  - Hemlock woolly adelgid (HWA red-belted clearwing moth [Synanthedon myopaeformis])
  - Pale Tussock moths
  - Dutch Elm disease
  - Oak Wilt
  - Phytophthora ramorum (Sudden Oak Death)
- Refer to updated CFIA list

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on identifying common quarantine pests of trees of Canada, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

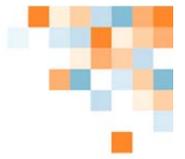
1. Identify pests, signs and symptoms
3. Identify quarantine pests



***Performance evaluation***

Performance The apprentice should be able to identify eight appropriate pest damages to plant material (at Instructor's discretion and/or as availability dictates).

Conditions Given a variety of samples.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D17 Develop and Implement Integrated Pest Management Plans for Trees in Urban Setting**

The Field Arborist is regularly responsible for developing Integrated Pest Management Programs to promote and support plant health.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
4	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to develop, implement and evaluate integrated pest management plans for urban arboriculture settings, according to Industry standards and the authorities having jurisdiction.

**LEARNING TASKS**

1. Explain the principles of Plant Health Care
2. Explain Integrated Pest Management
3. Identify the steps in developing an IPM Plan

**CONTENT**

- The relationship between tree care practices (including plant and site selection, site prep, planting and establishment care, managing nutrient, water and soil aeration, pruning, pest and disease management, monitoring for plant growth, preventing or mitigating plant problems) and plant pests
- Key plants, pests and stresses in local area
- IPM as a management approach
- The elements of IPM Prevention:
  - Identification
  - Monitoring
  - Action thresholds
  - Treatments
  - Evaluation
- Steps in an IPM Plan:
  - Identify pests
  - Develop plan
  - Implement plan
  - Ensure and obtain regulatory compliance

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on developing and implementing integrated pest management plans for trees in urban settings, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Principles of Plant Health Care
2. Integrated Pest Management
3. Steps in developing an IPM Plan



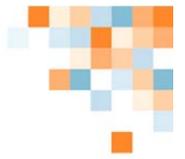
***Performance evaluation***

Performance The apprentice should be able to develop an appropriate IPM Plan including documentation for regulatory compliance.

Conditions Given a scenario.

Performance The apprentice should be able to accurately identify and fill gaps utilizing best practices.

Conditions Given an incomplete case study.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D18 Diagnose and Treat Insects and Diseases**

The Field Arborist will occasionally have to diagnose and treat tree disorders that result from a variety of fungi, parasitic plants and insects.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
4	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to identify, diagnose and treat insects and diseases, according to Industry standards.

**LEARNING TASKS**

1. Diagnose insects and diseases

**CONTENT**

- Insects:
  - Bronze Birch Borer
  - Cherry Bark Tortrix
  - Pine Bark Beetles
  - Aphids
  - Adelgids
  - Scales
  - Leaf Miner
  - Tent Caterpillars
  - Fall Webworm
  - Douglas Fir Silver Spotted Tiger Moth
  - Sawfly
  - Others
- Diseases:
  - Phytophthora ramorum (Sudden Oak Death)
  - Root Diseases
  - Anthracnose
  - Wilt
  - Powdery Mildew
  - Fire Blight
  - Armillaria
  - Laminated Root Rot
  - White Butt Rot
  - Hardwood Trunk Rot
  - Butt Rot
  - Silver Leaf Disease
  - Phomopsis
  - Cytospora
  - Nectria
  - Mistletoe
  - Keithia blight
  - Others



- 2. Determine threshold levels
  - 3. Determine control options
  - 4. Implement treatment options
- Economic and aesthetic losses based on each species
  - IPM model:
    - Reference tree profiles
    - Regulatory controls
    - Genetic controls
    - Biological controls
    - Cultural controls
    - Chemical controls
  - Variety of tree treatment options for insects and diseases:
    - Remove
    - Replace
    - Monitor
    - Treat

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on diagnosing and treating biotic woody plant disorders, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

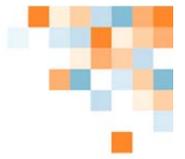
- 1. Plant growth and development
- 2. Pests and disease control

***Performance evaluation***

Performance The apprentice should be able to:

- Develop an IPM Program for a common insect problem including:
  - Analyze site and conduct an assessment:
    - Obtain background information
  - Action decisions:
    - Identification
    - Monitoring
    - Action thresholds
    - Treatments
    - Evaluation

Conditions Given a variety of samples.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D19 Inspect, Assess and Identify a Variety of Risks to Trees**

The Field Arborist will inspect trees and sites to determine damage to trees and develop and implement plans to manage risks associated with trees.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	4

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to inspect trees and assess damage to trees and identify risks associated with trees, according to Industry standards and the authorities having jurisdiction.

**LEARNING TASKS**

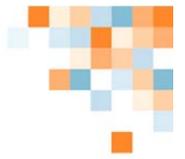
1. Identify components that comprise tree risk and assessment

**CONTENT**

- Tree structure
- Environment and target
- Variety of tree damage:
  - Pruning
  - Construction
  - Storm
  - Improper cutting
- Branch, trunk and root defects leading to failure including – decay, poor attachment, co-dominance, root removal, tree mechanics
- External indicators:
  - Cracks
  - Ribs
  - Bulges
  - Abnormal bark patterns
- Aggravating site and tree conditions including:
  - Taper
  - Weak attachments
  - Wind
  - Snow load
  - Soil saturation and depth
  - Grading changes
  - Restricted root zones and infrastructure conflicts (buildings, sidewalks)
  - Lean
  - Crown asymmetry
  - Recent exposure



2. Perform a site inspection
  - Soil characteristics
  - Elevation
  - Topography
  - Construction damage
  - Wind exposure and damage to trees
  - Development constraints
3. Explain methods of decay detection
  - Non-invasive tree assessment including:
    - Visual
    - Mallet tests
    - Ground penetrating radar
    - Probing
  - Invasive tests including but not limited to:
    - Increment borers
    - Drilling
    - Micro drills (e.g. Resistographs)
    - Acoustic measurements
    - Culturing
    - Electrical resistance
    - Root crown excavation
4. Develop mitigation strategies
5. Describe tree risk management programs
  - Variety of mitigation strategies
  - Assessing vs. managing risk abatement: moving target
  - Pruning
  - Cabling
  - Bracing
  - Modifying site conditions or tree removal
6. Create tree protection zones
  - Factors to create root protection zones, methods for creating root protection zones including:
    - Closures
    - Barricading
    - Fencing
    - Hoarding
    - Signage
7. Develop a risk management plan
  - Prioritization of risk within the plan

**Achievement Criteria:*****Theoretical evaluation***

Given a series of multiple-choice questions on inspecting, assessing and identifying a variety of risks to trees, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Tree structure, environment and target
2. Branch, trunk and root defects leading to failure
3. Decay, poor attachment, co-dominance, root removal, tree mechanics
4. Cracks, ribs, bulges, abnormal bark patterns
5. Taper, weak attachments, wind, snow load, soil saturation and depth, grading changes, restricted root zones and infrastructure conflicts (buildings, sidewalks), lean, crown asymmetry, recent exposure
6. Soil characteristics, elevation, topography, construction damage, wind exposure and damage to trees; development constraints
7. Managing risk
8. Risk abatement: moving target, pruning, cabling, bracing, propping, modifying site conditions or tree removal
9. Factors affecting safe work zone, methods for creating safe work zones: closures, barricading, fencing, hoarding

***Performance evaluation***

Performance The apprentice should be able to:

1. Properly use tools and equipment
2. Identify tree characteristics that could lead to tree decline and/or failure
3. Identify site characteristics that could lead to tree decline and/or failure
4. Develop risk management plan

Conditions Given a field situation involving five to ten trees.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D20 Inventory Trees**

The Field Arborist will carry out tree inventories to locate and determine the species, size and, condition.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
4	4

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to carry out tree inventories on a wide variety of sites, according to Industry standards.

**LEARNING TASKS**

1. Perform a tree inventory
2. Survey trees in development or other specific site
3. Locate trees on scaled plans

**CONTENT**

- General overview of the trees describing species composition, diameter distribution, age class and condition at a stand or individual tree level
- Identify and record tree species and characteristics
- Plotting center line of trunk using baseline, direct or triangulation measurements, drip line, base elevation, and corresponding tree inventory number

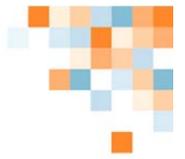
**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on inventorying trees, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to techniques to:

- Record tree species or lowest possible taxonomic level
- Size including trunk diameter, tree height and canopy spread, plant health, form and structure crown class, live crown ratio and crown integrity



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D21 Preserve and Retain Trees**

The Field Arborist will develop and implement plans to preserve and retain trees.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to develop and implement plans to preserve and retain trees on a wide variety of sites, according to Industry standards.

**LEARNING TASKS**

**CONTENT**

1. Identify goals of tree preservation	<ul style="list-style-type: none"> <li>• Value of trees</li> <li>• Respect tree growth patterns and development</li> <li>• The land development process</li> </ul>
2. Explain the steps of tree preservation process	<ul style="list-style-type: none"> <li>• Conduct a tree survey/inventory</li> <li>• Identify trees for preservation</li> <li>• Assess potential impacts to trees in development plans</li> <li>• Suggest modifications to development plans</li> </ul>
3. Determine tree protection zones	<ul style="list-style-type: none"> <li>• Evaluate species tolerance to disturbance</li> <li>• Assess construction impacts</li> <li>• Root and crown conformations</li> </ul>
4. Identify tree work needed prior to site clearing and grading	<ul style="list-style-type: none"> <li>• Identify tree work needed prior to site clearing and grading</li> </ul>
5. Prepare written specification for tree preservation	<ul style="list-style-type: none"> <li>• Written requirements for what work will be performed and how it is to be executed</li> </ul>
6. Monitor trees during construction	<ul style="list-style-type: none"> <li>• Including establishing critical protection zones</li> <li>• Respond to design changes, evaluate protection strategies and measures</li> </ul>
7. Prepare a post-construction maintenance plan	<ul style="list-style-type: none"> <li>• Cultural maintenance treatments to support tree health</li> </ul>

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on preserving and retaining trees, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

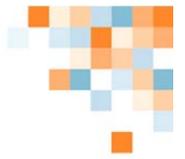
Evaluation content to include, but not limited to:

1. Identify trees for preservation
2. Assess potential impacts to trees in development plans
3. Evaluate species tolerance to disturbance
4. Assess construction impacts
5. Root and crown conformations



***Performance evaluation***

- Performance The apprentice should be able to write a report including:
1. Conduct a tree survey/inventory
  2. Identify trees for preservation
  3. Assess potential impacts to trees in development plans
  4. Suggest modifications to development plans
  5. Evaluate species tolerance to disturbance, assessing construction impacts, root and crown conformations
- Conditions Given a site situation.



**LINE D: D TREE WORK AND MANAGEMENT**

**Competency: D22 Examine Tree Value Appraisal**

The Field Arborist may appraise the value of trees in urban landscapes.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
2	1

**Objectives:**

To be competent in this area, the individual must be able to:

- Learn tree appraisal techniques, according to Industry standards.

**LEARNING TASKS**

1. Identify purposes for tree appraisals
2. Identify appraisal tools
3. Assess factors affecting the value of plants
4. Explain condition ratings

**CONTENT**

- Insurance valuation or claims
- Wrongful loss
- Property valuation
- Value of urban forest
- Accepted industry methodology e.g. :
  - Replacement cost methods
  - Trunk formula method
  - Cost of cure
  - Crop value
  - Amenity tree valuation
- Species
- Size
- Location
- Condition
- Describe weighted characteristics of structural integrity and tree health

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on appraising the value of trees, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Insurance valuation or claims
2. Wrongful loss
3. Property valuation
4. Value of urban forest
5. Replacement cost methods
6. Compounded replacement formula
7. Trunk formula method, cost of care
8. Cost of cure, crop value
9. Amenity tree valuation
10. Weighted characteristics of structural integrity and tree health



***Performance evaluation***

Performance	The apprentice should be able to develop two tree appraisals based on information including: <ol style="list-style-type: none"><li>1. Species</li><li>2. Species rating</li><li>3. Adjusted trunk appraisal ratings</li><li>4. Condition</li><li>5. Location ratings</li><li>6. Calculations based on given formulas</li></ol>
Conditions	Given a real site situation.



**LINE J: J ABORICULTURE SOIL SCIENCE**

**Competency: J1 Examine Soil Chemistry and Biology**

The Field Arborist will often have to collect soil samples, understand basic soil chemistry, and biology. A Field Arborist will also interpret soil analysis reports.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	2

**Objectives**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to interpret soil chemical properties, according to Industry standards.

**LEARNING TASKS**

1. Examine the relationship between soil texture and chemistry
2. Examine soil cation exchange capacity
3. Examine soil pH and Electrical Conductivity (EC)
4. Measure soil pH and EC
5. Discuss modifying soil pH, salinity and sodicity
6. Examine macro and micro nutrients and their relationship to plant growth
7. Examine basic soil biology
8. Determine fertility requirements
9. Sample soils
10. Select appropriate plants based on soil chemical properties

**CONTENT**

- Soil texture and soil organic matter and their relationship to soil chemistry
- Soil factors that influence CEC
- Soil acidity, salinity and sodicity
- Field methods for measuring soil pH and EC
- Methods of modifying soil pH, salinity and sodicity
- Macro and micronutrients and their role in plant growth and health
- Soil microorganisms
- Determine fertilizer requirements based on soil analysis reports
- Soil sampling techniques
- Practical application of plants and soil chemistry

**Achievement Criteria:*****Theoretical evaluation***

Given a series of multiple-choice questions on knowledge of soil chemistry and biology, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

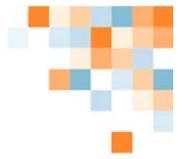
1. Cation exchange capacity
2. pH
3. Salinity
4. Sodicity
5. Macronutrients
6. Micronutrients
7. Soil sampling
8. Amending soil
9. Plant selection based on soil chemistry

***Performance evaluation***

Performance The apprentice should demonstrate proper soil sampling techniques.

Conditions In a field situation.

**NOTE:** The performance evaluations for J-1, J-2 and J-3 have been combined and will be covered off on one Practical Assessment Form within the Instructor Manual.



**LINE J: J ARBORICULTURE SOIL SCIENCE**

**Competency: J2 Examine Soil Physics and Hydrology**

The Field Arborist will often have to collect and review data on soil hydrology, drainage and compaction as it impacts tree health.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Demonstrate the ability to interpret soil physical properties and apply to plant health and site conditions, according to Industry standards.

**LEARNING TASKS**

1. Examine the origins of soils
2. Examine soil porosity, aeration capacity and hydraulic conductivity
3. Examine surface and sub-surface drainage
4. Examine impact of soil compaction on soil physical properties and plant growth
5. Examine causes of soil compaction
6. Examine methods for mitigating soil compaction

**CONTENT**

- Soil profiles and horizons
- Soil mineral fractions and soil organic content
- Influence of soil physical properties on:
  - Porosity
  - Aeration
  - Hydraulic conductivity
- Surface and subsurface drainage techniques
- Role of soil moisture and texture on soil compaction
- Vehicle and pedestrian traffic impact on soil compaction
- Soil compaction impacts on tree growth
- Methods of measuring soil compaction
- Vertical mulching / radial trenching
- Root crown excavation (air assisted)
- Mulch entire root zone
- Core aeration

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on soil physics and hydrology, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Soil texture
2. Soil porosity
3. Soil hydraulic conductivity
4. Soil compaction
5. Soil drainage

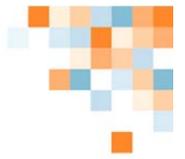


***Performance evaluation***

Performance The apprentices should demonstrate the ability to interpret soil physical properties and apply to plant health and site conditions.

Conditions Given a real site situation.

**NOTE:** The performance evaluations for J-1, J-2 and J-3 have been combined and will be covered off on one Practical Assessment Form within the Instructor Manual.



**LINE J: J ARBORICULTURE SOIL SCIENCE**

**Competency: J3 Develop and Implement Soil Remediation Strategies**

The Field Arborist will review soil data and develop soil management and remediation plans for a variety of urban sites.

Importance 1 (minimally) to 5 (extremely)	Frequency of use 1 (rarely) to 5 (daily)
5	2

**Objectives:**

To be competent in this area, the individual must be able to:

- Interpret soil reports.
- Develop a site remediation plan with methods to improve tree/plant health and survival.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Interpret soil reports</li> <li>2. Develop a site remediation plan with methods to improve tree/plant health and survival</li> </ol> | <ul style="list-style-type: none"> <li>• Interpretation of physical and chemical information from soil reports</li> <li>• Soil analysis (if required)</li> <li>• Site remediation methods to alleviate problems</li> <li>• Written report</li> </ul> |
|--|--|

**Achievement Criteria:**

***Theoretical evaluation***

Given a series of multiple-choice questions on developing and implementing soil remediation strategies, the apprentice will demonstrate knowledge by correctly answering the questions with a minimum achievement of 70%.

Evaluation content to include, but not limited to:

1. Soil texture
2. Developing a site remediation plan with methods to improve tree/plant health and survival

***Performance evaluation***

Performance The apprentices will develop a site remediation plan.

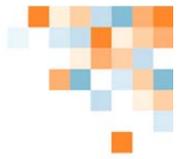
Conditions Given a real site situation.

**NOTE:** The performance evaluations for J-1, J-2 and J-3 have been combined and will be covered off on one Practical Assessment Form within the Instructor Manual.



# Section 4

## TRAINING PROVIDER STANDARDS



## FACILITY REQUIREMENTS

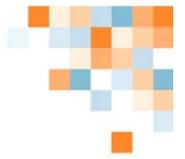
Field Arborist Apprenticeship Training Facilities must have a comfortable classroom space and a training area for practical assignments capable of facilitating 16 students including:

- Internet access
- Library resources
- Laboratory facilities for pest, entomology, and diseases
- Soils laboratory and access to sites to observe soils in the field
- Storage facility for tools and equipment
- Workshop area for tool maintenance

### REQUIREMENT/GUIDELINES FOR SPECIFIC GENERAL AREA OF COMPETENCIES:

#### **D – Tree Work and Management**

- Access to a large range of plant material common to the area



## TOOLS AND EQUIPMENT

The apprentices must provide their own Personal Protective Equipment as well as the following list of hand and small power tools:

- Binoculars
- Calculator
- Camera
- Compass
- Core sampler
- DBH tape
- Clinometer
- Increment borer
- Measuring tape
- Magnifying glass x 10
- Mini-mattock
- Secateurs / pocket knife
- Sounding mallet

Material and equipment list for the Training Provider is based on a class of 16 apprentices with one Instructor. Where applicable, equipment may be rented for instructional purposes.

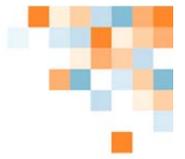
### Hand and Small Power Tools

- |  |                  |
|--|------------------|
| 1 – Air excavation tool and compressor | 4 – pH meter     |
| 4 – Cordless drill and small bits      | 1 – Resistograph |
| 4 – EC meter                           | 16 – Sample jars |
| 4 – GPS                                | 8 – Shovel       |
| 2 – Microscopes                        | 8 – Soil probes  |
| 2 – Penetrometers                      |                  |

### Materials

Examples/case studies which may include:

- Maps
- Site plans
- Pictures
- Tree survey
- On and off site civil engineering plans, etc.
- Office equipment including computers
- Pictures
- Samples (twigs, leaves, photos/illustrations)
- Soil analysis
- Soil samples
- Species rating book (current addition)
- Projector
- Water resistant paper



## REFERENCE MATERIALS

### Required Resources for Apprentices:

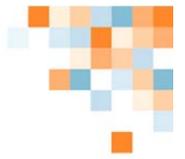
- *Arborist Technician Apprenticeship Training Program – Apprentice Manual*
- *Climbing Arborist Apprenticeship Training Program – Apprentice Manual*
- *Field Arborist Apprenticeship Training – Apprentice Manual*
- *Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines, 4<sup>th</sup> edition*, Harris, Clark and Matheny, Prentice Hall, 2004
- *BC Landscape Standard*, 7th Ed, BCLNA and the BCSLA, 2008
- *Common Tree Diseases of British Columbia*, Eric Allen, Duncan Morrison and Gordon Wallis, Natural Resources Canada, Canadian Forest Service, 1996
- *Trees in Canada*, John Farrar, Fitzhenry & Whiteside Publishing, 1995
- *Writing Effective Reports*, American Society of Consulting Arborists, 2004

### Required Resources for Instructors:

- *Arborist Technician Apprenticeship Training Program – Apprentice Manual*
- *Climbing Arborist Apprenticeship Training Program – Apprentice Manual*
- *Field Arborist Apprenticeship Training – Apprentice Manual*

### Additional Resources:

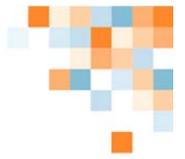
- *American National Standard for Arboricultural Operations – Pruning Standard*, ANSI A300 – 2001 (Part 1)
- *American National Standard for Arboricultural Operations – Fertilization Standard*, ANSI A300 – 2004 (Part 2)
- *American National Standard for Arboricultural Operations – Supplemental Support Systems*, ANSI A300 – 2006 (Part 3)
- *American National Standard for Arboricultural Operations – Lightning Protection Systems*, ANSI A300 – 2008 (Part 4)
- *American National Standard for Arboricultural Operations – Management of Trees and Shrubs During Site Planning, Site Development, and Construction*, ANSI A300 – 2005 (Part 5)
- *American National Standard for Arboricultural Operations – Transplanting*, ANSI A300 – 2005 (Part 6)
- *American National Standard for Arboricultural Operations – Integrated Vegetation Management (IVM)*, ANSI A300 – 2006 (Part 7)



- *Green Industry Standards Dictionary 2009-2010*
- *2007 Species Ratings for Landscape Tree Appraisal*, ISA press (PNW chapter)
- *A New Tree Biology Dictionary*, Alex L. Shigo, Shigo and Trees, Associates, 1986
- *A Photographic Guide to the Evaluation to Trees in the Urban Environment*, Nelda Matheny and James R. Clark, 2004
- *Arboriculture and the Law in Canada*, Dunster and Murray
- *Arborists' Certification Study Guide*, ISA Publication
- *Evaluating Tree Defects, Field Guide*, Ed Hayes, 2nd edition
- *Diseases of Trees and Shrubs*, Lyons, Sinclair et al., Cornell Press
- *Fungal Strategies of Wood Decay in Trees*, Schwarze, Engels and Mattheck
- *Guide for Plant Appraisal*, Council of Tree and Landscape Appraisers, 9<sup>th</sup> edition
- *Guide to Report Writing For Consulting Arborists*, ISA press
- *Hardy Trees and Shrubs: An Illustrated Encyclopedia*, Dirr, Michael, Timber Press, 2009
- *Insects That Feed on Trees and Shrubs*, Sinclair, Lyons et al., Cornell Press
- *Manual of Woody Landscape Plants, 9<sup>th</sup> edition*, Michael A. Dirr, Stipes Publishing Co., 2009
- *Native Trees of BC*. Halter, Reese & NJ Turner, Crown Publication, 2003
- *Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*, Nelda Matheny and James R. Clark
- *Principles and Practices, Soil Science*, 3rd edition, Washington
- *Species Ratings for Landscape Tree Appraisal*, Pacific Northwest Chapter of the International Society of Arboriculture
- *The Organic Gardener's Handbook Of Natural Insect And Disease Control*, Rodale press
- *The Random House Book Of Trees Of North America And Europe: A Photographic Guide To More Than 500 Trees*, Roger Phillips
- *Trees and Development*, Nelda Matheny and James R. Clark
- *Trees and Development: A Technical Guide to Preservation of Trees During Land Development*, Nelda Matheny and James R. Clark
- *Up by Roots*, James Urban

**Website Resources:**

- A Tree Story  
[http://www.youtube.com/watch?v=5-GUggGMmM&feature=player\\_embedded#!](http://www.youtube.com/watch?v=5-GUggGMmM&feature=player_embedded#!)
- Arbor Rigging Operations  
<http://arbormaster.com/uploads//pdfs/Arborist%20Rigging%20Operations.pdf>
- BC Forest Safety Council  
[http://www.bcforestsafe.org/training/faller\\_certification/resources.html](http://www.bcforestsafe.org/training/faller_certification/resources.html)
- BC Faller Training Standard, *InfoFlips*
  - Part one  
[http://www.worksafebc.com/publications/health\\_and\\_safety/by\\_topic/assets/pdf/bc\\_faller\\_training\\_standard\\_1.pdf](http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/bc_faller_training_standard_1.pdf)
  - Part Two  
[http://www.worksafebc.com/publications/health\\_and\\_safety/by\\_topic/assets/pdf/bc\\_faller\\_training\\_standard\\_2.pdf](http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/bc_faller_training_standard_2.pdf)
- BC Hydro  
<http://www.bchydro.com/safety/>
- BC One Call  
<http://www.bconecall.bc.ca>
- BC Provincial Emergency Program  
<http://www.pep.bc.ca/index.html>
- British Columbia IPM Regulations  
[http://www.bclaws.ca/EPLibraries/bclaws\\_new/document/ID/freeside/10\\_604\\_2004](http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_604_2004)
- British Columbia Motor Vehicle Act and other statutes and regulations  
[http://www.icbc.com/about%20ICBC/company\\_info/corporate\\_governance/statutes-regulations](http://www.icbc.com/about%20ICBC/company_info/corporate_governance/statutes-regulations)
- British Columbia Outdoor Wilderness Guide –The Trees of British Columbia  
<http://bcadventure.com/adventure/wilderness/forest/>
- British Columbia Workers Compensation Act  
[http://www.bclaws.ca/Recon/document/freeside/--%20w%20--/workers%20compensation%20act%20rsbc%201996%20c.%20492/00\\_act/96492\\_00.htm](http://www.bclaws.ca/Recon/document/freeside/--%20w%20--/workers%20compensation%20act%20rsbc%201996%20c.%20492/00_act/96492_00.htm)
- Canadian Environmental Protection Act  
<http://www.ec.gc.ca/alef-ewe/default.asp?lang=En&n=2140D763-1>
- Canadian Food Inspection Agency  
<http://www.inspection.gc.ca/english/plaveg/pestrava/pestravae.shtml>
- Canadian System of Soils Classification  
<http://sis.agr.gc.ca/cansis/taxa/cssc3/index.html>
- Commercial Vehicle Safety and Enforcement (CVSE)  
<http://www.th.gov.bc.ca/cvse/>



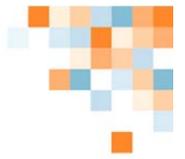
- E-Flora – Electronic Atlas of Plants of British Columbia  
<http://www.geog.ubc.ca/biodiversity/eflora/E-FloraTreesofBritishColumbia.html>
- Fisheries Act  
<http://laws.justice.gc.ca/en/F-14/index.html>
- Insurance Corporation of BC  
<http://www.icbc.com>
- Links to the British Columbia Motor Vehicle Act and other statutes and regulations  
[http://www.icbc.com/about%20ICBC/company\\_info/corporate\\_governance/statutes-regulations](http://www.icbc.com/about%20ICBC/company_info/corporate_governance/statutes-regulations)
- Ministry of Forest and Range – Tree Book: Learning the Trees of British Columbia  
<http://www.for.gov.bc.ca/hfd/library/documents/treebook/>
- Ministry of Transportation and Infrastructure, *Traffic Control Manual for Work on Roadways*  
[http://www.th.gov.bc.ca/publications/eng\\_publications/TCM/Traffic\\_Control\\_Manual.htm](http://www.th.gov.bc.ca/publications/eng_publications/TCM/Traffic_Control_Manual.htm)
- Pest Management Regulatory Agency  
<http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/pmra-arla/index-eng.php>
- Provincial Regulations  
<http://www.bclaws.ca/>
- Rigging Knots  
<http://www.arbormaster.org/uploads//pdfs/Rigging%20Knots.pdf>
- TDG  
<http://www.tc.gc.ca/eng/tdg/clear-schedule2-81.htm>
- Traffic Control Manual for Work on Roadways  
[http://www.th.gov.bc.ca/publications/eng\\_publications/TCM/Traffic\\_Control\\_Manual.htm](http://www.th.gov.bc.ca/publications/eng_publications/TCM/Traffic_Control_Manual.htm)
- Tree Care Industry Association (TCIA)  
<http://www.treecareindustry.org/index.aspx>
- Tree Rigging Concepts  
<http://www.treemettlenexus.com/pdfs/article4.pdf>
- Wildlife Act  
<http://laws.justice.gc.ca/en/W-9/>
- WorkSafeBC  
<http://www.worksafebc.com>
- WorkSafeBC First Aid Certification  
<http://www2.worksafebc.com/topics/firstaid/home.asp>
- WorkSafeBC OHS Guidelines <http://www2.worksafebc.com/publications/OHSRegulation/Home.asp>



- WorkSafeBC OHS Guidelines, Limits of Approach Part 19  
<http://www2.worksafebc.com/publications/OHSRegulation/GuidelinePart19.asp#SectionNumber:G19.9>
- WorkSafeBC, *Safe Work Practices for Certified Utility Arborists*  
[http://worksafebc.com/publications/health\\_and\\_safety/by\\_topic/assets/pdf/cert\\_utility\\_arborist.pdf](http://worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/cert_utility_arborist.pdf)
- WorkSafeBC, *Working Safely Around Electricity*  
[http://www.worksafebc.com/publications/health\\_and\\_safety/by\\_topic/assets/pdf/electricity.pdf](http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/electricity.pdf)

**NOTE:**

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.



## INSTRUCTOR REQUIREMENTS

### Occupation Qualification

The instructor must possess:

- Field Arborist - Certificate of Qualification

### Work Experience

A minimum of 5 years trade experience in at least 75% of the General Areas of Competency.

### Instructional Experience and Education

- Instructors must have a Provincial Instructor's Diploma Program or be registered in the Program

**OR**

- Hold a Bachelors or Master's degree in Education

### INSTRUCTOR(S) FOR SPECIFIC GENERAL AREAS OF COMPETENCY:

#### **A – Regulations and Other Occupational Skills**

- Diploma in management or a combination of education and experience
- 5 years experience in a related field
- Minimum of 5 years practical supervisory experience

#### **J – Arboriculture Soil Science**

- Diploma in Horticulture or a combination of education and experience
- 5 years experience in a related field

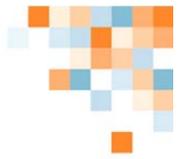


# Appendices



# Appendix A

## Glossary



## ARBORICULTURE TRADE GLOSSARY

**3-strand rope** – type of rope construction in which three strands are twisted together

**7-strand rope, common-grade cable** – type of cable, often used to cable trees

**12-strand rope** – braided rope construction used for climbing and rigging lines; the 12-strand construction is not easily spliceable

**16-strand rope** – braided rope construction with a cover and a core

**abiotic disorders** – plant problems caused by non-living agents

**abscissic acid** – plant growth substance that triggers leaf or fruit drop

**abscission** – leaf or fruit drop

**abscission zone** – area at the base of the petiole where cellular breakdown leads to leaf drop

**absorbing roots** – fine, fibrous roots that take up water and minerals; most of them are within the top 12 inches (30 centimeters) of soil

**absorption** – taking up

**access line** – a second climbing line hung in a tree as a means of reaching a victim in an emergency

**access route** – means of entering and leaving a property during a construction operation

**acclimation** – process by which plants and other living organisms adapt physiologically to a climate or environment different than their own

**acuminate** – leaf shape having an apex the sides of which are gradually concave and taper to a point

**acute** – disorder or disease that occurs suddenly or over a short period of time

**adaptability** – genetic ability of plants and other living organisms to adjust or accommodate to different environments

**addressed** – in close, tight proximity

**adventitious bud** – bud that arises from a place other than a leaf axil

**aeration** – provisions of air to the soil to alleviate compaction and improve its structure

**aeration system** – the set of holes or trenches created in a tree's root area to improve oxygen availability to the roots

**aerial device** – truck with booms and bucket used to place a worker in proximity of to a tree's crown

**aerial rescue** – method used to bring an injured worker down from a tree or aerial lift device

**aesthetic** – artistic or pleasing characteristics

**aggregate** – close cluster or mix

**air excavator** – device that blows air at high force; used to remove soil from the root of trees

**allelochemicals** – naturally produced substances in plants that serve as part of the plant's defense against pests and that may have effects on the growth and development of other plants

**allelopathy** – chemical effect or inhibition of the growth or development of plants introduced by another plant

**alternate** – having leaves situated one at each node and alternating positions on the stem; this arrangement means the leaves are not across from each other

**amon-eye nut** – specialized nut used in cabling trees; has a large eye for attachment of the cable

**anaerobic** – Characterized by the absence of molecular oxygen (O<sub>2</sub>)

**anatomy** – study of the structure and composition (of plants)

**angiosperm** – plants with seeds borne in an ovary; consisting of two big groups, monocotyledons and dicotyledons

**anion** – an ion that carries a negative charge

**annual rings** – see *growth rings*

**ANSI A300 standards** – industry-developed standards for the practice for tree care; acronym for American National Standards Institute

**ANSI Z133.1** – safety standards for tree care operations

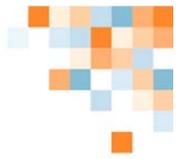
**anthocyanins** – red, purple, or blue pigments; responsible for those colours in some parts of trees and other plants

**antigibberellin** – plant growth regulator that inhibits the action to the plant hormone gibberellin

**antitranspirant** – substance sprayed on plants to reduce water loss through the foliage

**apical** – having to do with the tip

**apical bud** – terminal bud on a stem



**apical dominance** – condition in which the terminal bud inhibits the growth and development of lateral buds on the same stem

**apical meristems** – the growing points at the tips of shoots

**appropriate response process (ARP)** – method of systematically assessing plant health and client needs to determine which course of action, if any, is recommended

**approved** – acceptable to federal, state, provincial, or local enforcement authorities

**arboriculture** – the study of trees and other plants

**arborist block** – heavy-duty pulley with two attachment points and extended cheek plates; used in rigging operations

**artificial respiration** – forcing air into the lungs of a person who has stopped breathing

**auxin** – plant hormone or substance that promotes or regulates the growth and development of plants; it is produced at sites where cells are dividing, primarily in the shoot tips

**available water** – the water remaining in the soil after gravitational water has drained and before the wilting point has been reached

**axial transport** – movement of water, minerals, or photosynthate longitudinally within a tree

**axillary bud** – bud in the axil of a leaf; lateral bud

**back cut** – cut made on opposite side of a log toward the notch cut or face cut

**backfill** – soil (and amendments) put back into the hole when planting a tree

**balance** – in rigging, a technique used to lower a limb without allowing either end to drop

**balled and burlapped (B & B)** – having the root system and soil wrapped in burlap for moving and planting a tree or other plant

**barber chair** – dangerous condition created when a tree or branch splits vertically up from the back cut

**bare root** – tree or other plant taken from the nursery with exposed root system, without soil

**bark** – protective covering over branches and stem that arises from the cork cambium

**bark tracing** – cutting away torn or injured bark to leave a smooth edge

**barrier** – fences or other means used to establish a protection zone around trees on construction sites

**belay** – securing a climber's rope using wraps around a cleat, carabiner, or other device

**bend** – type of knot used to join two rope ends together

**bend ratio** – ratio of the diameter of a branch, sheave, or other device to the rope that is wrapped on it

**bight** – a curve or arc in the active part of a rope between the working end and the standing part

**biodegradable** – capable of decaying and being absorbed by the environment

**biological control** – method of controlling plant pests through the use of natural predators, parasites, or pathogens

**biotic** – pertaining to a living organism

**biotic disorders** – disorders caused by a living agent

**bipinnate** – double pinnate; see *pinnate*

**blade** – the expanded body of a leaf

**Blake's hitch** – a climber's friction knot sometimes used in place of the tautline hitch or Prusik knot

**blight** – any disease, regardless of the casual agent, that kills young, plant-growing tissues

**block** – a pulley used in rigging

**body thrust** – method of ascending a tree using a rope

**bollard** – a post on which wraps can be taken with a rope

**boom** – long, moveable arm of a bucket truck

**botanicals** – pesticides that are made from plants

**bowline** – looped knot used to attach items to a rope

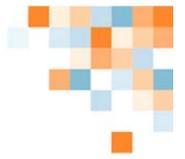
**bowline on a bight** – knot that can be used as a makeshift saddle in an emergency situation

**box cable system** - tree cabling system that forms closed polygons; used to join together more than three branches

**bracing** – installation of metal rods through weak portions of a tree for added support

**bracing rod** – metal rod used to support weak sections or crotches of a tree

**branch bark ridge** – top area of a tree's crotch where the growth and development of the two adjoining limbs push the bark into a ridge



**branch collar** – area where a branch joins another branch or trunk created by the overlapping xylem tissues

**branch protection zone** – tissues inside the trunk or parent branch at the base of a subordinate branch that protect against the spread of decay

**branch union** – point where a branch originates from the trunk or another branch; crotch

**broadcast fertilization** – application of fertilizer over the soil surface

**bud** – small lateral or terminal protuberance on the stem of a plant that may develop into a flower or shoot; undeveloped flower or shoot

**buffering capacity** – ability of a soil to maintain its pH

**bulk density** – mass of soil per unit volume; often used as a measure of compaction

**butt-hitching** – method of lowering pieces when the rigging point is below the work

**butt-tying** – tying off a limb at the butt end of for rigging

**buttress roots** – roots at the base of the trunk; trunk flare

**CPR** – cardiopulmonary resuscitation

**CSA** – Canadian Standards Association

**cable aid** – device used to tighten lags and to aid in cable installation

**cable clamp** – a double-bolted, U-shaped clamp used to secure tree cables

**cable grip** – device used to attach extra-high-strength cable to lag hooks or eye bolts

**cabling** – installation of hardware in a tree to help support weak branches or crotches

**cambium** – layer(s) of meristematic cells that give rise to the phloem and xylem and allow for diameter increase in a tree

**canker** – localized diseased area, often shrunken and discoloured, on stems or branches

**carabiner** – oblong metal ring used in climbing and rigging that is opened and closed by means of a spring-loaded gate

**carbohydrate** – compound, combining carbon and water, produced by plants during photosynthesis

**cardiopulmonary resuscitation** – procedure used to force air into the lungs and to force blood circulation in a person who has suffered cardiac arrest

**carotenoid** – a yellow, orange, or red pigment responsible for those colours in some parts of trees and other plants

**cation** – a positively charged ion

**cation exchange capacity (CEC)** – ability of a soil to adsorb and hold cations

**cavity** – an open wound or hollow within a tree, usually associated with decay

**cell** – smallest unit of an organism that is capable of self-reproduction

**cellulose** – complex carbohydrate found in cellular walls of the majority of plants, algae, and certain fungi

**central leader** – the main stem of a tree, particularly an excurrent specimen

**chaps** – a form of leg protection; worn when operating chain saws

**chlorophyll** – green pigment of plants, found in chloroplasts; it captures the energy of the sun and is essential in photosynthesis

**chloroplast** – specialized organelle found in some cells; the site of photosynthesis

**chlorosis** – whitish or yellowish discolouration caused by lack of chlorophyll; often used in referring to a plant's foliage

**chronic** – disorder or disease occurring over a long period of time

**class** – taxonomic group below the division level but above the order level

**climbing hitch** – knot used as the primary friction knot (tie-in knot) in climbing

**climbing line** – a rope that meets specifications for use in tree climbing

**climbing saddle** – a harness designed for climbing trees

**climbing spurs** – sharp devices that can be strapped to a climber's lower legs to assist in climbing poles or trees being removed

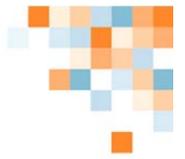
**clone** – asexually produced organisms that are genetically identical

**clove hitch** – knot used to secure an object to a rope

**CODIT** – Compartmentalization Of Decay In Trees

**codominant branches/codominant stems** – forked branches of nearly the same size in diameter and lacking a normal branch union

**come-along** – portable cable winch used to draw two things closer together



**command and response system** – a system of vocal communication convention used in tree care operations

**compaction** – compression of soil resulting in the loss of macropores

**companion cell** – parenchyma cells associated with sieve tube members

**compartmentalization** – natural process of defense in trees by which they wall off decay in the wood; see *CODIT*

**complete fertilizer** – fertilizer that contains nitrogen, phosphorus, and potassium

**complex** – a combination of factors that contribute to the stress or decline of a tree

**compound leaf** – a leaf with two or more leaflets

**conduction** – carrying water or nutrients

**conifer** – a cone-bearing tree or other plant that has its seeds in a structure called a cone

**conk** – the fruiting body of a fungus, often associated with decay

**contact insecticides** – materials that cause injury or death to an insect after coming in contact with the pest

**container grown** – tree or other plant that has been grown in a container

**containerized** – plant available from the nursery with its root mass in a container

**controlled-release fertilizer** – slow-release or slowly soluble form of fertilizer

**conventional notch** – 45-degree notch with a horizontal bottom cut; used in felling trees

**cordate** – heart-shaped

**cork cambium** – meristematic tissue from which cork and bark develop to the outside

**cracks** – defects in trees that, if severe, may pose a risk of tree or branch failure

**crenate** – leaf margin with rounded teeth

**cross section** – section cut perpendicular to the axis of longitudinal growth

**crown** – the above ground portion of a tree

**crown cleaning** – removal of watersprouts and dead, dying, diseased, crossing, and hazardous branches from a tree

**crown reduction** – method of reducing the height or spread of a tree by performing appropriate pruning cuts

**crown restoration** – method of restoring the natural growth habit of a tree that has been topped or damaged in any other way

**crown rot** – disease or decay at the base of a tree or root flare

**cultivar** – a cultivated variety of a plant

**cultural control** – method of controlling plant pests by providing a growing environment favourable to the host plant and/or unfavourable to the pest

**cuticle** – waxy layer outside the epidermis of a leaf

**cytokinin** – plant hormone involved in cell division

**D-rings** – D-shaped metal rings on a climber's saddle used to attach ropes and snaps

**dead-end grips** – cable termination devices that must be used with extra-high-strength cable

**dead-end hardware** – cabling, bracing, or guying hardware that is terminated by screwing into the tree

**deadwooding** – removal of dead and dying limbs from a tree

**decay** – decomposition of woody tissues by fungi or bacteria

**deciduous** – tree or other plant that loses its leaves sometime during the year and leafless generally during the cold season

**decurrent** – rounded or spreading growth habit of the crown of a tree

**deficiency** – lack or insufficient quantity of a required element

**defoliation** – loss of leaves from a tree or other plant by biological or mechanical means

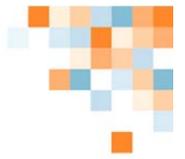
**dehiscent** – opening spontaneously at maturity to release seeds

**dentate** – having marginal teeth that are perpendicular to the leaf margin

**desiccation** – total drying out

**design criteria** – aspects of the site and required functions to be served by the plant that must be considered in plant selection

**design factor** – factor by which the tensile strength of a rope or piece of hardware is reduced to arrive at the working-load limit for a given application



**dicot** – see *dicotyledon*

**dicotyledon** – plant with two cotyledons in its embryo

**dieback** – condition in which the ends of the branches are dying

**differentiation** – process in the development of cells in which they become specialized for various functions

**diffuse porous** – pattern of wood development in which the vessels are distributed evenly throughout the annual ring

**dioecious** – plant with unisexual flowers with each sex confined to separate plants

**direct cable system** – simple tree cabling system to join two branches

**direct contact** – when any part of the body touches an electrical conductor

**division** – taxonomic division below kingdom level but above class level

**dormant** – state of reduced physiological activity in the organs of a plant

**double braid** – rope construction that consists of a braided rope within a braided rope

**double crotch** – climbing technique consisting of tying into two places in a tree

**double serrate** – toothed margin of a leaf with smaller teeth within

**downy mildew** – white fungal growth emerging from water-soaked tissue, usually on the underside of the leaf

**drill-hole method** – applying fertilizer by drilling holes in the soil occupied by the roots or surrounding them

**drip irrigation** – method of watering in which water evaporation and runoff are minimized

**drip line** – perimeter of the area under a tree delineated by the crown

**drop-crotch pruning** – method of reducing the height of a tree; see *reduction*

**drop cut** – branch-removal technique consisting of an undercut and a top cut farther out on the branch

**drop zone** – area where cut branches or wood sections will be dropped from a tree

**drum lace** – method of tying a balled-and-burlapped tree root ball for moving

**dynamic loading** – forces created by a moving load; load that changes with time

**electrical conductor** – body or medium that allows the passage of electricity; while working on trees, generally this will be any overhead or underground electrical device, including communication cables and power lines that have electricity or the potential to have it

**emergency response** – predetermined set of processes by which emergency situations are assessed and handled

**entire** – leaf margin without teeth

**epicormic** – arising from latent or adventitious buds

**epidermis** – outer tissue of leaves, stems, roots, flowers, and seeds

**epinasty** – distortion of growth

**espalier** – specialized technique of pruning and training plants to grow within a plane

**essential elements** – the 17 minerals essential to the growth and development of trees

**ethylene gas** – naturally occurring plant growth substance that triggers fruit ripening

**evapotranspiration (ET)** – moisture lost by evaporation of the soil's water and transpiration of the plant

**evergreen** – tree or plant that keeps its needles or leaves year round; this means for more than one growing season

**excurrent** – tree growth habit with pyramidal crown and central leader

**exfoliating** – peeling off in shreds or layers

**extra-high-strength cable** – type of cable used in supporting trees; stronger but less flexible than standard wrapped cable

**exudation** – oozing out

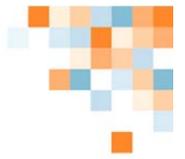
**eye bolt** – a drop-forged, closed-eye bolt installed in trees attach cable

**eye splice** – technique used to attach common-grade cable to eye bolts or lags

**eyesplice** – termination in a rope forming an eye and made by splicing the rope back upon itself

**face cut** – a notch cut used in felling trees or limbs

**fall protection** – equipment and techniques designed to ensure a climber will not fall from a tree



**false crotch** – device installed in a tree to set ropes during climbing or rigging when there is not a suitable natural crotch available

**family** – the taxonomic division under the order level and above the genus level

**fermentation** – incomplete path of respiration in the absence of sufficient oxygen

**fertilizer** – substance added to a plant or the surrounding soil to supplement the supply of essential elements

**fertilizer analysis** – the percentage of nitrogen, phosphorus, and potassium in a fertilizer

**fertilizer burn** – injury to plants resulting from excess fertilizer salts in the surrounding soil

**fiber** – elongated, tapering, thick-walled cell that provides strength

**field capacity** – the point at which soil becomes saturated and cannot absorb any more water.

**figure-8 descender** – metal device used in rigging

**figure-8 knot** – safety knot or stopper tied in the climbing knot

**first aid** – emergency care or treatment of the injuries or illnesses of a person to stabilize his or her condition before medical help is available

**foliage** – the leaves of a plant

**foliar analysis** – laboratory analysis of the mineral content of foliage

**foliar application** – application of fertilizer or other substance by direct spray on the foliage

**footlocking** – method of climbing a rope by wrapping the rope around one's feet

**friction device** – device used to take wraps in a load line; provides friction for controlled lowering

**friction hitch** – any of several friction knots used in climbing trees or rigging

**fronds** – large, divided leaves, as in palms

**fruiting bodies** – the reproductive structures of fungi, the presence of which may indicate decay in a tree

**fungicides** – chemical compounds that are toxic to fungi

**gall** – swelling of plant tissues; frequently caused by insects, nematodes, fungi, or bacteria

**genus** – a group of species having similar fundamental traits; botanical classification under the family level and above the species level

**geotropism** – plant growth produced as a response to the force of gravity; it can be positive as in the roots, or negative as in the trunk

**gibberellin** – a plant growth substance involved in cell elongation

**girdling** – inhibition of the flow of water and nutrients in a tree by choking vascular elements

**girdling root** – root that grows around a portion of the trunk of a tree, causing inhibition of the flow of water and nutrients by choking the vascular elements

**glaucous** – having a somewhat glaucous appearance or nature; becoming glaucous  
**glaucous** – covered with a grayish, bluish, or whitish waxy coating or bloom that is easily rubbed off: glaucous leaves

**gravitational water** – water that drains from the soil's larger macropores under the force of gravity

**ground rod** – 10-foot (3-meter) metal rod used in grounding a lightning protection system

**grounded** – electrically connected to the earth

**growth rate** – speed at which something grows

**growth rings** – rings of annual xylem visible in a cross section of the trunk of some trees

**guard cells** – pair of cells that regulate the opening and closing of a stomate due to a change in water content

**gummosis** – exudation of sap or gum, often in response to disease or insect damage

**guying** – securing a tree, if needed, with ropes or cables fastened to anchors in the ground or another tree

**gymnosperm** – plant with seeds exposed

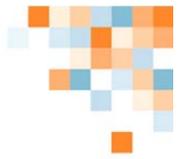
**half hitch** – simple wrap of a rope used to secure a line temporarily

**hardened off** – acclimated to the cold or to a new environment

**hardiness** – ability of a plant to survive low temperatures

**hazard assessment** – process by which the risk potential or a tree is determined

**heading back** – topping; cutting limbs back to buds, stubs, or lateral branches not large enough to assume apical dominance



**heartwood** – inner, nonfunctional xylem tissues that provide structural resistance to the trunk

**hinge** – a strip of wood fibers created between the notch and the back cut that help control direction in tree felling

**hinge cut** – sequence of cuts used to control the direction of a limb being removed

**hitch** – a knot made when a rope is secured around an object or its own standing part

**hollowed braid** – rope construction characterized by a braided rope with no core

**honeydew** – substance secreted by certain insects when feeding upon plants

**horizon** – layer of soil within the soil profile

**horticultural oils** – highly refined petroleum oils used to smother insects and disrupt their membranes

**Humboldt notch** – a felling notch that is horizontal on the top and angled on the bottom

**IPM** – see *Integrated Pest Management*

**identification key** – aid used to help identify plants

**imbricate** – where one tepal is outside all others, one is inside all others, and the others are outside on one margin and inside on the other

**implant** – device, capsule, or pellet that can be inserted into a tree to treat disorders

**included bark** – bark that becomes embedded in a crotch between branch and trunk or between codominant stems and causes a weak structure

**increment borer** – device used to take core samples from trees for the purpose of determining age or detecting problems

**indirect contact** – touching any conductive object that is in contact with an electrical conductor

**infectious** – capable of being spread from plant to plant

**infiltration** – downward entry of water into the soil

**infiltration rate** – speed at which water soaks into the soil

**inorganic fertilizer** – mineral fertilizer, not coming from plant or animal

**insect growth regulators** – substances, naturally occurring in insects, that affect growth and development

**insecticidal soaps** – mild salts of fatty acid that disrupt insect life process

**insecticides** – substances that are toxic to insects

**Integrated Pest Management (IPM)** – method of controlling plant pests combining biological, cultural, and chemical controls

**internodal** – between two nodes on a stem

**internode** – the region of the stem between two successive nodes

**interveinal tissue** – leaf tissue between the veins or vascular bundles

**introduced species** – plant species that are not native to a region

**involucre** – a series of bracts beneath or around a flower or flower cluster. The cupule, the cuplike structure holding an oak acorn, is a modified, woody involucre

**ion** – one atom or group of atoms with a positive or negative charge

**job briefing** – brief meeting of a tree crew at the start of every job to communicate the work plan, responsibilities and requirements, and any potential hazards

**jump cut** – branch-removal technique consisting of an undercut and a top cut closer in on the branch

**kerf** – slit or cut in a log made by a saw

**kernmantle** – rope manufactured to have a core and woven sheath

**key** – plant identification tool used to determine a plant species

**kickback** – sudden backward or upward thrust of a chain saw

**kickback quadrant** – upper quadrant of the tip of a chain saw bar

**kingdom** – the primary division in taxonomy, separating plants from animals

**lag eye** – lag-threaded cable anchor with a closed eye

**lag hook/J-hook** – J-shaped bolt used to attach cables to trees

**lag-threaded rod** – steel bracing rod used to screw into pre-drilled hole to provide added support to a tree

**landing zone** – predetermined area where parts will be brought down in a rigging operation

**landscape function** – the environmental, aesthetic, or architectural functions that a plant can have



**lanyard** – a short rope equipped with snaps or carabiners; work-positioning lanyards are used for temporarily securing a climber in one place

**larva** – immature life stage of an insect

**lateral** – secondary or subordinate branch

**lateral bud** – vegetative bud on the side of a stem

**lateral root** – side-branching root that grows horizontally

**leach/leaching** – tendency for elements to wash down through the soil

**leader** – the primary terminal shoot or trunk of a tree

**leaf apex** – tip of the leaf blade

**leaf base** – bottom part of the leaf blade

**leaf blotch** – irregularly shaped areas of disease on plant foliage

**leaf margin** – outer edge of the leaf blade

**leaf scar** – scar left on the twig after a leaf falls

**leaf spot** – patches of disease or other damage on plant foliage

**leaflet** – separate part of a compound leaf blade

**leg protection** – chaps or other protective clothing worn over the legs when operating a chain saw

**lenticel** – opening in the bark that permits the exchange of gases

**liability** – something for which one is responsible; legal responsibility

**lignin** – substance that impregnates certain cell walls

**lion tailing** – poor pruning practice in which limbs are thinned from the inside of the crown to a clump of terminal foliage

**liquid injection** – method of injecting liquid forms of fertilizer into the surrounding soil of a tree

**load line** – rope used to lower a tree branch or segment that has been cut

**lobe** – projecting segment of a leaf blade

**lowering device** – instrument attached to the base of a tree in rigging; used to take wraps with the load lines

**machine-threaded rod** – steel rod used in cabling and bracing; must be terminated with washers and nuts

**macronutrient** – any of the essential elements required by plants in relatively large quantities

**macropore** – larger spaces between soil particles that are usually air-filled

**main conductor** – primary conductor cable of a lightning protection system; standard down conductor

**mature height** – the maximum height that a plant can reach if the conditions of the planting site are favourable

**meristem** – undifferentiated tissue in which active cell division takes place

**microinjection** – method used to introduce chemicals directly into the xylem of trees

**micronutrient** – any of the essential elements required by plants in relatively small quantities

**micropore** – space between soil particles that is relatively small and likely to be water filled

**micropulley** – small pulley used by tree climbers

**minimum irrigation** – the practice of minimal irrigation through the use of drought-tolerant plants and watering only when necessary due to reduced rainfall

**mismatch cut** – cut type used in branch removal in which offset, overlapping cuts allow the section to be manually broken off; snap cut

**mitigation** – process of reducing damages or risk

**monitoring** – keeping a close watch; performing regular checks or inspections

**monocot** – see *monocotyledon*

**monocotyledon** – a plant whose embryo has one seed leaf (cotyledon)

**monoecious** – a plant with both sexes on the same plant

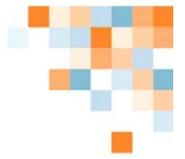
**morphology** – study of the form and structure of living organisms; in this case, of plants

**mortality spiral** – sequence of events causing the decline, and eventually death, of a tree

**mycorrhizae** – a symbiotic naturally attaches itself to fine feeder roots and grows its own roots, hyphae which mine the soil for minerals and water to bring into the feeder roots

**native species** – indigenous to a region

**naturalize species** – a non-native species that has become established in a region



**necrosis** – localized death of a tissue in a living organism

**needle** – slender conifer leaf

**negligence** – failure to exercise due care

**nematode** – microscopic roundworm; some feed on plant tissues and may cause disease

**node** – slightly enlarged portion of a stem where leaves and buds arise

**nomenclature** – scientific naming system for living organisms; scientific names are written in Latin, the genus first (starting with capital letter), followed by the species (always with lowercase letter)

**notch** – a wedge cut into a log or tree for felling

**nutrient cycling** – movement of mineral nutrients within an ecosystem as organic matter decomposes and is recycled in plants

**oblique** – lop-sided, one side larger than the other

**obtuse** – rounded, approaching semi-circular

**Occupational Safety and Health Act (OSHA)** – in the United States, the legislative act dealing with health and safety in the work place; administered by the Occupational Safety Administration; Occupational Health and Safety Administration (OHSA) in Canada

**oedema (edema)** – watery swelling in plant tissue

**oils** – highly refined petroleum oils used to smother insects and disrupt their membranes

**open-face notch** – wedge-shaped cut (commonly about 70 degrees) used in felling or removing tree sections

**opposite** – opposite leaf arrangement; leaves situated two at each node, across from each other on the stem

**order** – taxonomic division below class level but above family level

**organic fertilizer** – fertilizer derived from plants or animals

**organic layer** – layer of organic matter at the soil's surface

**osmosis** – diffusion of water through a semi-permeable membrane from a region of higher water potential to a region of lower water potential

**outriggers** – projecting structures on boom trucks

**pH** – a measure of acidity or alkalinity of a medium

**palmate** – radiating in a fanlike manner; type of compound leaf

**parasite** – organism living in or on another organism from which it derives nourishment

**parenchyma cells** – thin-walled, living cells essential in photosynthesis

**parent material** – soil bedrock material from which the soil's profile develops

**pathogen** – casual agent of disease

**perched water table** – accumulation of water in an upper soil layer

**percolation** – movement of water through the soil

**permanent branches** – branches that will be left in place, often forming the initial scaffold framework of a tree

**permanent wilting point** – point at which a plant cannot pull any more water from the soil

**personal protective equipment (PPE)** – personal safety gear such as hard hats, safety glasses, and hearing protection

**pest resistance** – in plants, the tendency to withstand, or not to get, certain pest problems

**pesticides** – chemicals used to kill unwanted organisms such as weeds, insects, or fungi

**pest resurgence** – increase in the population of a pest following a reduction in the population of natural predators or parasites of that pest

**petiole** – the stalk of a leaflet

**phenols** – naturally produced organic alcohols with acidic properties; one of several chemical defense compounds in trees

**pheromone** – chemical substance produced by insects that serves as a stimulus to other insects of the same species

**phloem** – plant vascular tissue that conducts photosynthates; situated to the inside of the bark

**photoperiod** – length of daylight required for certain developmental processes and growth of a plant

**photosynthate** – general term for the products of photosynthesis

**photosynthesis** – the process in green plants (and in some bacteria) by which light energy is used to form organic compounds from water and carbon dioxide

**phototropism** – influence of light on the direction of plant growth

**phylum** – primary taxonomic division within a kingdom; the plural is phyla



**physiological disorder** – in plants, a disorder not caused by an insect, pathogen, or injury

**physiology** – the study of the life function (of a plant)

**phytotoxic** – a term used to describe a compound that is poisonous to plants

**pigment** – substance that appears coloured due to the absorption of certain light wavelengths

**pinnate** – compound leaf with leaflets along each side of a common axis

**pioneer tree** – is of the pioneer species which colonize previously uncolonized land, usually leading to ecological succession. They are the first organisms to start the chain of events leading to a livable biosphere or ecosystem. Since uncolonized land may have thin, poor quality soils with few nutrients, pioneer species are often hearty plants with adaptations such as long roots, root nodes containing nitrogen-fixing bacteria, and leaves that employ transpiration. They will die and break down after some time, making new soil for secondary succession, and nutrients.

**plant growth regulator** – a compound, effective in small quantities, that affects the growth and development of plants

**plant growth substance** – a naturally produced compound, effective in small quantities, that affects the growth and development of plants; see *plant hormone*

**Plant Health Care (PHC)** – a holistic and comprehensive program to manage the health, structure, and appearance of plants in the landscape

**plant hormone** – substance produced by a plant that affects physiological processes such as growth; see *plant growth substance*

**planting specifications** – detailed plans and statements of particular procedures and standards for planting

**pole pruner** – long-handled tool used to make small pruning cuts that cannot be reached with hand tools

**pole saw** – long-handled tool with a pruning saw on the end

**pollarding** – a specialty pruning technique used on large-maturing trees that results in the development of callus at the cut ends of the branches

**positive-locking** – unable to be opened unintentionally; locks automatically and requires two or more motions before opening

**powdery mildew** – white or grayish fungal growth on the surface of stems or foliage

**preformed tree grip** – device used to attach extra-high-strength cable to lag hooks or eye bolts

**prescription fertilization** – philosophy of basing fertilization recommendations on plant needs

**pruning** – cutting away unwanted parts of a plant

**Prusik hitch** – type of multi-wrapped friction hitch used in climbing and rigging; used to attach the Prusik loop to the climbing line when footlocking

**Prusik loop** – loop of rope, smaller in diameter than the climbing line, used for the secured footlock method of ascending a rope

**radial aeration** – means of aerating the soil in the root zone of a tree by removing and replacing soil in a spokelike pattern

**radial transport** – movement of substances in a tree perpendicular to the longitude axis of the tree

**radial trenching** – method of improving aeration in the root zone of a tree; radial aeration

**raising** – removing lower limbs from a tree to provide clearance

**ray** – tissues that extend radially across the xylem and phloem of a tree

**reaction wood** – wood formed in leaning or crooked stems, or on lower or upper sides of branches

**reaction zone** – a natural boundary formed by a tree to separate wood infected by disease organisms from healthy wood; important in the process of compartmentalization

**reactive forces** – the forces generated in operating a chain saw

**redirect rigging** – changing the path of a rigging line to modify the forces or the direction of limb removal

**reduction** – pruning to decrease the height and/or spread of a branch or crown

**rescue kit** – climbing gear and emergency equipment that should be set out on every job site so that it is available in an emergency situation



**rescue pulley** – light-duty pulley used in rigging operations

**resistance** – in plants, the tendency to withstand, or not to get, certain diseases

**resistance varieties** – plants that are tolerant of, or not susceptible to, certain disease or pest problems

**resource allocation** – distribution and use of photosynthate for various plant functions and processes

**respiration** – process by which carbohydrates are converted into energy by using oxygen

**restoration** – pruning to improve the structure, form, and appearance of trees that have been severely headed, vandalized, or damaged

**rhizosphere** – immediate environment of roots where biological activity is high

**rigging** – method of using ropes and hardware to remove large limbs or take down trees

**rigging line** – rope used in rigging operations; usually the load-bearing line

**rigging point** – the place in a tree (natural or false crotch) that the load line passes through to control limb removal in rigging operations

**ring porous** – pattern of wood development in which the large-diameter vessels are concentrated in the earlywood

**risk assessment** – process of determining the level of risk posed by a tree or group of trees on a property

**risk management** – process of assessing and controlling risk in tree management

**root ball** – containment of roots and soil of a tree or other plant

**root crown** – the upper-most portion of the root system where the major roots join together at the base of the stem or the trunk

**root hair** – modified epidermal cells of a root that aid in the absorption of water and minerals

**root pruning** – in transplanting, the process of pre-digging a root ball to increase the density of root development within the final ball

**rope sling** – a section of rope, usually with at least one eyesplice, used to secure equipment or tree sections in rigging operations

**running bowline** – knot often used to tie off limbs for removal

**rust** – disease caused by a certain group of fungi and characterized by reddish brown spots

**sanitation** – practice of removing dead or diseased plant parts to reduce the spread of disease

**sapwood** – outer wood that actively transports water and minerals

**scabbard** – sheath for a pruning saw

**scaffold branches** – the permanent or structural branches of a tree

**scale** – one of a group of insects that attach themselves to plant parts and suck the sap

**scorch** – browning and shrivelling of foliage, especially at the leaf margin

**screw link** – connecting device with a threaded closure mechanism; used in rigging operations

**secondary nutrients** – nutrients required in moderate amounts by plants

**secondary pest outbreak** – increase in secondary pest population following a reduction in the population of natural predators or parasites

**secured footlock** – method of ascending a rope in which the climber is secured against a fall

**serrate** – sawtooth margin of a leaf with the teeth pointed forward

**shackle** – a U-shaped fitting with a pin run through it; clevis

**shakes** – separation of the growth rings in wood

**shall** – the word that designates a mandatory requirement in the ANSI standards

**sheave** – the inner fitting within a block over which the rope runs

**ship auger** – type of drill bit used to drill holes in trees for cable installation

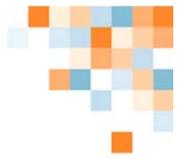
**shock-loading** – the dynamic load placed on a rope or rigging apparatus when a moving log is stopped

**should** – the word that designates an advisory recommendation in the ANSO standards

**sieve cells** – long, slender phloem cells in gymnosperms

**sieve tube elements** – specialized phloem cells involved in photosynthate transport

**sign** – the physical evidence of a casual agent



**simple leaf** – a single, one-part leaf; not composed of leaflets

**sink** – a plant part that uses more energy than it produces

**sinker roots** – downward-growing roots that take up water and minerals; most are in the top 12 inches (30 centimeters) of soil

**sinus** – space between two lobes of a leaf

**site analysis** – determination of the conditions, environment, and needs of a planting site

**site considerations** – the factors that must be taken into account when assessing a planting site to select plant species

**skeletonized** – leaves that have had the tissue removed from between veins by insects

**sling** – device used in rigging to secure equipment or pieces being rigged

**slowly soluble fertilizer** – a fertilizer that has some particles coated to delay the dissolving of the minerals

**snap** – connecting device used by tree climbers primarily for connecting the climbing line to the saddle

**snap cut** – cut type used in branch removal in which offset, overlapping cuts allow the section to be manually broken off; mismatch cut

**soil amendment** – material added to soil to improve its physical or chemical properties

**soil analysis** – analysis of soil to determine pH, mineral composition, structure, and other characteristics

**soil auger** – device for removing cores of soil for inspecting or testing

**soil compaction** – compression of the soil resulting in reduction of the total pore space, especially the macropores

**soil profile** – vertical section through a soil, through all of the horizons

**soil structure** – the arrangement of soil particles

**soil texture** – the relative fineness or coarseness of a soil due to a particle size

**source** – plant part that produces carbohydrates; mature leaves are sources

**species** – a group of organisms composed of individuals of the same genus name that can reproduce among themselves and have similar offspring

**specific epithet** – the classification name that follows the genus name in scientific nomenclature

**specifications** – detailed plans and statements of particular procedures and standards

**speed lining** – a method of lowering tree segments past obstacles below

**speedline** – rigging line strung in such a way as to slide tree segments to the ground

**splits** – open cracks or fissures in tree trunks or branches

**split-tail** – tree climbing system in which the climbing hitch is formed with a separate, short length of rope

**square knot** – a knot used to tie together two ropes of equal diameter

**staking** – supporting a newly planted tree with stakes

**stand delineation** – general overview of the trees describing species composition, diameter distribution, age class and condition at a stand or individual tree level

**standard down conductor** – length of copper cable used in lightning protection systems on trees

**standing part** – the inactive part of a rope, as opposed to the working end

**stippling** – speckled or dotted areas on foliage

**stomata** – small pores between two guard cells on leaves and other green plant parts through which gases are exchanged

**stopper knot** – knot tied in the end of line to keep the tail from passing through the climbing hitch

**stress** – factor that negatively affects the health of a tree

**structural defects** – flaws, decay, or other faults in the trunk, branches, or root collar or a tree, which may lead to failure

**structural pruning** – pruning to establish a strong branch scaffold system

**stunting** – growth reduction of organisms, in this case, plants

**subordinate** – pruning to reduce the size and growth of a branch in relation to other branches or leaders

**subsurface application** – placement of fertilizer below the soil surface

**sucker** – shoot arising from the roots



**surface application** – placement of fertilizer or other material on the soil surface

**symbiosis** – a mutually beneficial association of two different types of living organisms

**symbiotic** – a mutually beneficial association

**symbiotic relationship** – association between two organisms that is mutually beneficial

**symptom** – a plant's reaction to a disorder

**systemic** – substance that moves throughout and is absorbed by the entire organism, in this case, by the roots, leaves, or both

**tagline** – rope used to control the swing and direction of drop of a limb being removed

**tannins** – organic substances produced by trees; believed to be involved in the tree's chemical defense processes

**tap root** – central, vertical root that grows right below the trunk and is often choked off by the development of other roots

**taper** – the change in diameter over the length of trunks and branches

**target** – person, object, or structure that could be injured or damaged in the event of tree or branch failure

**tautline hitch** – type of climbing hitch used by climbers to tie in

**taxonomy** – science that studies the description, denomination, and classification of living organisms, based on their similarities and differences

**temporary branches** – branches left in place when training young trees; such branches will be removed later

**tensile strength** – the breaking strength of a rope under load

**tensiometer** – instrument used to measure soil moisture

**terminal bud** – the bud on the end of a twig or shoot

**terracing** – method used to lower the soil grade in stages

**thimble** – device used in cabling to form the loop in the cable

**thinning** – selective removal of unwanted branches and limbs to provide light or air penetration through the tree or to lighten the weight of the remaining branches

**threaded rod** – metal rod used for support bracing of trees

**thresholds** – pest population levels requiring action

**through-hardware** – anchors or braces that pass completely through a trunk or branch and are secured with washers and nuts

**throwing ball** – device used to set a rope in a tree

**throwing knot** – a series of loops and wraps tied in a rope to form a weight for throwing

**throwline** – device consisting of a small weight attached to a thin, lightweight cord; used to set climbing ropes in trees

**tie in** – to secure a climber's rope in a tree with a tautline hitch

**timber hitch** – knot consisting of a series of wraps on a rope; used to secure the rope to a limb or tree

**tip tying** – tying a rope on the tip (brush) end of a limb or tree

**topping** – cutting back a tree to buds, stubs, or lateral not large enough to assume apical dominance

**torts** – wrongful acts, other breach of contract, for which civil action may be taken

**tracheid** – elongated, tapering xylem cell, adapted for support

**translocated** – movement of sugars in the phloem

**transpiration** – water vapour loss through the stomata of leaves

**transplant shock** – stress following transplant in which growth is reduced and the tree may wilt or drop foliage

**transplanting** – moving a plant to a new location

**tree island** – soil or landscape surrounding a tree, such as within a paved area

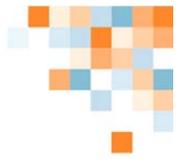
**tree spade** – mechanical device used to dig and move trees

**tree well** – wall constructed around a tree when the soil grade is raised to maintain the original soil level and provide oxygen to the root zone

**tree wrap** – material used to wrap the trunks of newly planted trees

**trenching** – digging to install utilities; of concern due to root damage

**triangular cable system** – tree cabling that forms a triangular shape



**tropism** – growth movement or variation of a plant as a response to an external stimulus such as light or gravity

**tunneling** – alternate means to trenching for installation of underground utilities

**turgid** – fully hydrated to a normal state of distension

**undercut** – a cut on the underside of a limb to be removed to prevent unwanted tearing as the limb falls

**utility pruning** – pruning around or near utility facilities with the object of maintaining safe and reliable utility service

**variety** – subdivision of a species having a distinct difference, and breeding true to that difference

**vascular discolouration** – darkening of the vascular tissues of woody plants in response to disease

**vascular tissue** – tissue that conducts water or nutrients

**vector** – organism that transmits a pathogen

**venation** – arrangement of veins

**vertical mulching** – filling vertical drilled holes in the soil with materials such as gravel, perlite, peat, or sand

**vessels** – stacked, tubelike, water-conducting cells in the xylem

**vigor** – overall health; capacity to grow and resist stress

**vista pruning** – selective pruning to allow a view from a predetermined point

**vitality** – overall health; a plant's ability to deal effectively with stress

**water shoot** – a secondary, upright shoot arising from the trunk, branches or roots of a plant

**water-holding capacity** – ability of a soil to hold moisture

**water-insoluble nitrogen (WIN)** – nitrogen fertilizer in a form that is not soluble in water

**watersprout** – an upright, adventitious shoot arising from the trunk or branches of a plant; although incorrect, it is also called a sucker

**webbing sling** – length of sewn webbing, often formed into a loop, used as an attachment in rigging

**whorled** – leaves arranged in a circle around a point on the stem

**wilt** – loss of turgidity and subsequent drooping of leaves

**wire basket** – type of metal basket used to support the root ball of balled-and-burlapped plants

**witch's broom** – plant disorder in which large number of accessory shoots develop

**work plan** – predetermined, orderly means for job completion

**working end** – the part of a rope terminated for use

**working-load limit (WLL)** – tensile strength divided by design factor; load limit for a rope or piece of equipment

**work-positioning lanyard** – rope or strap designed to aid in climbing and tree work; secondary means of attachment

**wound dressing** – compound applied to tree wounds or cuts, if necessary

**xylem** – main water- and mineral-conducting tissue in trees and other plants; provides structural support and becomes wood after lignifying