Skilled Trades Ontario | Métiers spécialisés Ontario

Apprenticeship Curriculum Standard

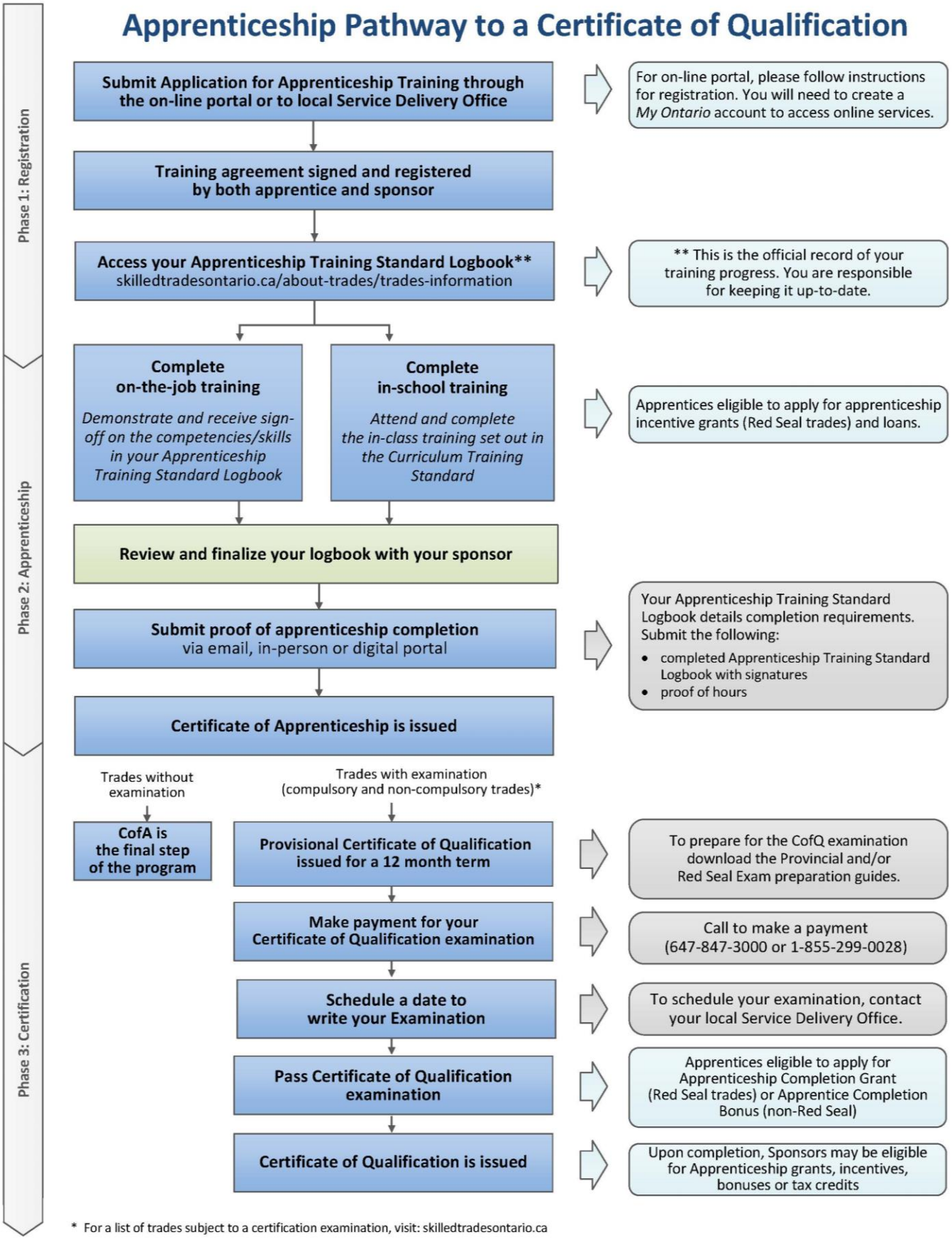
Horticultural Technician 441C

Level 1

Level 2

2023

Apprenticeship Pathway to a Certificate of Qualification



* For a list of trades subject to a certification examination, visit: skilledtradesontario.ca

Draft version: 2022-03-16

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Introduction

Description: A **Horticultural Technician** grows, installs, and maintains indoor and outdoor plants, builds urban and rural landscapes, maintains outdoor properties, cares for turf grass and golf courses and installs and maintains irrigation systems.

Specifically, a Horticultural Technician:

- grows plants using different propagation techniques
- identifies nutrient requirements of plants, applies fertilizers and monitors plants
- transplants, installs and prunes plants
- analyzes plant watering requirements and installs and maintains irrigation systems
- establishes and maintains turf grass
- constructs landscapes according to drawings
- controls plant pests and diseases using integrated pest management techniques
- recycles waste materials

The content of this Horticultural Technician Curriculum Standard was significantly revised to be harmonized with the 2017 Red Seal Occupational Standard for the Trade of Landscape Horticulturist.

Similar to the on-the-job Training Standard for this trade, the philosophical underpinnings of the content are applying horticultural principles and environmental stewardship and sustainability practices. The curriculum supports and reinforces landscape and horticultural practices such as water optimization, conservation and protection, the use of native and natural materials, green infrastructure and using tools and equipment that produce fewer emissions and reduce noise and vibration. There is an emphasis in the standard on plant health, as this focus needs to starts at the design phase and carry through to construction and maintenance. Safety, communication, grading and drainage concepts are reinforced throughout the curriculum.

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The Curriculum Standard

This Horticultural Technician curriculum consists of 2 levels of in-school training. The curriculum standard identifies the learning outcomes that apprentices must achieve while in school. It focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives identified in the "on-the-job" industry-approved Training Standards.

The program is substantively harmonized with the 2017 Red Seal Occupational Standard (RSOS) for the trade of Landscape Horticulturist, in that the content progresses in a similar sequence. Level 1 of this curriculum covers content from Level 1 and 2 in the RSOS and Level 2 covers the content from Level 3 and 4 from RSOS.

As the curriculum standard provides a minimum standard of theoretical knowledge and practical application to complement on-the-job experience, Employers/Sponsors are expected to extend the apprentice's knowledge and skills through practical training on a work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to ensure that all apprentices have achieved the learning outcomes identified in the curriculum standard.

Curriculum standard objectives provide a basis for:

a. Sound theoretical training to meet challenges presented by innovation and increasingly complex tools and equipment within the workplace.
b. Reinforcement of fundamental trade proficiency through practice of work skills as identified in specific learning outcomes.
c. Development of a high standard of skill and problem-solving.
d. Formation of a desirable work attitude and a keen sense of responsibility, particularly concerning public and personal safety.

To assure consistency in delivery, a time allocation has been included for each reportable subject, along with theoretical and practical breakdown of the learning content. Theoretical knowledge and skills are to be reinforced in the practical aspects of the in-school program. Specific times have been allocated for practical skills development to ensure that apprentices have an opportunity to demonstrate achievement of learning outcomes according to performance criteria.

As jurisdictional safety and prevention legislation changes, compliance requirements by industry are increasing. Safety awareness and implementation of safe work practices in the industry is evolving to better protect the workforce and the general public. In all practical learning activities, the apprentices will abide by the Occupational Health and Safety Act (OHSA) and all other regulations and policies relating to safety; in particular, the use of personal protective equipment.

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Communication skills and safety-related content are formally taught in level one, and continually reinforced "in context" in subsequent courses/levels.

Please refer to Skilled Trades Ontario website (skilledtradesontario.ca) for the most accurate and up-to-date information about Skilled Trades Ontario. For information on *Building Opportunities in the Skilled Trades Act, 2021 (BOSTA)*) and its regulations, please visit
Building Opportunities in the Skilled Trades Act, 2021, S.O. 2021, c. 28 - Bill 288 (ontario.ca)

*** Please note that all practices described in this standard must be performed according to Occupational Health and Safety Act (OHSA) and all other relevant legislative regulations as noted in 3625 Trade Practices -Safety, Tools and Equipment, as well as manufacturer's recommendations/specifications, company policies and the Canadian Landscape Standard (CLS) https://www.csla-aapc.ca/standard.**

Pre-requisites
In order to advance to Level 2 of the apprenticeship program, an individual must have completed all of the units outlined in Level 1.

Hours Disclaimer (if applicable)
It is agreed that Training Delivery Agents (TDAs) may need to make slight adjustments (with cause) according to particular apprentice needs and may deviate from the unit sequencing and the prescribed practical and theoretical hours shown within the standard. However, all TDAs will comply with the hours at the reportable subject level.

Suggested Equipment for Training Delivery Agencies
The listing of tools on in Appendix C does not list minimum quantities based on the understanding that the delivering TDA is in the best position to determine the need based on its delivery methodology.

Evaluation and Testing
Frequency and method of assessment will depend upon the materials being covered, whether assessing theory or practical skills and therefore may vary from reportable subject to reportable subject. Methods may include completion of projects, quizzes, tests, and demonstration.

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Program Summary

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
Level 1				
3625	Trade Practices -Safety, Tools and Equipment	48	36	12
3626	Work and Project Organization	24	24	0
3627	Communication Skills	24	18	6
3628	Horticultural Principles	60	48	12
3629	Environmental Principles-Soil, Water, Environmental Stewardship	36	30	6
3630	Pre-Construction Activities	30	24	6
3631	Hardscape Installation and Maintenance	48	12	36
3632	Softscape Installation and Maintenance-Turf	30	24	6
3633	Softscape Installation and Maintenance	48	36	12
3634	First Aid-CPR	12	6	6
	Total	**360**	**258**	**102**
Level 2				
3635	Site Preparation and Protection	48	18	30
3636	Project Preparation	24	18	6
3637	Marketing and Sales	24	18	6
3638	Plant Identification and Management	42	30	12
3639	Environmental Practices	48	48	0
3640	Hardscape Structures Installation and Maintenance	48	12	36
3641	Plant Health Care –Pest, Diseases & Invasive Species management	30	24	6
3642	Interior Landscape Installation and Maintenance	24	18	6
3643	Green Infrastructure Installation and Maintenance	48	42	6
3644	Mentoring and Training Techniques	24	18	6
	Total	**360**	**246**	**114**

Safety, plant care principles, communication, grading and drainage in pre-construction activities are concepts that are reinforced throughout the curriculum.

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Number:	3625		
Title:	**Trade Practices -Safety, Tools and Equipment**		
Duration:	Hours Total: 48	Theory: 36 Hours	Practical: 12 Hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject the apprentice is able to describe jurisdictional regulations relevant to the trade, safe work practices for responding to on-site conditions, hazards, and emergencies and the operation and maintenance of safety equipment; maintain safety records, driving logs and work records and use and maintain hand tools, power tools and vehicles/motorized equipment, trailers and attachments used in the landscape and horticultural trade.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3625.01 Describe jurisdictional regulations, agencies and associations with application to workplace practices for the Horticultural Technician trade.

- Identify relevant regulations, agencies and associations such as:
  - Ontario Health and Safety Act
    - Explain regulations regarding an employee's rights and responsibilities to complete work safely
      - Right to know
      - Right to participate
      - Right to refuse
  - Workplace Hazardous Materials Information System
  - Construction Safety Act
  - Ministry of Labour Training and Skills Development
  - Ministry of the Environment, Conservation and Parks
  - Workplace Safety and Insurance Board
  - Technical Safety Standards Association
  - Ontario Regional Common Ground Alliance
  - Transportation of Dangerous Goods (TDG)
  - The Canadian Nursery Landscape Association (CNLA)
  - Landscape Ontario (LO)
- Describe sections of the Highway Traffic Act, relating to circle checks, maintenance and trip logs, dimension and weight limits, traffic plans
- Identify regulations within the Pesticides Act, R.S.O. 1990, c. P.11 such as:
  - prohibitions of pesticides for cosmetic use,
  - license requirements,
  - exempted uses
  - handling, storage, display or disposal of pesticides
  - regulating the sale, offering for sale or transfer of pesticides

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- Identify municipal by-laws related to conservation, site alteration and building codes
- Identify Migratory Birds Convention Act, 1994
- Identify Endangered Species Act, 2007
- Identify Fish and Wildlife Conservation Act, 1997

3625.02 Describe methods to maintain a safe work environment.

- Identify workplace hazards, risks and prevention measures
- Identify the process to determine locates and best practices for compliance
- Describe procedures for inspecting, adjusting, maintaining and wearing personal protective equipment (PPE) (*Appendix A*)
  - Identify types of PPE as appropriate to the task
  - Identify types and application of respiratory protection
  - Explain the procedure to inspect PPE prior to use i.e. check for expiration dates, damage and need for replacement of components
  - Describe the procedure to store PPE to maintain integrity
- Describe the process for lifting and carrying tools, equipment and materials, in a safe manner
- Describe the impact of weather extremes on workplace safety and performance
  - Identify workplace policies
  - Identify attire for weather extremes
    - precipitation, wind, lightning, sun, ultraviolet rays
    - temperature – heat alerts
    - air quality index (smog)
    - flooding
    - snow and ice
- Describe pedestrian and vehicular job site traffic control measures required by the Highway Traffic Act
  - Identify the use of traffic control devices and signs
  - State how to delineate and mark pedestrian access to site
- Describe safety measures employed when working around operating equipment
  - Determine safety lanes around equipment
  - Demonstrate the use of universal hand signals
  - Describe the use of other safety methods such as:
    - warning signals/alarms
    - signs etc. to create a visible presence
  - Identify safe distances/clearances
  - Describe lock out/tag out procedures

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3625.03 Describe protocols for handling emergency situations.

- Identify protocols for handling emergency situations including:
  - Assessing the situation
    - Preserving and protecting safety of self and others
    - securing site
  - Making calls as required for the situation
    - 911 poison control centres
    - MOE / Spill Response
  - Applying first aid (A-airway, Breathing, C- Circulation)

3625.04 Describe the operation and maintenance of safety equipment.

- Identify types of safety equipment including, ventilation fans, spill kits, fire extinguishers, barriers, signage, first-aid kit and communication devices
- Describe the procedures for the use and maintenance of safety equipment
- Identify legislation governing the handling and operation of safety equipment
- Explain inspection and maintenance procedures for safety equipment

3625.05 Describe the applications, maintenance and operation of hand tools.

- Describe safe work practices for hand tool use
- Identify types of hand tools, applications
- Describe manufacturers specification requirements
- Describe the procedures used to inspect, maintain, sharpen and store hand tools
- Describe the procedure to clean and disinfect hand tools
- Describe the impact of hand tool selection and use on the environment

3625.06 Describe the applications, maintenance and operation of power tools.

- Describe safe work practices for power tools and equipment use
  - Identify hazards and prevention measures when working with power tools
  - Identify measures to maintain a safe work site
- Describe manufacturers specification requirements
- Describe the applications and limitations of power tools
- Describe the implications of power tool selection and use on the environment
- Describe the daily and seasonal operating procedures used to inspect, maintain, sharpen, clean, and store power tools
- Describe the procedure to clean and disinfect power tools

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3625.07 Describe the application, operation and maintenance of vehicles/motorized equipment, trailers and attachments used in the landscape and horticultural trade.

- Identify type and application of vehicles, motorized equipment, attachments and trailers
- Identify the features and operation of vehicles, motorized equipment, attachments and trailers
- Describe the basic function and operation of engine systems
- Describe safe work practices pertaining to vehicles, motorized equipment, attachments and trailers
  - Identify jurisdictional regulations pertaining to the operation of vehicles, motorized equipment, attachments and trailers
  - Identify type of license required to operate vehicles, motorized equipment, attachments and trailers
  - Describe the procedure to mount and dismount equipment safely
- Identify the daily and seasonal operating procedures used to inspect, clean and maintain and store engines, vehicles, motorized equipment, attachments and trailers
- Describe the impact that the selection and use of vehicles, motorized equipment, attachments and trailers has on the environment

3625.08 Describe procedures to maintain safety records, driving logs and work records.

- Identify types of safety records, driving logs and work records
- Explain the importance of accurate record-keeping
- Describe the procedures used to complete and maintain safety records, driving logs and work records

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3626		
Title:	**Work and Project Organization**		
Duration:	Hours Total: 24	Theory: 24 Hours	Practical: 0 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject the apprentice is able to describe the use of trade-related documentation and reference material and identify processes to conduct site assessments and procedures for receiving, organizing, storing, transporting plants, materials, tools and equipment.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3626.01 Describe types of trade related documentation and reference material.

- Identify types and purpose of trade related documentation such as: contracts, work orders, tenders, quotation documents, plans and specifications.
  - Identify contract details such as:
    - scope of work
    - agreement of parties
    - details and pricing
    - requirements- components and tasks
    - safety compliance requirements
  - Identify features of work orders such as:
    - site access/site protection
    - scope of work and sequence
    - materials
    - equipment
    - personnel
  - Identify plan features such as:
    - title blocks
    - standard symbols
    - existing versus proposed elements
    - site access
    - work/site limits
    - drawing scale
    - cardinal direction
    - plant key/list
    - contact personnel

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- Identify specification details such as:
  - general conditions
  - supplementary general conditions
  - planting details/specifications
  - construction details/specifications

3626.02 Identify the process to conduct site assessments.

- State what is visually inspected and verified from plan and drawings
  - locates
  - site restrictions
  - access points, traffic flow and patterns
  - landscape site soils and storage areas
  - soil quality
  - site features requiring preservation and protection
  - existing and proposed grading and drainage patterns based on plan
  - security requirements
  - irrigation lines
  - hazards

3626.03 Describe the procedures for receiving, organizing and storing materials, plants and equipment.

- Define terminology associated with ordering, receiving, verifying, organizing and storing materials, plants and equipment
- Identify the industry standards relevant to ordering plants and materials such as the Canadian Nursery Stock Standard (CNSS) and Canadian Landscape Standard (CLS)
- Describe procedures for ordering, receiving, verifying, organizing and storing materials, plants and equipment
- Interpret documentation relevant to receiving, organizing and storing materials, plants, tools and equipment
- Explain the process for verification and acceptance of plants and material (soil, mulch and hardscape) shipments on-site

  Verify:
  - plan and specification requirements
  - shipping documents
  - plant accuracy- quantity, variety, quality and size
  - materials- quantity, volume, colour, size

  - Describe procedures for unloading to ensure plant protection
  - Identify requirements to store and protect plants, materials and equipment prior to use
- Identify hazards and safe work practices pertaining to receiving, organizing and storing materials, plants and equipment

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3626.04 Explain the procedures for transporting materials, tools and equipment.

- Define terminology associated with transporting materials, tools and equipment
- Identify requirements within jurisdictional regulations for transporting materials, tools and equipment
- Describe safe work practices pertaining to transporting materials, tools and equipment
  - Identify hazards, risks and mitigation measures
- Interpret documentation relevant to load weights and transporting materials, tools and equipment
- Describe procedures for loading and securing plants, materials and equipment for shipping including:
  - Select method of transportation based on requirements
  - Verify shipping order and paper work
    - plant accuracy verification prior to shipping
      - quantity
      - variety
      - quality
      - size
  - Determining requirements for the protection of plants and root zones
  - Loading and securing plants
  - Desiccation protection/prevention
- Describe the procedure to load and unload materials and equipment.
  - Identify requirements for loading, securing and unloading materials as stated in jurisdictional regulations and company policies
  - Describe the process for the selection of vehicle/trailer type
    - equipment and attachments
    - weight restrictions
    - licensing requirements
  - Describe the procedure to load materials and equipment
    - flags and signs
    - ramps
    - traffic cones
    - blocks
    - traffic plans

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- Describe the procedures to secure loads including:
  - approved tie-down procedures
  - procedures to prevent shifting hazards

- Describe the procedure to unload material and equipment
  - location
  - site protection
  - proximity to work area
  - surface stability
  - vehicle/trailer stabilization
  - traffic cones
  - blocks
  - traffic plan

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies such as lectures, presentations, demonstrations and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Number:	3627		
Title:	**Communication Skills**		
Duration:	Hours Total: 24	Theory: 18 Hours	Practical: 6 hours
Prerequisites	N A		

General Learning Outcome

On successful completion of this reportable subject the apprentice is able to demonstrate effective communication practices including, listening, speaking, reading and writing required to function effectively as part of a crew/team in the workplace.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3627.01 Demonstrate verbal and non-verbal communication skills.

- Describe the importance of using effective communication with co-workers, clients, suppliers, office staff, clients
- Describe different methods of communication
  - verbal
  - non-verbal
  - written
- Define the qualities of effective verbal communication
  - clear enunciation
  - choosing precise words
  - coherence
  - appropriate language and etiquette
- Describe the impact of non-verbal communication and interpersonal relations
  - Define non-verbal communication skills
    - facial expression
    - body language
    - tone of voice
    - gestures
    - physical distance when communicating

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- Identify barriers to communication
    - use of jargon or technical terms
    - lack of attention, distractions, or irrelevance to the receiver.
    - differences in perception, viewpoint and preconceived notions
    - physical disabilities such as hearing problems or speech-related difficulties.
    - physical barriers to non-verbal communication; not being able to see the non-verbal cues (during phone calls, text messages, email) versus face-to-face communication
    - emotional barriers and sensitivities (politics, religion, disabilities, sexuality and gender, racism etc.)
    - language differences and the difficulty in understanding
    - differences
        - unfamiliar accents. Accents
        - colloquialisms
    - expectations and prejudices which may lead to false assumptions or stereotyping

3627.02 Demonstrate effective listening skills.

- Perform active listening techniques such as mirroring/repeating back and note taking
    - clarify understanding by asking questions, repeating main idea/components, expressing concerns or stating the course of action
- Demonstrate in-person and telephone etiquette

3627.03 Describe conflict management techniques.

- Define conflict and sources of conflict
- Identify styles for managing conflict
- Identify conflict management techniques, including de-escalation

3627.04 Describe the process for problem-solving.

- define problem/identify main issue/challenge
- question/ask for additional input
- research/data collection
- generate and evaluate alternative solutions
- recommend course of action

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3627.05 Identify personal responsibilities and attitudes that contribute to on-the-job success.

- Describe the importance of work ethic and ethical behaviour
  - comply with company policies i.e. human resource policies and standards of behaviour
  - meet society's expectations of ethics
  - accept responsibility for one's actions/for personal decisions and choices
- Describe communication that constitutes harassment
- Describe how to present as a professional (e.g. driving, clothing**,** music, helpfulness)

▪ Requirements and respect for:

  - physical appearance/presentation/hygiene
  - Communication and conduct
    - verbal, written, body language (best practices and considerations)
    - Social media profiles
    - Privacy

- Identify the link between time management, productivity and accountability
- Describe the importance of showing respect, workmanship, pride in work

▪ Describe the value of working with others (colleagues, other trades)

3627.06 Demonstrate effective writing skills.

- Define trade-specfic terms
- Demonstrate
  - grammar skills with consideration to:
    - sentence structure
    - punctuation
    - legibility
  - clear and concise content on job records and time records

Prepararation of typical forms:

- time-sheets
- daily logs
- accident/incident reports
- requisitions
- letters, emails and memos.
- employer reports and record-keeping

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3627.07 Demonstrate use of electronic communication/research methods.

- email
- internet search engines
- social media, and discussion platforms
- two-way radios
- cell phones

- Describe protocol and etiquette when using electronic communication tools
- Explain ethical use of technology (internet, cell phones, social media)
- Identify data collection/research techniques

3627.08 Demonstrate use of computer software applications such as:

- Office applications
- Word processing
- Spreadsheets
- Cloud based applications
- PDF (fillable forms)

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3628		
Title:	**Horticultural Principles-Plant Science**		
Duration:	Hours Total: 60	Theory: 48 Hours	Practical: 12 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject the apprentice is able to describe plant morphology and characteristics, environmental factors and soil characteristics that affect plant growth and development; identify 80 ornamental landscape plants common to Ontario using the required nomenclature (**Refer to Appendix D -Ontario Horticultural Technician Plant List**), the cultural requirements and pests and diseases as they relate to each plant; describe procedures to prune landscape plants and demonstrate sexual and asexual plant propagation methods.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3628.01 Describe the basic principles of plant science.

- Define terminology associated with plant science
- Identify plant characteristics
- Identify plant anatomy and differences in morphology
- Explain the biological processes of a plant
- Identify plant categories
- Define characteristics of plant growth
- Identify plant growth patterns
    - annuals
    - biennials
    - perennials
    - herbaceous perennials
    - woody perennials

3628.02 Describe the external anatomy and morphology of woody and herbaceous plants including the following:

- Monoecious vs. dioecious plants
- Root and stems, storage tissue
- Leaf arrangement/shapes, leaf tips, margins, surfaces and venation
- Flower types, structure and symmetry, complete and incomplete flowers
- Fruit types, including fleshy, dry, dehiscent and indehiscent

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3628.03 Describe seed characteristics, development and germination.

- Identify parts of a seed, basic and special germination requirements, monocot vs dicot, angiosperm vs gymnosperm, dormancy and viability and environmental stressors.

3628.04 Describe factors and conditions which impact plant growth and development.

- Identify nutrient/pH requirements
- Identify effects of deficiencies and excesses of nutrient/pH on plants and plant growth
- Identify effects pests and diseases have on plant growth and development
- Identify environmental factors that impact plant growth such as:
    - air quality
    - ozone
    - pollutants
    - light
    - humidity
    - wind
    - temperature
    - moisture
    - reflective heat load
    - microclimates
    - available space
    - plant hardiness
    - topography
    - growing medium /soil type/quality
    - soil growing media and compaction
    - soil depth

3628.05 Identify basic practices that affect plant health.

- Plant selection and nursery stock quality-Canadian Nursery Stock Standard (CNSS)
- Maintenance and installation practices
    - cultural practices/ human activities - past and present
    - poor planting practices - planting too low/high
    - girdling ropes and ties, girdling roots

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3628.06 Define terminology to describe plant stress.

Abiotic
- nutrient deficiencies
- environmental conditions

Biotic
- Diseases
- Pests

- Identify signs and symptoms of health and evidence of stress

3628.07 Describe soil characteristics (physical, chemical and biological) that impact plant health.

- Define soil characteristics (physical, chemical and biological)
- Describe the soil triangle and variations in bulk density
- Define pH levels and types of soil nutrients- nitrogen (N), phosphorus (P) and potassium (K)
- Describe the significance of biome to soil health
  - Identify soil types, components and functions of soil biota
  - Identify soil components and their role in soil quality
    - bacteria
    - fungi
    - protozoa
    - nematodes
    - arthropods
    - earthworms
    - plants
- Describe soil and soil-less media quality for plant-growing purposes
  - Identify purpose and methods for testing soil and soil-less media
  - Describe steps to improve soil and soil-less media composition and structure for optimal plant health

3628.08 Identify methods for improving soil nutrients/element deficiencies.

- Explain the role of organic matter in soil
  - composition
  - chemical and physical behaviour
  - carbon cycle

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- Identify methods for promoting beneficial soil organisms
  - Addition of organic matter
  - Addition of soil amendments
  - Addition of micro/macro-nutrients
    - Amendment formulations and types (liquid, granular, slow release)
  - Application / incorporation practices and requirements (broadcast, systemic and deep root methods)
    - environmental conditions
    - availability of recyclable nutrients (compost, water, green manures, turf clippings)
- Identify factors to consider for applying soil amendments
  - Interpret test results
  - Plant cultural requirements
  - Site limitations, conditions and uses
  - Soil structure, texture and analysis

3628.09 Identify 72 ornamental landscape plants and 8 invasive plants on the ***Ontario Horticultural Technician Plant List -****Refer to Appendix D* the required nomenclature and state the cultural requirements and pests and diseases as they relate to each plant.

- Classify different plant groups.
  - deciduous/ conifers/ evergreens/ broad-leafed evergreens
  - woody trees, shrubs
  - climbing plants, vines
  - perennials, annuals and bulbs
  - native/non-native
- Identify 72 ornamental landscape plants commonly used in Ontario and 8 invasive species, using the International System of Plant Nomenclature.
  - family
  - genus
  - species (specific epithet)
  - forma/variety/subspecies and cultivar
  - common names
- Describe the key identification characteristics of the 72 ornamental landscape plants and 8 invasive species.
  - leaves/needles
  - flowers/fruits/seeds
  - buds
  - bark
  - growth habit /form

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- Identify cultural requirements of the 72 ornamental landscape plants
    - moisture
    - light
    - type
    - hardiness (climatic zones)
    - pH/ nutrient requirements
    - pruning/dead heading
    - cultivation
    - common pests
- State the potential landscape uses for the 72 ornamental landscape plants identified.

3628.10 Describe the procedures to prune landscape plants.

- Define terminology associated with pruning
- Identify hazards and describe safe work practices pertaining to pruning
    - locate over ground utilities
- Describe the purpose of pruning
    - plant health and vigor
        - dead, disease, damage and interfering (DDDI)
        - enhancing fruit and flower production
        - rejuvenation
    - aesthetics /plant appearance/size/scale
    - structure
    - prevention of winter damage
- Identify factors that affect the timing of pruning shrubs, vine and groundcover based on growth and flowering habits
    - flowering
    - growth response
    - dormant season
    - non-dormant pruning
    - wind, frost damage
    - site activities
- Identify types of pruning including: shearing, heading, thinning, cleaning, canopy raising, crown balancing, reducing, restoring, hedging, removal
- Identify pruning tools and accessories
- State the requirements for cleaning and sanitizing tools

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3628.11 Demonstrate sexual and asexual plant propagation methods.

- Identify principles and methods of plant propagation
  - Define terminology associated with plant propagation
  - Identify reasons for propagation using asexual methods
  - Identify types of asexual propagation methods including: division, grafting, budding, seeding, layering, stem cuttings, root cuttings and tissue culture
  - Identify methods and reasons for asexual propagation based on:
    - plant type
    - season
    - tools and equipment
    - purpose of propagation
    - labelling and record-keeping
  - Identify Plant Growth Regulators (PGR) and their role in propagating stem and leaf cuttings
  - Identify storage organs that require harvesting and division
  - Identify methods and reasons for sexual propagation
    - reasons for propagation using seed
    - seed collection, extraction and storage
    - seed preparation
    - after ripening and stratification treatments
    - pre-germination treatments, scarification, imbibitions
    - media selection or soil preparation for seeding
    - environmental conditions for successful germination
    - seed sowing techniques
  - State the requirements for cleaning and sanitizing hand tools
  - Identify environmental conditions for successful propagation
  - Identify hazards and safe work practices relating to plant propagation
- Propagate plants by asexual methods including; budding and grafting, layering, divisions and offsets, root, stem and leaf cuttings, use of specialized vegetative parts such as bulbs, tubers, rhizomes and corms.
- Propagate plants by sexual methods considering:
  - pre-germination treatments, including stratification and scarification
  - media selection or soil preparation for seeding
  - environmental conditions for successful germination
  - seed sowing techniques

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Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3629		
Title:	**Environmental Principles: Soil-Water Environmental Stewardship**		
Duration:	Hours Total: 36	Theory: 30 Hours	Practical: 6 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe the principles of environmental stewardship as it relates to soil and water.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3629.01 Describe principles of environmental stewardship principles related to soil and water.

- Define 'ecosystems'
  - Describe the function, purpose, benefits and structure of natural ecosystems
- Describe the impact of the environment and landscape on psychosocial health
- Identify conservation and restoration principles related to plant life, habitat, water (quantity and quality)
  - Identify purpose and function of environmental stewardship practices
    - prevention of soil compaction
    - erosion and silt control
    - habitat and ecosystem preservation/restoration
    - interrelationships (plants, fungi, animals)
    - soil restoration and enhancement

3629.02 Describe factors and characteristics of soils.

- Identify characteristics of native soils
    - biotic factors (living organisms and benefits)
    - define soil profile horizons
    - topography
- Identify characteristics of manufactured soils
- Define soil quality and impacts on:
    - environment
    - human
    - plant productivity

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- Explain the physical properties of soil and soilless media
  - texture
  - structure
    - density/ soil compaction
    - soil water-holding capacity
  - porosity
  - chemistry
  - colour

- Explain the factors that impact physical properties of soil
  - pH
  - cultivation
  - cation exchange capacity
  - organic material /compost
  - soil organisms
  - nutrients
  - air and water

- Describe the soil and water relationship
  - Identify hydraulic conductivity of soil
    - percolation
    - permeability
    - pore space
    - gravity
    - water retention

3629.03 Describe environmental soil management practices.

- Define the concept of soil management
- Describe the benefits of preserving soil health
  - economic
  - environmental
    - erosion control
    - pollution
    - carbon sequestration
  - plant health
- Identify jurisdictional regulations relating to soil stewardship
- Identify site protection and soil preservation techniques to minimize environmental impact
  - erosion control measures
  - existing species/specimen protection
  - cut and fill
  - tillage practices
  - organic matter recycling
  - drainage and infiltration
  - topography/grades

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3629.04 Describe the impact of water management on the practice of environmental stewardship.

- Identify jurisdictional regulations related to water stewardship
- Describe elements of water stewardship
  - protection of endangered species in waterways
  - prevention of invasive species in waterways
  - lot level storm water management
  - water conservation/recycling
  - source quality and recovery rates
  - rainwater harvesting
  - pollution prevention
  - infiltration promotion
  - riparian maintenance and restoration
  - species selection

- Identify low impact development (LID) elements and methods that promote water stewardship

  - downspout disconnection
  - rain barrels
  - infiltration trenches
  - bioswales
  - rainwater gardens
  - green roofs
  - bio-retention gardens
  - storm water pond
  - permeable paving
  - efficient irrigation systems
  - erosion control
  - responsible chemical, fertilizer and salt use

  - Identify the benefits of preserving urban forest tree canopy to maintain leaf surface, improve air quality and promote water infiltration

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies including, lectures, presentations, demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “method of work” which includes application of theory.

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Number:	3630		
Title:	**Pre-Construction Activities**		
Duration:	Hours Total: 30	Theory: 24 Hours	Practical: 6 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to interpret information from landscape drawings and documentation related to site preparation and identify the requirements for preparing construction sites including performing calculations used in the horticulture industry and use of standard measuring devices.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3630.01 Perform linear, area and volume calculations in both imperial and metric systems of measurement.

- Demonstrate calculator usage, including exponential notation, and percentage calculations
  - ratios
  - linear measurement
  - formulas
  - slope
  - Pythagorean Theorem
    - 3-4-5 triangle
  - area measurement
  - volume measurement
- Perform calculations and conversions using metric and Imperial systems of measurement

3630.02 Demonstrate the application, operations and maintenance of measuring equipment.

- Identify types of measuring tools
  - tape measures and measuring wheels
  - rulers and scales
  - surveyor’s chains
  - surveyor’s level
  - surveyor’s rod
  - Zip Level
  - Laser level

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- Describe their applications and procedures for use
- Describe safe work practices pertaining to using measuring equipment on sites
  - Identify hazards pertaining to measuring equipment
- Describe the procedures used to inspect, clean, maintain and store measuring equipment

3630.03 Identify landscape information on plans, details and specifications.

- scale
- cardinal direction
- construction feature benchmark(s)
- abbreviations
- utility locations
- obstacles and hazards
- traffic flow patterns for duration of project
- existing feature protection and preservation requirements
  - stockpiling and storage locations
- planting plans
  - individual/mass plant locations
- grading plans
  - grading control stakes
- construction plans
  - construction details

3630.04 Describe the procedures to perform site measurements.

- Define terminology associated with site measuring
- Identify hazards and safe work practices pertaining to measuring sites
- Describe methods to establish site/project stake out points
  - grid system
  - triangulation
  - distance and vector

3630.05 Describe the procedures for site grading.

- Identify the purpose for determining ground elevations and slopes
  - Define terminology associated with site grading such as: benchmarks, rough grading, grading for drainage, finish grading
  - Identify hazards and safe work practices pertaining to grading
  - Interpret codes and regulations pertaining to grading (site alteration by-laws etc.)

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- Interpret documentation pertaining to drainage plans
  - site function
  - specifications
  - grading plans
    - existing grades
    - proposed grades (finished)
    - contour/topographical plans
  - verification
- Perform calculations required to determine slope with consideration to elevation, slope and cut and fill

- Describe the applications and operations of specific tools and equipment relating to grading
  - shovels
  - grading rakes
  - excavators
  - loaders
  - skid-steers
  - tractors and attachments

- Describe the procedure to strip and stockpile topsoil based on plans, specifications, the CLS and jurisdictional regulations

3630.06 Describe the environmental impact of grading on site soils and hydrology.

3630.07 Describe the installation of drainage system.

- Identify the relevant jurisdictional regulations requirements and environmental stewardship practices
- Identify and use tools and equipment required to install drainage systems
- Identify the benefits of effective drainage- including plant health and soil micro and macro organisms
- Describe the considerations for selecting drainage systems
  - soil texture and structure
  - site/lot level topography
  - hydrological cycle
  - urban run off
  - overland flow
  - sub-surface flow
  - effects of over-drained soils
  - lot level and community wide drainage issues

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- Describe types and functions of drainage systems and their components
  - Identify surface drainage systems
  - Identify subsurface drainage systems

3630.08 Describe the procedures for planning and preparing a construction site.

- Identify jurisdictional regulations and guidelines within the CLS related to planning and preparing a construction site
- Interpret and extract information from landscape drawings and documentation
  - Plans
    - grading plans,
    - planting plans
    - hardscape plans
  - Details
  - Existing site conditions and features
  - Discrepancies

3630.09 Describe the considerations for site preparation.

- lay out the site
- identify existing conditions
- utilities
- identify existing site elements requiring protection /sensitive areas
- soil
- plant material
- hardscape features
- hazards
- debris
- invasive species
- site access
- traffic flow

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3631		
Title:	**Hardscape Installation and Maintenance**		
Duration:	Hours Total: 48	Theory: 12 Hours	Practical: 36 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to demonstrate the installation and maintenance of landscape paving, steps and retaining walls (natural and precast materials) according to jurisdictional codes and regulations.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3631.01 Describe the requirements of legislation and regulations including federal, provincial and municipal legal requirements, CLS and industry standards such as the Interlocking Concrete Pavement Institute (ICPI).

- Interpret codes, regulations and manufacturers' specifications pertaining to installing surface materials (walkway, patio, driveway and parking lot materials) and steps and retaining walls

3631.02 Demonstrate the procedures for installing walkway, patio, driveway and parking lot materials using the correct tools, equipment and materials.

- Identify the requirements in the CLS and industry standards such as the ICPI
- Identify risks, hazards and safety practices pertaining to the installation of surface materials
- Use PPE required for the installation of surface materials
- Describe the application of tools and equipment required for preparing and installing the base and surface materials
- Identify types and properties of surface materials
    - stones
    - concrete products
    - aggregates
    - permeable pavement
    - synthetic materials (artificial turf)
    - paving stones
- Identify base and bedding materials used with a variety of surface materials base on location/site and use requirements

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- Demonstrate the preparation procedures for installing surface materials
  - Identify the steps to prepare the site
    - Layout
    - Excavation
      - removal of excavated materials
      - storage of excavated materials
    - Base material installation
      - subgrade compaction
      - installation in lifts

- Demonstrate the procedure to install walkway, patio, driveway and parking lot surface materials such as geotextiles, pavers, edge restraints and joint materials

- Demonstrate sub-grade and base preparation for installation of landscape surface materials/ paving, step and wall installation, based on plan and specifications
  - Use of PPE
  - Operation of equipment
  - Excavation
    - topsoil conservation
    - subsoil
    - shoring for safety and temporary retention
  - Compaction of sub-grade
  - Installation of drainage
    - pipes/tiles
    - stone, i.e. clear stone etc.
  - Placement of base material
    - aggregate identification and use
    - concrete base
  - Use base material compaction method
    - equipment
    - monitoring

- Demonstrate installation of landscape paving, step and walls

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3631.03 Demonstrate the procedures for maintaining steps and retaining walls, walkway, patio, driveway and parking lot materials based on manufacturers' specifications.

- Identify risks, hazards and safe work practices pertaining to the maintenance of surface materials
- Use PPE required for the maintenance of surface materials
- Identify the tools and equipment required for maintaining surface materials
- Inspect and report defects, failures and repairs
- Maintain tools and equipment
    - Identify requirement within manufacturers' specifications
    - inspection and report
    - cleaning
    - lubricating
- Demonstrate the procedure to maintain pavers, wall stone, drainage systems, edge restraints, and joint materials
- Identify the steps to clean up site, repair damaged surfaces and materials and dispose of waste material
- Identify types and properties of surface materials to determine maintenance requirements
    - stones
    - concrete
    - aggregates
    - permeable pavement
    - synthetic materials (artificial turf)
    - paving stones etc.

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Number:	3632		
Title:	**Softscape Installation and Maintenance - Turf**		
Duration:	Hours Total: 30	Theory: 24 Hours	Practical: 6 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe the procedures to install sod and turf from seed and maintain grass/turf grass including monitoring turf grass quality, mowing, applying amendments and identifying and correcting grass/turfgrass problems according to industry standards and jurisdictional requirements.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3632.01 Describe benefits of healthy turf grass.

- carbon sequestration
- oxygen production
- soil erosion
- pollution abatement (noise/dust)
- climate cooling
- aesthetic value and versatility
- safety for sports fields

3632.02 Identify common turfgrass species, blends and their characteristics.

- Define the physiology of turf grass plants
- Identify common turfgrass species and blends and growth habits such as:
  - Perennial ryegrass
  - Annual ryegrass
  - Annual bluegrass
  - Kentucky bluegrass
  - Fine fescues
  - Creeping bentgrass
  - Colonial bentgrass
  - Tall fescue
- Identify seed quality based on:
  - the national turfgrass evaluation program
  - certified and common seed
  - seed germination percentages
  - seed purity

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- Describe the relationship between turfgrass and water use
    - Identify water requirements for different types of turfgrass species
    - Identify turfgrass species with drought-resistance characteristics

- Describe the factors for selecting species based on turf function -rececreational, sports, aesthetic, environmental
    - use/application
    - site conditions
    - growth characteristics
    - environmental tolerances
    - traffic tolerance and recuperative ability
    - colour

3632.03 Describe procedures to install turf from seed.

- Identify the considerations when selecting turf seed types
    - common turf grass species
    - growth habits
    - shade/sun
    - water requirements
    - use/application based on environment
    - environmental tolerances- pollution, salt, excessive moisture, heat/drought
    - hardiness
    - pest and disease resistance
    - maintenance requirements

- Perform calculations required for determining seed quantities
    - verify seed variety on product label
    - determine area and application rate
    - identify calibration requirements

- Calculate fertiilzer requirements
    - verify fertilizer on product label
    - determine area and application rate
    - identify equipment requirements
    - calibration of drop and/or rotary spreaders

- Identify requirements for selecting and using tools and equipment to install seed

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- Describe process of seed distribution and application

    - Identify factors that affect uniform and targeted application of seed
        - Product characteristics
            - coated vs non-coated seed
        - Application method (hydroseeding, terraseeding)
        - weather conditions
            - wind
            - temperature
            - precipitation
        - organic matter application
        - moisture retention
        - erosion control
        - animals

- Describe procedures for preparing a seedbed and installing seed.

    - Identify standards and specifications related to prpearing and installing seed
        - utility locates
        - debris removal
        - verify grades and soil depth
        - low-depth till
        - rough grade
        - addition of amendments
            - lime
            - organic matter
            - nutrients
            - mycorrhizae
        - scarify
        - apply seed
        - final grade
        - roll
        - irrigate

- Describe methods used for post-seeding care including:
        - irrigation
        - weeding
        - touch-up application
        - monitoring for establishment

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3632.04 Describe the procedure to install sod.

- Identify industry standards and specifications related to installing sod
- Identify considerations when selecting sod types
  Functions
    - recreational
    - aesthetic
    - sports
    - environmental
- Describe procedures for preparing the area to be sodded
    - locate utilities
    - removal of debris
    - grade area to be sodded
    - determine soil depth and compaction
    - add amendments
        - lime
        - organic matter
        - mycorrhizae
        - fertilizers
    - irrigate
    - scarify
- Describe the procedures for laying sod
    - Identify sod requirements based on drawings and specifications
    - Perform calculations required for determining sod quantities
    - Verify sod variety and quality corresponds with standards and contract requirements
    - Lay sod based on:
        - site topography, use and features
        - orientation to minimize cuts and maximize establishment
- Identify the methods used post-installation to verify establishment of sod.
  Identification of:
    - root attachment
    - plant health
    - deficiencies

  evidence of:
    - poor irrigation
    - pest infestation
    - nutrient deficiency
- Describe procedures to dispose of or recycle excess materials
    - Identify jurisdictional regulations and industry standards related to the disposal of or recycling of excess materials

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3632.05 Describe procedures to maintain turfgrass.

- Identify mowing requirements
  - species
  - low maintenance vs. formal
  - site conditions (irrigated vs. non-irrigated)
  - determine quality/height of cut to maximize plant performance and weed reduction
  - site size and intricacy
  - alternating mowing pattern
  - prevent compaction

- Identify methods for maintaining turfgrass such as mowing, fertilizing, irrigating, aerating, top dressing, over-seeding, edging/trimming

- State requirements to prepare site
  - inspect site
  - identify hazards
  - remove debris
  - locate portable obstacles (patio furniture, tee blocks)

- Describe procedures to mow and trim turfgrass including edge/line trimming
  - select and inspect equipment
    - Site conditions and slope
    - blade sharpness
    - mowing height
  - move portable obstacles/site features
  - remove excessive clippings/mulching when required
  - conduct final inspection to determine finished appearance
    - uniformity
    - pattern

- Describe site clean-up procedures

  - State jurisdictional requirements regarding compostable/recyclable and disposal and transportation of materials
    - clear mowing debris from pathways, driveways and gardens etc.
    - replace portable obstacles/site features

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3632.06 Describe procedures for maintaining turf health.

- Create a maintenance plan for turf
  - Conduct a visual inspection to identify turf species and condition (colour, uniformity and density)
  - Identify deficiencies and stressors
  - Identify existing and potential causes of plant injury turf/problem
    - Determine the causal agent(s) (insect, disease, cultural, mechanical)
  - Develop action plan to address issues
  - Develop a schedule to monitor turf health
  - Identify the fertilizer/ amendment products and selection criteria
    - types of amendments
    - fertilizers
      - micro and macro nutrients
    - natural organic sources
    - weather conditions
    - customer expectations
- Identify the tools, equipment, PPE and process for adding amendments
- Identify follow-up procedures - equipment cleaning and lubricating requirements
- Describe the procedures for storing and disposal of materials
  - Identity jurisdictional requirements and industry standards

3632.07 Describe procedures to identify and correct turfgrass issues

- Describe safe work practices and identify hazards pertaining to turfgrass maintenance products, equipment and their uses
- Interpret codes and regulations pertaining to turfgrass maintenance products
- Inspect area to assess turf, site and growing media conditions to determine turfgrass issues
  - compaction
  - thatch build-up
  - poor drainage
  - winter kill
  - pests and diseases
  - exposure
  - nutrients

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- Describe methods to determine thresholds/tolerance level per species and situation
  - Identify practices to monitor pest populations
    - focus on early/timely identification of pests and diseases
  - Identify requirements for reporting and recording pest problems
    - dates of application
    - treatment type and method
    - plant species/variety
    - weather conditions
  - Describe the elements of a pest control management action plan
    - identify suitable control method(s)

3632.08 Describe turf grass irrigation procedures and water stewardship practices.

- species plants identification
- site considerations i.e. wind and use
- equipment selection and calibration
- rate and time of application
- manual/ automatic applications
- drainage
- topography
- water optimization and irrigation scheduling
  - time/ rate/duration of application
- consideration of requirements based on stage of growth and root system development
- soil/water relationship including wetting agents
- environmental and site conditions such as slope/exposure

3632.09 Describe irrigation system auditing and scheduling procedures.

- Auditing
  - test system performance (pressure, consumption, coverage)
  - verify schedule and adjust as required
  - monitor turf health
  - check system components for leaks, breaks or deficiencies
  - adjust, repair or replace components as required
- Scheduling for water optimization based on
  - jurisdictional regulations
  - species and climate
  - effects on plant health
  - technology (controllers and programs)

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Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through on-going assessment: tests, assignments, demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3633		
Title:	**Softscape Installation and Maintenance**		
Duration:	Hours Total: 48	Theory: 36 Hours	Practical: 12 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe the procedures to install and maintain exterior softscape- plants (woody, herbaceous and annual plants) and materials (growing media and mulch) and demonstrate pruning techniques for young and established shrubs, groundcovers and vines based on the Canadian Landscape Standard (CLS) and jurisdictional regulations.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3633.01 Describe the procedure for installing landscape plants.

- Define terminology associated with exterior softscape
- Identify hazards and describe safe work practices pertaining to exterior softscape
- Interpret codes and regulations pertaining to exterior softscape
- Identify the hand tools and equipment required to install exterior landscape plants
- Describe how to prepare plant materials
  - Identify stock types and container types
    - bare root
    - container
    - balled and burlapped
    - wire basket
- Identify requirements for monitoring and maintaining plant health
    - desiccation
    - storage
- Describe the considerations before laying out plant materials
  - Placement and spacing
  - Drawings and specifications
  - Suitability for conditions based on:
    - sun and wind exposure
    - proximity to building
    - water availability and requirements

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- Identify considerations for staking and guying plant materials
  - drawings and specifications
  - contract documents
  - industry standards

- Identify considerations for pruning plant materials
  - roots
  - dead, diseased, damaged and interfering (DDDI)
  - aesthetics

- Identify considerations/determinants for verifying moisture content
  - growing media
  - irrigation
  - plant material requirements

- Describe the procedures to dispose of or recycle excess materials
  - Identify industry standards and jurisdictional regulations

- Describe procedures for post-planting care
  - protection
  - stabilizing
  - irrigation
  - mulching

3633.02 Describe the procedures to install growing media.

- Identify specific tools and equipment relating to growing media installation

- Describe the procedures used to estimate quantities of materials required to install growing media

- Describe the method to verify functioning of drainage systems
  - surface
  - subsurface

- Describe the method for adding growing media
  - identify requirements based on drawings and specifications
  - add in lifts specified to reach required depth
  - identify the standards for compaction
  - moisten as required

- Identify methods to add and incorporate amendments (fertilizers, composts, coir, peat moss etc., mycorrhizae)

- Describe methods to shape and grade growing media based on industry standards, drawings and specifications

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3633.03 Describe the procedures for installing mulch.

- Identify the hand tools and equipment required to install mulch
  Tools
    - wheelbarrows
    - landscape rakes
    - pitchforks
    - shovels

  Equipment
    - skid steers
    - blower trucks
    - loaders

- Describe properties and purpose of mulch
- Identify the types of mulch
    - wood
    - bark
    - aggregates
    - composts

- Identify the purposes of mulch
    - weed suppression
    - water retention
    - nutrient recycling
    - erosion prevention
    - compaction prevention to support soil microbiome
    - temperature regulation
    - soil amending

- Describe the storage requirements for mulch

  - Identify industry standards and jurisdictional requirements related to storage of mulch

- Describe the procedures to install mulch

  - Identify the considerations for preparing the mulch installation area based on:
    - contracts
    - grades
    - soil compaction
    - standards
    - jurisdictional requirements
    - landscape fabric

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- Identify the steps and considerations for applying mulch
  - depth
  - timing
    - soil temperature
    - soil moisture
  - distribution
  - proximity
    - plant material
    - structures
  - plant health

- Identify the process and considerations for verifying mulch installation
  - standards and specifications
  - contract documents

3633.04 Explain procedures to maintain exterior softscape including woody, herbaceous and annual plants.

- Describe the purpose of exterior softscape maintenance
  - landscape health and aesthetics
  - design intent
  - contract documents
  - site-specific
  - plant preservation
  - structure preservation

- Describe the processes for maintaining exterior plants including:
  - top dressing
  - thinning
  - removal of dead/dying plant parts
  - soil cultivation/mulching
  - plant staking
  - removal of weeds and debris

- Describe methods to repair inorganic materials (filter fabric permeability, aggregate, rubber)
  - cleaning
  - replenishing
  - releveling
  - replacing

- Identify tools and equipment required for maintaining exterior softscape

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- Describe the procedure for installing and removal of seasonal planting.
  - Identify the guidelines and standards in the CLS
  - Identify the considerations for planting and removal of seasonal plants (annuals, biennials, and bulbs) for plant health and aesthetics
    - Inspect of seasonal plants for health and quality and maintenance levels
- Describe the process of deadheading in accordance with plant life cycles
- Describe the process for mulching beds and containers
  - Identify need of mulching for moisture retention and weed suppression
- Describe the procedure for inspecting and maintaining natural and manufactured edges
  - Identify industry practices and manufacturers' recommendations for:
    - plastic
    - wood
    - metal
    - brick
    - stone
  - Define the purpose of edging
    - bed definition
    - weed control
    - aesthetics
  - Describe the processes for inspecting natural and manufactured edges
  - Identify maintenance requirements based on edging material and type
- Describe procedures to perform site cleanup
  - litter pickup
  - removal of excess clippings
  - surface cleaning

3633.05 Demonstrate pruning techniques for young and established shrubs, groundcovers and vines.

- Define the considerations for selecting the pruning method
  - overall plant appearance
  - deciduous plant growth requirements
  - coniferous plant requirements
  - diseased/infected plant parts
  - timing
  - plant form
  - function
  - age and longevity
  - location

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- Describe the procedures used to inspect, use, maintain, store and transport pruning tools and equipment
    - Describe the use of tools and equipment required for pruning
    - Describe procedures for cleaning and sanitizing pruning tools and equipment
    - Compare the purpose and function of hand pruning versus using mechanical tools
- Describe pruning methods including: 3-cut method, flush cut, heading, reduction, removal
- Demonstrate pruning techniques for heading and removal based on the guidelines in the CLS
- Describe the procedure to organize and dispose of pruned material (contaminated and non-contaminated)
    - Identify jurisdictional regulations

3633.06 Describe digging procedures for transplanting plants.

- Identify methods for preparing plants for transplanting or relocating based on species and scope of work
    - balled-and-burlapped
    - potted/containerized plants
    - bare-root
    - landscape fabric
- Identify the factors to consider as part of a site analysis before transplanting plants
    - Location
        - accessibility
        - soil type
        - site conditions
        - plant specific drainage requirements
    - Plant Characteristics
        - size
        - plant species/cultivar
        - seasonal implications/ timing
        - quarantine requirements
    - Sanitation for pest management

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- Describe procedures for transplanting plants
  - Identify considerations for selecting planting method for site and species
  - Identify the hand tools and equipment required for transplanting plants
  - Describe industry standards and manufacturers' specifications to clean, sanitize, report damage/failure and store tools and equipment

3633.07 Describe plant health care maintenance practices.

- Define requirements for monitoring plant health during establishment
- Perform visual inspection to determine plant health, appearance, maintenance levels based on contract documents
- Identify staking, guying and mulching requirements based on the guidelines in the CLS
- Determine irrigation schedule
  - Identify plant irrigation requirements
  - Describe water soil relationship/ soil moisture content
  - Identify jurisdictional regulations related to plant irrigation
  - Identify types of irrigation methods
    - automatic
    - overhead
    - drip
- Describe uses for amendments/ fertilizer formulations (organic/inorganic) to address plant health care requirements
  - Identify considerations for applying soil amendments to address plant health care requirements
    - availability of recyclable nutrients (compost, water, green manures, turf clippings)
    - nutrient deficiencies -macro and micro nutrients
    - compaction and drainage issues
  - Identify amendment formulations and types
    - application / incorporation practices
    - identify the method for determining the effectiveness of fertilizer applications/inspection of plants for plant performance
    - analysis of growing media

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3633.08 Describe processes for garden winterization and seasonal plant protection.

- Identify winter clean-up practices
  - removal of annuals
  - preparation of perennials
- Identify methods of protection
  - wrapping/screening/tying
  - rodent/wildlife protection
- Identify the types of materials used for seasonal protection

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3634		
Title:	**First Aid and CPR Training**		
Duration:	Hours Total: 12	Theory: 6 Hours	Practical: 6 hours
Prerequisites:	N A		

General Learning Outcome

On successful completion of the reportable subject, the apprentice is able to demonstrate first aid and CPR techniques to respond to emergencies in the workplace.

This unit is comprised of the standard First Aid certification requirements.

Learning Outcomes and Content

3634.01 On successful completion the apprentice is able to describe use of First Aid/CPR techniques to deal with on the worksite emergencies

- Subject contents are pre-determined by first aid training provider

Evaluation Methods

First aid/ CPR testing

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Level 2

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Reportable Subject Summary-Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
3635	Site Preparation and Protection	48	18	30
3636	Project Preparation	24	18	6
3637	Marketing and Sales	24	18	6
3638	Plant Identification and Management	42	30	12
3639	Environmental Practices	48	48	0
3640	Hardscape Structures Installation and Maintenance	48	12	36
3641	Plant Health Care – Pest, Diseases & Invasive Species Management	30	24	6
3642	Interior Landscape Installation and Maintenance	24	18	6
3643	Green Infrastructure Installation and Maintenance	48	42	6
3644	Mentoring and Training Techniques	24	18	6
	Total	**360**	**246**	**114**

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Number:	3635		
Title:	**Site Preparation and Protection**		
Duration:	Total Hours: 48	Theory: 18 Hours	Practical: 30 hours
Prerequisites:	3626		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to demonstrate procedures used to perform site assessment which includes, interpretation of documentation pertaining to site assessment, assessment of site conditions for protection, identification of existing and proposed grading and drainage patterns and inspection of site-specific environmental conditions and the evaluation of soil erosion.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3635.01 Demonstrate procedures used to perform site assessment.

- Verify landscape information on plans, details and specifications are true to the site
  - scale
  - cardinal direction
  - site measurements
  - construction feature benchmark(s)
  - existing feature protection and preservation requirements
    - stockpiling and storage locations
  - planting plans
    - individual/mass plant locations
  - grading plans
    - grading control stakes
  - construction plans
    - construction details

- Mark out hazards to site assessment

  - Describe safe work practices pertaining to site assessment
  - Mark out:
    - utility locations
    - obstacles and hazards
    - site and site access and traffic patterns

  - Verify that grading plan conforms to jurisdictional requirements

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- Perform site grading based on grading and drainage plan
    - lay out and mark site
    - cut and fill
    - rough grade
    - grade for drainage
    - verify to plan and performance
    - finish grading

- Demonstrate drainage system installation
    - Identify drainage plan requirements
    - Identify jurisdictional regulations, CLS guidelines and environmental stewardship practices related to drainage system installation
    - Use tools and equipment required to install drainage systems
    - Calculate elevation and slope
    - Excavate subsoil
    - Store or remove excavated materials
    - Lay out, assemble and place system components
    - Verify drainage system operation and installation meets specifications
    - Backfill drainage system
    - Complete final/finish grade

3635.02 Demonstrate site preparation and protection of existing site elements

- Lay out site - mark and stake elements to be installed
- Identify existing conditions
    - utilities
    - buildings, site features
    - structures
    - plants
    - hardscape features
    - sensitive/protected areas
    - hazards
    - debris to be removed
    - invasive species
- Remove unwanted materials
- Verify site is prepared and protected and ready for the next phase
- Assess pre-construction site soils to determine potential impact on-site conditions:
    - contamination levels
    - compaction and health
    - microbiome

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- Using site plan, assess for potential soil erosion

    - erosion patterns (gullies, rills, sediment build up)
    - watering practices
    - wind/climate
    - exposure
    - slope
    - downspout positions
    - soil characteristics

- Develop a site protection plan

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Number:	3636		
Title:	**Project Preparation**		
Duration:	Total Hours: 24	Theory: 18 Hours	Practical: 6 hours
Prerequisites:	Level One		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to explain the planning activities required to prepare for landscape horticultural projects, including the use of documentation and reference material, interpretation of plans, specifications, the purpose for maintaining records and describe procedures for ordering and organizing plants, materials and equipment.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3636.01 Describe the application of trade-related documentation and reference material.

- Identify company policies related to project preparation and jurisdicational requirements such as building codes and other standards
- Use catalogues for plant identification, product comparison, and ordering tools, equipment and plant materials
- Use text and field books for referencing to identifiy pests, diseases, and determine methods of control
- Describe the function of tenders, bid documents, supplementary documents, contracts, and change orders

3636.02 Interpret landscape drawings and design intent.

- Describe primary landscape horticultural design principles
- Interpret project specifications and scope of work
    - work/site limits
    - contract documentation
    - site access
    - site protection plan
    - softscape and hardscape details
    - planting plan

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3636.03 Describe the purpose for maintaining records used in the horticultural profession.

- Identify types of work records
  - heath and safety
  - work orders
  - IPM records
  - training records
  - daily time sheets
  - change orders
  - site assessment records
  - employee evaluation
- Identify the function of the following:
  - records for temperatures and communication
  - work permits
  - utility locates
  - certification records
  - IPM reports
  - shipping and receiving information
  - records for adjusting inventory
  - change orders
  - health and safety records
  - certifications and licences
  - regulatory documentation
  - phytosanitary certificates

3636.04 Describe considerations and requirements for project planning.

- Define terminology associated with project planning tasks
- Identify jurisdictional legislation and company policies related to transportation, water and habitat and wildlife preservation
- Verify scope of work and determine sequence of jobs
  - identify processes for time management and task prioritization and performance efficiencies
  - Identify safety requirements based on safety plan, site conditions, contract documents and jurisdictional requirements
  - Locate utilities (private, public) on site plan
  - Identify and schedule daily and end-of-contract site clean up
  - Identify labour requirements, sustainable materials, tools and equipment
  - Plan site-specific staging
  - Identify and schedule sub-contractors
  - Verify material lists based on plans and specifications and work schedule

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3636.05 Describe the procedures for ordering plants and materials.

- Define terminology associated with ordering plants and materials
- Interpret documentation relevant to ordering plants and materials
  - Reference industry standards, (CLS, CNSS) relevant to ordering plants and materials and jurisdictional requirements
- Identify required materials based on requirements/contract documents
  - types
  - size
  - quality
  - quantity
- Describe the considerations when ordering materials
  - Accuracy of ordering
    - botanical nomenclature
    - industry terminology
  - Budget
    - price comparisons
  - Delivery and pick-up schedules
    - site staging
    - sequence of tasks
    - coordination with on-site contractors
  - Size and weight
    - seasonal transportation weight restrictions
    - load-bearing capacity
- Describe types of record-keeping
  - order number
  - tracking number
  - supplier contact information
  - purchase orders
- Identify required permits to prevent delays

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3636.06 Describe the procedures for organizing materials and equipment.

- Identify the process for receiving and storing plants and material based on the guidelines in the CLS
    - unloading
    - recording
    - protection
    - maintenance
    - storage
        - size and species groupings
        - designated areas
        - sequencing
- Describe the methods for handling substandard plants and materials
    - Identify the procedures within the CLS, company policies and jurisdictional regulations to:
        - quarantine
        - reject
        - dispose of plants and materials

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Number:	3637		
Title:	**Marketing and Sales**		
Duration:	Hours Total: 24	Theory: 18 Hours	Practical: 6 hours
Prerequisites:	3627 Communication Skills		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe procedures for controlling inventory, selling services and methods for developing and maintaining customer relations.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3637.01 Describe the procedures for controlling inventory.

- Define terminology associated with controlling inventory
- Identify inventory policies and related jurisdictional regulations
- Describe the purchasing process: receiving, storage, FIFO (first in, first out), issuing and controlling inventory
  - Define the methods of controlling inventory
    - manual
    - electronic systems
    - inventory records
  - Identify the considerations for sorting and managing inventory, factoring in details about the product including:
    - age
    - quality and condition
    - size
    - efficiency
    - cost-effectiveness
    - safe disposal
  - Identify the considerations for restocking orders
    - quantities
    - expiration dates
    - seasonal needs
    - demand
    - availability
- Identify hazards and describe safe work practices pertaining to inventory control
- Interpret documentation relevant to inventory control

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3637.02 Describe marketing techniques for products and services.

- Describe considerations for client education and advising
  - Describe how to determine client needs
    - plants, products, services
    - identify components of contracts
  - Explain the benefit to demonstrating knowledge of products, services and environmental stewardship
- Identify marketing principles
  - product, price, place and promotion
- Describe mechanisms for promoting sales/business

  Visual display/Signs
  - attractiveness
  - visibility
  - placement
  - professional image

  Digital advertising
  - social media
  - on-line presence
  - newsletters

  Print media
  - brochures/flyers
  - business cards
  - newspapers/magazines

  Other Media/methods
  - television
  - radio
  - hosting educational events/seminars
- Describe sales techniques for up-selling
  - related products
  - special offers
  - services
  - in-store promotions
- Identifying potential customers for future business

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3637.03 Describe procedures used to calculate and estimate job requirements.

- Define terminology associated with estimating
- Identify considerations required to determine quantities of materials, equipment and labour based on construction plans and specifications including:
  - estimating processes
  - time and materials
  - equipment and labour
  - restrictions/limitations (e.g. noise bylaws)
- Identify job requirements
  - Interpret site information and documentation based on:
    - drawings
    - specifications
    - tendering documents
    - client instructions
    - digital mapping
    - observation
  - Identify sources of information pertaining to estimating
    - suppliers
    - on-line research
    - referenced standards and definitions
- Estimate material costs
  - quantity take off
  - materials
    - aggregates
    - lumber
    - hard material
    - mulch
    - plants
    - growing media
    - rates of application
  - expansion and compaction factors (shrinkage)
  - pricing
- Estimate labour costs
  - job requirements
  - historical data
  - labour productivity
  - labour availability
  - skill level
  - scheduling
  - wages and labour burden

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- Estimate equipment costs
  - job requirements
  - historical data
  - rental
  - availability
  - site considerations
  - hourly operational cost

- Estimate additional costs
  - sub-contractors
  - direct job overhead costs
    - transportation
    - change orders
    - accommodations
    - permits
    - waste disposal
    - surcharges
  - indirect job overhead costs
    - safety program
    - administrative overhead
    - advertising
    - insurance
    - relevant limiting regulations
    - non-recoverable labour such as repairs, organizing, community/volunteer projects and guarantee work
  - allowance for contingencies
    - weather
    - other projects getting larger/running overtime (scope creep)
  - profit
  - taxes

- Present estimate of project based on contract documents
  - Confirming details/timelines with clients
    - company policies (rain day protocol, safety clauses, change orders)
    - specific contract details (payment terms, definitions, order and timing of work

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3637.04 Demonstrate the preparation of invoices, calculate taxes and prepare receipts.

- Describe considerations for handling payments for products and services based on:
  - company policy, contracts
  - scope of work, materials
  - timelines, costs

3637.05 Describe strategies for developing and maintaining customer relations

- Identify practices to develop and maintain customer relations
  - Address concerns
    - tact
    - politeness
    - timing
    - escalating the concern to supervisor
  - Present a professional image on-site and in transit
    - dress/uniform
    - tools, equipment and vehicle cleanliness and repair
    - social media presence
    - behaviour/conduct
  - Providing after-service follow-up to determine customer satisfaction
    - tracking for guarantee replacement
    - follow-up visits/communication
    - surveys
- Describe methods for maintaining customer records
  - Identify jurisdictional regulations pertaining to customer record information
  - Explain the importance of keeping and maintaining accurate and current customer information
  - Identify systems for maintaining manual and electronic records
  - Identify information to be included in customer records e.g. product preferences
    - use of digital calendar/alarms to schedule future tasks

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration, case studies, and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3638		
Title:	**Plant Identification and Management**		
Duration:	Hours Total: 42	Theory: 30 Hours	Practical: 12 hours
Prerequisites:	3628 Horticultural Principles-Plant Science		

General Learning Outcome

Upon successful completion of this reportable subject, the apprentice is able to identify 120 ornamental landscape plants using the required nomenclature and stating the cultural requirements for each (**Refer to Appendix D -Ontario Horticultural Technician Plant List-**) and understanding pests and diseases as they relate to plant selection and demonstrate tree pruning techniques.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3638.01 Identify 120 ornamental landscape plants using the International System of Plant Nomenclature of common ornamental landscape plants used in Ontario.

- family
- genus
- species (specific epithet)
- forma/variety/subspecies/cultivar/registered and trademarked names
- common names

3638.02 Describe the key identification characteristics of the 120 ornamental landscape plants.

- leaves/needles
- flowers/fruits/seeds
- bud
- stems/ bark
- growth habit /form

3638.03 Explain the cultural requirements of the 120 ornamental landscape plants identified.

- Identify common pest problems associated with these plants
  - moisture
  - light
  - soil type
  - hardiness (climatic zones)
  - pH/nutrient requirements
  - pruning/dead heading
  - production/ cultivation/ handling and storage
  - common pests

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3638.04 State the potential landscape uses for the 120 ornamental landscape plants identified.

- plant-specific uses
- residential applications
- commercial/institutional/industrial applications
- environmental impact
    - creation of specific environments
    - siting

3638.05 Explain management practices for 'repairing' damaged plants.

- Identify industry standards and management practices for damaged plants
- Identify plant requirements
    - structural supports
    - pruning
    - amending soils
- Identify the reasons for replacing plants
    - dead, damaged, diseased
    - maintenance level
    - contract documents
    - threshold levels
    - IPM
    - species
    - appearance
    - client preference
- Describe hardening-off practices that assist/increase plant survival
- Describe reasons for replacing growing media
    - poor test results
    - pernicious pests
    - jurisdictional regulations
- Describe repair and adjustment of staking and guying materials to prevent plant damage
    - Identify standards and specifications for staking and guying materials
- Identify indicators of need to repair grading and drainage based on standards and manufacturers' specifications
- Create a basic maintenance plan for an exterior planting

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3638.06 Demonstrate tree pruning techniques.

- Describe basic plant morphology, anatomy, and physiology with regard to pruning trees
  - roots
  - trunk
  - crown
  - branching

- Identify reasons for pruning trees
  - health and vigour
  - direct, control, or modify growth
  - enhancing fruit and flower production
  - dead, disease, damage and interfering (DDDI)
  - aesthetics

- Describe factors and considerations affecting the pruning of trees
  - plant form
  - function/requirement
  - age
  - location
  - timing
  - dormant season
  - growth response
  - wind and frost damage
  - non-dormant pruning
  - scorch
  - site activities

- Identify compartmentalization
  - Compartmentalization of decay in trees (CODIT): Resisting decay in trees
  - Callus and wound wood

- Identify factors contributing to tree failure
  - structural defects
  - plant species
  - size
  - age
  - site conditions
  - past maintenance practices
  - climate change
  - weather

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- Perform pruning techniques for young and established trees

  - Identify hazards and risks associated with pruning trees
  - Select and use tools and equipment based on requirement
  - Identify efficiencies while pruning
    - Hand pruning vs. mechanical tools
  - Describe types of pruning cuts
  - Describe pruning techniques such as:

    - crown cleaning
    - canopy thinning
    - canopy raising
    - canopy reduction
    - removal
    - crown balancing
    - canopy restoration
    - pinching
    - pollarding
    - espalier

- Describe training techniques for young trees
    - developing trunk caliper
    - scaffold spacing
    - co-dominant stems
    - root pruning

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3639		
Title:	**Environmental Practices**		
Duration:	Hours Total: 48	Theory: 48 Hours	Practical: 0 Hours
Prerequisites:	3629 Environmental Principles		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe landscaping practices that support environmental stewardship to develop, conserve, preserve, protect and reclaim natural habitats and ecosystems to sustain a healthy environment.

Learning Outcomes and Content

On successful completion the apprentice is able to:

3639.01 Describe the value and purpose of biodiversity

- Define biodiversity
  - Explain the inter-relationships between species
  - State the benefits of plants

- Describe the function and benefits of biodiverse plantings and natural areas
  - climate moderation
  - carbon capture
  - symbiotic relationships
  - pest control
  - pollution abatement
  - energy conservation
  - water infiltration
  - resilience and food security
  - ecosystem preservation

- Describe a variety of habitats that support a range of organisms

  - Identify habitats that support a range of species
    - refuge and nesting sites and plants
    - wildlife-supporting plants
    - water and food sources
  - Identify organisms that support diversity within a habitat
    - beneficial insects/ pollinators
    - biological controls
    - mycorrhizae and other soil biota
    - birds

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3639.02 Describe practices for increasing biodiversity within a landscape design and the development process.

- Describe design strategies for enhancing bio-diversity in a landscape
    - 'Let it lay'
    - 'refugia'
    - product and plant selection
    - creation of woodlands, buffer-strips, wetlands, hedgerows, wildflower meadows within the site
    - use of native plants in the design
    - adding a green roof
    - use of climbing plants on walls to provide shelter and foraging opportunities
    - use of sustainable urban drainage systems which serve as wildlife habitats, (swales, ponds etc.)
    - use of edible plants in landscapes

- Identify the considerations for plant selection to enhance diversity
    - aesthetics
    - disease and pest resistance
    - flower time
    - plant type
    - functions
    - edible/medicinal
    - economic
    - hydrozones

- Identify maintenance strategies that enhance diversity
    - spring cleanup versus fall cleanup- benefits and drawbacks
    - reduce chemical use
    - reduce tillage

- Describe the value of environmental, economic and social impact of the tree canopy

- Explain the risks of not including biodiversity within a landscape

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3639.03 Describe factors for consideration for installing biodiverse plantings and natural areas.

- Identify jurisdictional regulations related to biodiversity - biodiverse plantings and natural areas
- Identify characteristics of plant material used for biodiverse plantings and natural areas
- Identify the differences between noxious, aggressive, invasive, native and nativars
- Describe the purpose for using sustainable horticultural and landscaping materials

3639.04 Describe methods for conserving soil and preserving soil health.

- Describe the difference between good and poor soil structure
- Describe the impact of cultivation on the soil structure, health and biomes
  - Identify methods for minimizing harm to soil structure, health and microbiome
  - Identify situations in which cultivating is required
- Describe methods to prevent soil erosion and siltation
- Describe procedures used to apply and/or incorporate growing media and amendments
  - Identify considerations for selecting soil amendments for maintaining optimum growing conditions and minimizing environmental impacts
    - Industry standards
    - jurisdictional regulations
  - Identify consideration for composting
    - process and maintenance
    - use of finished compost
    - use of compost tea
- Describe the procedures for placement, storing, and transporting of soils and soil amendment products
  - Identify jurisdictional regulation requirements

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3639.05 Describe practices that promote water stewardship.

- Identify xeriscape principles
- Identify low impact development landscapes (Fusion landscaping)
- Identify low-water-use plants and turf types
- Describe the benefits and use of reclaimed water systems (i.e. rainwater, greywater etc.)
- Identify efficient irrigation systems and components for water optimization
- Identify erosion control methods and products as it relates to water stewardship
- Identify water retention and weed prevention materials
- Identify methods for preventing fertilizers, pesticides and pollutants from entering waterways

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment: tests, assignments, and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3640		
Title:	**Hardscape Structures Installation and Maintenance**		
Duration:	Hours Total: 48	Theory: 12 Hours	Practical: 36 Hours
Prerequisites:	3630 3631		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to demonstrate the installation of landscape structures, irrigation systems, low voltage lighting water features and describe the procedures to repair hardscape and maintain irrigation systems according to industry standards and jurisdictional regulations.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

3640.01 Describe the industry standards, and jurisdictional regulations pertaining to the installation of landscape structures.

- Interpret codes and regulations pertaining to landscape structures

3640.02 Demonstrate the procedures to construct landscape structures according to specifications.

- Define terminology associated with landscape structures
- Identify risks, hazards and safety practices pertaining to the installation of landscape structures
- Use PPE required for the installation of landscape structures
- Use tools and equipment required installing landscape structures
- Identify products and materials used to construct landscape structures and applications and procedures for use
- Identify products and materials used in feature construction
    - wood
        - lumber grades
    - composite
    - stone
    - segmented block
        - concrete
- Describe the preparation procedures used to install landscape structures
    - Interpret documentation pertaining to site layout
    - Identify site preparation, layout, excavation etc.
    - Describe procedures to prepare and install poured concrete foundation

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- Describe the steps for installing wood landscape features
  - prepare site
  - prepare wood/lumber, materials and hardware
  - construct wood feature
  - finish surface
  - site clean up
  - maintain tools and equipment

- Construct landscape structures according to plans, specifications and jurisdictional regulations

  - decks
  - pergolas
  - gazebos
  - fences
  - gates
  - walls
  - paved surfaces
  - outdoor kitchens

- Demonstrate use of protective products such as preservatives, stains, sealant

- Clean-up site, repair damaged surfaces and disposal of waste material

  - Describe the industry standards and jurisdictional requirements for cleaning up site, repairing damaged surfaces and the disposal of waste material

3640.03 Describe processes to make minor repairs to hardscape.

- Review industry standards and manufacturers' specifications

- Identify damage to hardscapes

  Damage such as:
  - cracks
  - frost heave
  - spalling
  - settling

  Issues such as:
  - damaged pipes
  - plugged catch basins
  - pooling

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- Describe the requirements to make minor repairs to hardscape including:
    - Damaged stones
        - damaged timber
        - pipes
        - leveling structures
        - mortar
        - adhesives
        - sealants
    - lift and re-lay
        - slope regrading
    - aggregate surfaces
    - low voltage cable

- Describe procedures for repairing hard surfaces as part of grounds maintenance practices
    - identify need for repair
    - repair/restore
    - re-installation of modular units
    - reapplying adhesive and jointing sand

3640.04 Install irrigation systems.

- Describe the procedures to install irrigation systems
    - Identify requirements for the installation such as:
        - tools and equipment related to irrigation
        - types of irrigation systems and their applications
        - system components
    - Identify the factors that determine irrigation rates and methods
        - water sources for irrigation
    - Identify the procedures for determining water quality and availability

- Install irrigation components
    - trenching and pulling pipe
    - bedding pipe and wiring
    - back filling
    - adjust head and nozzle heights

- Install control system
    - program control system
    - verify operation of system
    - clean up site

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3640.05 Describe the procedures to maintain, troubleshoot, repair and adjust irrigation equipment and systems.

- Identify manufacturers' specifications and industry standards
- identify system start-up procedure (charging and running system through a test cycle) from manufacturers' specifications
- determine functioning of system by visual site inspection
- identify, troubleshoot and repair problems
- adjust system components based on site requirements
- check functioning of zone valves

3640.06 Describe the installation of low voltage landscape lighting.

- Define terminology associated with low voltage landscape lighting
- Identify types of low voltage landscape lighting and describe their characteristics and applications
- Identify components of low voltage landscape lighting
- Identify hazards and describe safe work practices pertaining to low voltage landscape lighting
- Interpret codes and regulations pertaining to low voltage landscape lighting
    - Identify requirements for bird friendly lighting e.g. setting lighting controls to turn off lights in certain months so to not confuse migration patterns
- Interpret documentation pertaining to low voltage landscape lighting
- Describe voltage drop calculation, its application and procedure for use
- Describe the procedures used to prepare site for installation of low voltage landscape lighting
- Describe the tools and procedures used to install low voltage landscape lighting
- Describe the procedures used to estimate quantities of materials required to install low voltage landscape lighting

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3640.07 Describe the procedures to install landscape water features.

- Define terminology associated with water features
- Identify types of water features
- Describe characteristics and applications of water features
- Identify hazards and safe work practices pertaining to water features
- Identify the implications of water features on the practice of environmental stewardship
- Interpret codes and regulations pertaining to water features
- Interpret documentation pertaining to water features
- Describe the procedures used to prepare site for installation of landscape water features
- Describe the procedures used to install landscape water features
  - Identify installation procedures for:
    - geotextile, liners and membranes
    - water supply and drain components
    - pumps and filtration systems
    - lighting and electrical conduits
    - adhesives, foams and mortar
    - aggregates, plants, fish and decorative features

3640.08 Demonstrate procedures to maintain water features.

- Identify hazards and safe work practices pertaining to the maintenance of water features
- Interpret codes and regulations pertaining to the maintenance of water features
- Interpret documentation pertaining to the maintenance of water features
- Describe types of water features, their characteristics and applications
- Identify the methods of maintaining water features
  - checking water levels
  - algae and floating debris
  - cleaning components such as filters, screens, pumps, nozzles and skimmers

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3640.09 Describe the procedures to maintain low voltage landscape lighting.

- Identify hazards and safe work practices pertaining to the maintenance of low voltage landscape lighting
- Interpret codes and regulations pertaining to the maintenance of low voltage landscape lighting
- Interpret documentation pertaining to the maintenance of low voltage landscape lighting
- Describe methods of maintaining landscape lighting
    - Identify deficiencies within different components
        - observing for flickering, over-illumination etc.
    - Identify adjustment of lighting components such as positioning, coverage, and timers
    - Cleaning lighting components, including sensors and fixtures and cleaning debris

Instructional & Delivery Strategies

Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration and assignments.

Evaluation Methods

Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3641		
Title:	**Plant Health Care- Pests, Diseases and Invasive Species Management**		
Duration:	Hours Total: 30	Theory: 24 Hours	Practical: 6 Hours
Prerequisites:	3628 Horticultural Principles		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able identify nutrient deficiencies, pests, diseases and disorders, explain the care and treatment of plants, describe Integrated Pest Management (IPM) principles and interpret relevant legislation and jurisdictional requirements.

Learning Outcomes and Content

Upon successful completion the apprentice is able to:

3641.01 Describe the signs, symptoms and causes of pests, diseases and disorders.

- Identify signs and symptoms of pests, diseases and disorders
- Identify factors that contribute to diseases such as pathogens, biotic and abiotic factors
- Define biotic and abiotic factors (beneficial and non-beneficial interactions)

  - Identify abiotic factors that impact plants caused by factors such as:
    - light
    - water
    - radiation
    - temperature
    - humidity
    - atmosphere
    - acidity
    - soil
    - elevation

  - Identify biotic factors such as plants, insects, animals, fungi, bacteria and viruses
  - Identify the impact of human activities on plants such as:
    - soil compaction
    - equipment or mechanical damage
    - off-target chemical damage
    - poor pruning procedures
    - change of grade
    - under/overwatering

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3641.02 Describe characteristics and life cycles of common diseases and disorders.

- Identify causes of diseases and environmental conditions that support the pathogen
  - Identify pathogens that cause disease - fungi, bacteria, viruses
  - Define the disease cycle
- Define host environments - such as light, humidity, oxygen, temperature
- Identify signs, symptoms and potential damage of vascular diseases -e.g. verticillium wilt, hickory Anthracnose and boxwood blight

3641.03 Describe characteristics and life cycles of common pests, invasive species and beneficial insects.

- Identify types of pests
  - native and non-native
  - invasive
  - noxious
- Identify beneficial insects

3641.04 Describe methods for determining and resolving nutrient deficiencies in plants.

- Identify macro and micro-nutrients and their impact on plant health and IPM performance
- Identify formulations of fertilizers and amendments
- Identify methods for determining nutrient availability
  - Determine nutrient levels in plants
    - observe and monitor growth patterns and overall plant health
    - interpret soil and irrigation water test results
    - collect plant tissue for sampling
  - Identify treatment methods
  - Prepare an action plan
- Identify the characteristics and applications of various types of amendments and fertilizers
- Identify methods for resolving nutrient deficiencies

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3641.05 Interpret relevant legislation and jurisdictional requirements pertaining to pest and disease management.

- Identify jurisdictional regulations, quarantine protocols and import/export restrictions
  - containment or destruction of contaminated materials
  - sanitation practices for personnel, tools and equipment, vehicles and facilities
  - early detection and control

3641.06 Identify strategies used for pest and disease management and treatment.

- Define preventative/reactive control practices - mechanical, biological, chemical and cultural
- Describe cultural control methods such as:
  - nutrient management
  - mulching
  - sanitation
  - watering practices
- Describe mechanical/physical control methods such as trapping, cultivating, pest exclusion
- Describe biological control methods such as the use of natural enemies of the pest and or pathogens e.g. *Bacillus thuringiensis, Encarsia formsa,* and *Cryptolaemus montrouzieri*
- Identify chemical control methods such as using growth regulators, pheromones and biological/chemical pesticides
- Compare the benefits and effects of cultural, mechanical, biological and chemical pest management control methods

3641.07 Describe Integrated Pest Management (IPM) principles.

- Describe the history of pest control in landscape horticultural practices
- Describe the key components of an IPM strategy (Prevent, Monitor, Intervene) as it relates to plant health care programs
  - Define the protocols of an Integrated Pest Management (IPM) program
  - Define terminology associated with pest and disease management such as pest threshold levels
- Describe the benefits of IPM within environmental stewardship best practices

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- Describe the requirements for documentation and associated procedures pertaining to IPM and plant care health programs
  - Identify information required
    - observations
    - time and date
    - location
    - site use (parkland, sports fields)
    - general plant health and symptoms
    - populations
    - thresholds
    - historical records
    - method and type of treatment (mechanical/ biological/natural and synthetic products)
    - rate and frequency of application
    - species treated
    - method of application
    - weather conditions
    - evaluation

3641.08 Identify the factors and considerations for selecting and applying pest and disease controls.

- Identify considerations for the selection of control method
  - plant species
  - environment
  - pathogen lifecycles
  - action thresholds
  - optimal application time (phenology)
  - product selection/client preference
  - safety of non-target organisms
  - environmental impact

3641.09 Explain the procedures for safe handling, transporting, applying and storing of pest-control products (chemical and biological controls).

- Identify hazards associated with use of pest control products
  - Describe the effects of products and impact on human health and the environment
  - Identify symptoms and antidotes for chemical use
  - Identify spills and emergency response mitigation measures
  - Explain the implications of **LD_{50}** in the selection of chemical control products

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- Describe the considerations for selecting application method
  - formulation
  - equipment
  - plant requirements,
  - manufacturers' specifications
  - industry standards
- Describe the procedures for safe handling, transporting, storage and disposal of control products
  - Describe jurisdictional regulations requirements for control products
  - Describe the handling and disposal procedure for current and expired product and containers
- Describe pest control treatment application techniques
  - Identify control methods such as:
    - cultural
    - installation of traps
    - release or implementation of biologicals
    - pesticides and herbicide application (concentrates, granular, fogs)
  - Identify considerations for selecting application method such as:
    - plant species
    - environmental conditions
    - terrain and soil type
    - time of application
    - product specific requirements (before/during/after application)
    - application rate of product
    - cost
  - Identify PPE, tools, products and application equipment relating to pest and disease control (low volume high pressure application equipment and back-packs)
  - Describe procedures for equipment cleaning and lubrication
  - Describe the procedures for calibration of equipment
  - Describe site preparation
    - posting and securing site for safe operation and public safety
  - Describe methods for assessing and monitoring the effectiveness of treatments
- Describe maintenance requirements for pest control application equipment
  - Identify maintenance protocols within manufacturers' specifications

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3641.10 Explain the procedures to apply, transport, store and dispose of fertilizers and amendments.

- Identify jurisdictional regulations pertaining to the use of fertilizers and amendments
  - Identify the requirements for transporting, storing and the disposal of fertilizers/amendments
- Identify hazards and safe work practices pertaining to fertilizers/amendments and their use
- Describe the implications of fertilizer management on the practice of environmental stewardship
- Describe the considerations for selecting application method
  - formulation
  - equipment
  - plant requirements
  - manufacturers' specifications
  - industry standards
- Identify the schedule for the application of fertilizers and/or amendments
- Describe the procedures for calibration of equipment
- Describe procedures for equipment cleaning and lubrication

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, tours of local interior landscapes demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Number:	3642		
Title:	**Interior Landscape Installation and Maintenance**		
Duration:	Hours Total: 24	Theory: 18 Hours	Practical: 6 hours
Prerequisites:	3632, 3633		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe the procedures for installing and maintaining interior landscapes.

Learning Outcomes and Content

Upon successful completion the apprentice is able to:

3642.01 Describe functions and applications for interior landscape plants.

- Identify applications for interior landscape plants: planter bed, free-standing planters, decorative containers, living walls etc.
- Define terminology associated with interior softscape

3642.02 Identify foliage and seasonal plants for use within interior landscapes.

- Identify key characteristics and cultural requirements such as growth habits, water consumption and pest and disease resistance
- Identify environmental conditions suitable for optimal growing

3642.03 Identify the considerations for determining suitability of interior site for softscape and hardscape element(s) installation.

- Identify suitability of project site interior environment with consideration to temperature, light, humidity, structural integrity of walls and floors etc.
- Interpret codes and regulations pertaining to interior softscape such as bylaws related to water supply and waste water etc.
- Identify hazards and describe safe work practices pertaining to interior softscape
- Identify suitability of hardscape element(s) for interior installation
- Identify right plant for “planter” or technology for function such as planting bed, free-standing planters, living walls etc.
- Identify transportation and protection requirements for plants to site and during staging

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3642.04 Describe procedures to install interior hardscape elements.

- Describe the process for assessing existing conditions to determine hardscape selection based on the space/environment
  - Verify contract documents (drawings and project specifications/details), industry standards and manufacturer's specifications
  - Verify site access for hardscape elements for delivery and installation
- Identify tools and equipment required to install interior hardscape elements based on different applications and site specifications
  - planters
  - planter beds
  - living walls
  - irrigation systems
- Describe the procedures to construct or install hardscape elements
  - Verify requirements prior to installing interior landscape hardscape elements including:
    - product and site preparation
    - location
    - quantity, quality of products and elements
    - drainage hardware and material performance for open and closed systems
    - delivery logistics and sequence
    - site access based on time of year and staging
    - protection required for furnishings and surfaces
    - guidelines in the Canadian Landscape Standard (CLS)

3642.05 Describe procedures to install interior softscape elements.

- Identify industry standards, specifications and contract documents
- Identify the application and operation of specific tools and equipment relating to plant material installation
- Identify the steps to assess readiness of conditions of planting site for plant material such as:
  - water quality
  - climate requirements (temperature and humidity)
  - 86plumbing for irrigation
  - light quality and quantity (natural and supplemental)

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- Identify steps to verify growing media and irrigation water meets specification

    - collect sample according to lab requirements
    - submit for analysis to test for pH, macro and micro nutrients, minerals, elements and other details
    - allow for quantity and compaction

- Verify plants are as specified prior to installation

    - quantity, size,
    - quality, form, condition

- Describe how to prepare plant materials for installation including:

    - removal of containers and plant tags
    - removal of excess granular and slow release fertilizer
    - scarify root ball
    - removal of dead and damaged plant parts
    - foliar washing

- Describe the process to plant interior landscape plants

    - verify drawings, specifications and industry standards

- Describe post installation procedures

    Monitor

    - stress and signs of acclimation (foliar retention/defoliation)
    - media moisture
    - plant health and performance
    - plant form and structure
    - irrigation systems/components/hardware for performance as specified

- Describe the requirements for site clean-up including:

    - removal of excessive material
    - removal of floor and wall protection coverings etc.
    - replacement of furniture and interior design features/structures

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3642.06 Describe procedures to maintain interior softscape.

- Identify the application and operation of specific tools and equipment relating to interior softscape maintenance

- Identify the procedures to maintain interior softscapes

  - Perform visual inspection to identify plant health condition/performance

    - appearance and growth rate, root condition (root bound)
    - growing media
      - quality
      - compaction
      - salt buildup
    - evidence of pests and diseases

- Describe IPM practices for interior plants

  - Identify common pests and diseases

- Identify the maintenance procedures for replenishing, restoring and amending growing media as it applies to interior softscape including:

    - levels and depth of growing media are maintained at required levels
    - nutrients and amendments applied as per industry standard for interior softscape
    - aeration and core-aeration requirements

  - Identify requirements for amendments, product types and application methods
    - fertilizer (both water soluble & slow release)
    - perlite
    - vermiculite
    - coir
    - peat moss
    - crushed brick/stone
    - mycorrhizae
    - mulch (organic/inorganic)

  - Describe general maintenance practices for interior softscape
    - move and rotate plants to promote uniform growth
    - check media moisture levels
    - clean off foliage and containers
    - fertilize and amend media and plants based on lab test results, season and plant condition/ plant health

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- apply principles of pruning to interior plants for aesthetics, plant health, structure/form and space restrictions
- root prune interior plants for containment
- transplant, “up-plant” plants as required for plant health
- propagate by division and cutting
- monitor and control pests as required
- replacement of damaged or broken containers
- removal of debris and contaminants
- leach media of contaminants and build up of nutrient excess as required

▪ Describe site cleanup procedures

- Identify industry practices
- contract documents requirements

o Describe procedures for plant replacement

▪ Identify the principles for performing plant replacement and seasonal rotations

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, tours of local interior landscapes demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3643		
Title:	**Green Infrastructure Installation and Maintenance**		
Duration:	Hours Total: 48	Theory: 42 Hours	Practical: 6 hours
Prerequisites:	3629, 3631		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able describe procedures to install and maintain green infrastructure, including applications for maximizing green space and permeable surfaces, installation of erosion control materials, green roofs and walls, and rainwater and stormwater management systems.

Learning Outcomes and Content

Upon successful completion the apprentice is able to:

3643.01 Describe the purpose and benefits of green infrastructures.

- Define examples of green infrastructure such as living walls, green roofs, rain gardens, green parking, permeable pavement, bioswales, urban forests, bioretention ponds, engineered wetlands
- Compare rainwater management with stormwater management
- Identify benefits of green infrastructure and applications of plants and green infrastructure technologies
  - biodiversity
  - water conservation
  - rain/stormwater management
  - climate change mitigation
  - air purification/pollution mitigation
  - reduced heat island effect
  - protection of natural resources
  - carbon sequestration
  - symbiotic relationships
  - site sustainability
- Identify value of environmental, economic and social impact of urban forests
  - Explain the benefits of the functions of a natural ecosystem

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3643.02 Describe the procedures for installing and maintaining erosion control material.

- Identify jurisdictional regulations related to the installation of erosion control materials
- Identify types of erosion control materials:
  - silt fencing
  - gabion walls
  - roll-type materials
  - tarps
  - mats
  - blankets
  - wattles
  - plant materials
  - boulders
  - aggregates

- Describe process to estimate quantities of erosion control material required.
- Describe the methods of installation of erosion control materials
  - Identify tool and equipment requirements
  - Describe procedures for installing erosion control materials including:
    - site preparation
    - placement
    - securement
    - verification
    - disposal
- Describe the requirements and methods for maintaining erosion control material
  - Identify the procedures to inspect erosion control materials
    - functionality
    - sloughing
    - rilling
    - gullies
    - sedimentation
    - flooding
    - weed control
  - Describe the procedures to repair erosion control materials
    - Identify industry standards
    - Identify jurisdictional regulations
  - Identify the legal consequences of erosion control failures

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3643.03 Describe factors affecting the selection of green infrastructure.

- Define the types of infrastructures- blue, grey and green
- Describe green field and brown field reclamation
- Describe considerations for determining what types of green infrastructure is used such as:
  - feasibility
  - cost
  - environmental impact
  - design aesthetic
  - maintenance
  - product availability
- Identify site-specific conditions and considerations
  - environmental
    - water flow
    - topography
    - drainage patterns
    - humidity/precipitation rates
    - air flow
    - growing media
    - existing vegetation and waterways
    - proximity to natural areas
  - construction limitations
    - structural load
    - building envelope
    - drainage
  - natural ecosystem considerations
    - Function
    - Purpose
  - structure
  - budget
  - jurisdictional regulations
  - community plans
  - client needs

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3643.04 Describe the procedures for installing green roofs and walls.

- Identify jurisdictional regulations related to the installation of green roofs and walls

- Describe the process for conducting a risk assessment
  - Identify risks and hazards
  - Identify fall protection regulations and procedures

- Describe types and functions of green roof and walls
    - extensive
    - intensive

- Describe the components of green roofs and walls

  - Identify the non-organic components of green roofs and walls
    - membranes
    - root barriers
    - drainage
    - irrigation
    - ballasts

  - Describe the characteristics of growing media used in green roofs and walls
  - Describe the characteristics of plant material used in green roofs and walls
  - Identify plants used on green roofs and walls and their function

- Describe the procedures for the installation of green roofs and walls

  - Describe factors considered before the installation of a green roof or green wall
    - weight of the green roof system
    - waterproofing requirements
    - provisions for maintenance access
    - surface and subsurface drainage requirements

  - Identify tool and equipment requirements
    - lifts
    - booms
    - cranes
    - fall protection

- Describe the method for the installation of green roofs and green walls including:
    - site preparation
    - growing media
    - plant material
    - safe working procedures

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3643.05 Describe processes for maintaining green roofs and walls.

- Explain processes required to maintain organic components of green roofs and walls including:
    - debris removal
    - weed control
    - pests and diseases monitoring
    - fertilizer/compost application
    - assessment of irrigation requirements
    - plant coverage assessment
    - plant pruning
    - growing media inspection
    - identification of jurisdictional regulations and requirements for fall protection
    - record-keeping/maintenance log

- Identify process to inspect and maintain non-horticultural elements of green roofs and walls including:
    - Leak detection
    - Inspection of:
        - exposed membrane
        - vents
        - pumps
        - pipes
        - drainage system
            - standing water
            - sedimentation
            - drain pathways

3643.06 Explain the procedures for installing rainwater and stormwater management systems, harvesting and retention systems.

- Identify codes and jurisdictional regulations related to the installation of rainwater, stormwater management systems, harvesting, and retention systems
- Identify risks and hazards associated with the installation of rainwater, stormwater management systems, harvesting, and retention systems
- Describe the purpose, types and functions of rainwater and stormwater management systems, harvesting and retention systems and components
    - Identify the benefits of rainwater and stormwater management systems
    - Identify effects on man-made infrastructure (flooding reduction, decreased stress on drainage infrastructure, etc.)
    - Identify effects on the natural environment

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- Describe the components of rainwater and stormwater retention systems
    - growing media
    - plant materials
    - aggregates
    - liners
    - filter products and sediment control systems
    - biofilters
    - overflow drainage systems
    - water aerators

- Describe the components of rainwater/ stormwater harvesting systems
    - cisterns
    - pumps
    - hoses
    - valves
    - pipes
    - aggregates
    - rain barrels
    - tanks
    - irrigation systems
    - soil cells
    - water-harvesting crates

- Describe the method for the installation of rainwater/stormwater systems including:
    - Identification of safe work practices
    - Site preparation
    - Component installation
    - Growing media and plant material installation

3643.07 Describe the requirements and methods for maintaining rainwater and stormwater management systems.

- Identify industry standards, codes and jurisdictional regulations related to the maintenance of rainwater and stormwater management systems
- Identify PPE and site-specific requirements

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- Explain the processes to inspect and maintain horticultural elements of rainwater and stormwater management systems including:
    - plant health assessment
    - water testing and analysis
    - plant pruning
    - growing media inspection
        - erosion
        - viability
    - weed and invasive species control
    - pest and disease control
    - fertilizer/compost application
    - debris removal
        - mulch assessment depth
        - quality
        - type

- **I**dentify the processes to inspect and maintain non-horticultural elements of rainwater and stormwater management systems including:
    - leak detection
    - debris removal
    - winter protection to prevent salt damage
    - mulch assessment
        - depth
        - quality
        - type
    - water testing
    - exposed membrane
    - vents
    - drainage system
        - standing water
        - sedimentation
        - inflow blockage
        - drain pathways
        - aggregates
    - pumps
    - pipes
    - mesh
    - filters
    - basins
    - inlet channels and outlet channels
    - cisterns

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3643.08 Explain practices for maintaining biodiverse plantings and natural areas.

- Identify criteria for monitoring site
  - Site disturbances
    - erosion
    - vandalism
    - dumping
    - trespassing
  - Public safety
  - Plant health
    - identification of invasive and unwanted species
    - plant establishment
- Contract documents

- Describe procedures for maintaining biodiverse plantings and natural areas

  - identify inspection and reporting requirements
  - check integrity of pathways
  - remove debris
  - remove invasive and unwanted species
  - assessment for plant health
  - prune
  - plant and maintain
  - protect plant
    - tree guards
    - fencing
  - assess and restore aggregates

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstrations and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment: tests, assignments and demonstration of proficiency. In all practical assignments, the unit is to evaluate the “Method of work” which includes application of theory.

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Number:	3644		
Title:	**Mentoring and Training Techniques**		
Duration:	**Hours** Total: 24	Theory: 18 Hours	Practical: 6 hours
Prerequisites:	3627 Communication Skills		

General Learning Outcome

On successful completion of this reportable subject, the apprentice is able to describe communication and mentoring techniques and strategies for enhancing personal and team development.

Learning Outcomes and Content

Upon successful completion the apprentice is able to:

3644.01 Compare the characteristics of an effective team versus an ineffective team.

- Identify effective team characteristics such as:
  - members have trust in each other and in the team's purpose
  - everybody is working toward the same goals
  - team members are clear on how to work together and how to accomplish tasks
  - everyone understands both team and individual performance goals and knows what is expected
  - disagreement is viewed as beneficial and conflicts are managed well
  - team members actively diffuse tension and friction using conflict resolution strategies
  - the team engages in productive discussion, and everyone gets a chance to contribute
  - criticism is constructive and is oriented toward problem solving
  - the team makes decisions based on mutual agreement
  - each team member carries their own weight and is respectful of each other and the teams' processes
  - the leadership emerges from within the group and adapts as required to drive result
- Identify the characteristics of an effective team member
  - engages in group decisions and actions
  - takes initiative/leadership as needed
  - takes responsibility for self and others
  - is supportive of other team members

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- Describe the value of diversity in the workplace
    - recognizing and respecting and valuing of peoples' diversity
    - acknowledgement of:
        - individual differences
        - varying perspectives
        - the value of different skills/knowledge/experience

3644.02 Describe leadership functions in an organization.

- Identify leadership styles and their impact on the team
- Define the difference between management and leadership
- Describe role and responsibilities of supervisors, managers
    - delegation
    - goal setting
    - coaching and mentoring
    - compliance with Employment Standards Act for Ontario

3644.03 Explain strategies for developing and facilitating learning (being a mentee, working with a mentor).

- State the shared responsibilities for workplace learning
- Describe the role and responsibilities and skills required of a mentor
    - training
    - modelling
    - observing
    - supporting
    - motivating
    - monitoring skills progression
- Describe methods for helping people learn
    - Identify different ways people learn (learning styles)
        - visual
        - auditory
        - kinesthetic
        - tactile
    - Describe considerations for accommodating learning needs such as:
        - learning challenges/capabilities
        - learning speed
        - language proficiency
            - verbal and written communication
        - learning preferences/styles

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- Describe best practices for 'On the Job Training'(OJT) instruction
    - match tasks based on interests and skill/strengths
    - identify learning opportunities
    - state the lesson/task objective and link the lesson to the requirements of the work
    - determine instruction method based on skill and mentee's learning style and skill level
    - identify different techniques to meet individual learning needs
    - explain the importance of providing opportunities for skill practice
    - explain the need for post training supervision and for receiving and providing constructive feedback
    - describe the importance of attributes such as patience and maturity

3644.04 Prepare a professional development/learning plan.

- Establish achievable career goals
    - Identify personal limitations and career growth
    - Identify pathways for continuous learning
- Research career opportunities within the sector
- Identify methods for researching professional development opportunities
    - networking to advance professional development and mentorship
- Develop a resume and cover letter
- Create a project portfolio

Instructional & Delivery Strategies
Instruction is presented using a variety of teaching methodologies, lectures, presentations, demonstration, case studies and assignments.

Evaluation Methods
Apprentices are evaluated through ongoing assessment and demonstration of proficiency. In all practical assignments, the unit is to evaluate the "Method of work" which includes application of theory.

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Appendix A

PPE and Safety Equipment

chaps/ballistic pants

chemical suit

ear protection

eye protection (various types)

eye wash kit

face shields

fall protection equipment

fire extinguisher

first aid kits

flares

gloves

hard hat

hearing protection

high visibility clothing

respiratory protections

safety boots or shoes

safety vests

scabbard/protective sheath

skin protection

spill kit

sun hat

sunblock

traffic cones

ventilation fans

Eye protection- CSA and/or ANSI approved: ▪ Goggles ▪ Prescription safety glasses ▪ Non-prescription safety glasses	Head protection CSA and/or ANSI approved: ▪ Hard hats Class E type ▪ Face protection ▪ CSA and/or ANSI approved ▪ Face shield	Hearing protection CSA and/or ANSI approved: ▪ Ear muffs ▪ Ear plugs ▪ Disposable foam plugs
Hand protection CSA and/or ANSI approved ▪ Work gloves ▪ Chainsaw gloves	Foot protection CSA and/or ANSI approved: ▪ Electrical resistive	Leg protection CSA and/or ANSI approved: ▪ Chainsaw pants ▪ Chaps
Fall Arrest ▪ Carabiner ▪ Safety snap, ▪ Shock absorbing lanyard		

Environmental Hazards ▪ Restricted visibility, i.e. glare, fog, darkness ▪ Wet/ice/snow conditions ▪ Wind ▪ Thunder & lightning ▪ Temperature extremes/seasonal fluctuations ▪ Residue of storm damage	Poisonous plants ▪ Poison Ivy ▪ Poison Parsnip ▪ Poison Sumac ▪ Giant Hogweed ▪ Monkshood

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Appendix B

Acronyms

ANSI	American National Standards Institute
ATV	all-terrain vehicles
CLS	Canadian Landscape Standard
CSA	Canadian Standards Association
EC	electrical conductivity
GFCI	ground fault circuit interrupter
GPS	global positioning systems
HVAC	heating, ventilation and air conditioning
ICPI	Interlocking Concrete Pavement Institute
IPM	integrated pest management
LID	low impact development
OEM	operator equipment manual
OH&S	Occupational Health and Safety
PMRA	Pest Management Regulatory Agency
PPE	personal protective equipment
ROP	rollover protection devices
TDG	Transportation of Dangerous Goods
UV	ultraviolet
WHMIS	Workplace Hazardous Material Information System

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Appendix C

Tools and Equipment

Hand Tools

axes
backpack sprayer
blocks
box cutters
brick carriers
brick splitter
brooms
bypass pruners
calculator
cart
chains
chisels (various types)
ladders (various types)
levels (various types)
loppers
microscope
nursery carts
paving stone cart
paving stone extractor
picks
pipe cutters
pliers (various types)
plumb line
pole pruners
pole saw
post hole auger
post maul
post pounder
pruning saw
pruning shears
pry bar
core samplers (probe)
crimpers
crowbars
cultivator (manual)
dibblers
dolly
edgers
files
flags
forks (various types)
grease guns
rakes (various types)
roller
scaffolding
screeding bars
screwdrivers (various types)
scythe
secateurs
seed/fertilizer spreader
sharpening tools
shears
shoring equipment
shovels (various types)
side cutters
sod lifter
soil screener
spades (various types)
sprinklers
spreaders (various types)
guillotine
hammers (various types)
hand plane
hand tamper
handheld watering equipment
handsaws (various types)
hedge shears
hex keys
hoes
knives (various types)
string line
square (various types)
tape measure
tarps
tie downs (various types)
transplant table
tree cart
trowels
water hose
water key
watering cans
weed digger
weed torch
wheelbarrow, trolley
wire cutters
wire strippers
wrenches (various types)

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Power Tools and Motorized Equipment

air seeder
attachments
chainsaw (pole)
circular saw
compressor
concrete saw (dry, wet)
core aerator
demolition hammer (electric)
demolition hammer (pneumatic)
electric drill
fertilizer injector
grinders (various types)
hammer drill
heat gun
hydro-seeders
lathe
mechanical diggers
misters
mitre/chop saw
mortar/cement mixer
mower/mulcher
powder-actuated tools
power auger
power cultivator (rototiller)
power pole saw
power seeder/ power spreader
power soil screener
power sprayer
power washers
powered wheelbarrow
reciprocating saw
sabre saw
saws
spider lifts
table saw
torch
tree spade
trencher
vacuum (various types)
vacuum lifter
walk-behind aerator
wet saw

Measuring Equipment

anemometer
automated plan scaler
barometer
catch can reader
compaction measuring device
EC meter
engineer levels
flow meter
gas meter
gauges
GPS
hygrometer
laser distance measure
levels (various types)
light meter
graduated cylinders (metric/imperial)
measuring wheel
moisture metre/sensor
monitoring devices
pH meter
scale ruler
scales
soil tester
measuring tape
tension meter
thermometer
timers & controllers
tire pressure meter
tree caliper
volt meter/multimeter
water meter

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Motorized Equipment

air compressors
all-terrain vehicles
backhoes
baggers
bale breaker
bed edger
blender (power)
blower trucks
blowers (various types)
brush cutter
chipper
circulation/exhaust fans
clearing saws
compactor (various types)
conveyor belts
de-thatchers (various types)
dollies
edgers
excavators
fertilizer injectors
flat filler
fork lift
generators
golf carts
guillotine under hand tools
hedge trimmer (various types)
hydro-seeding equipment
lifts (various types)
loaders (front end, pay)

mortar mixer
mower (various types)
mulcher
paddle broom
pallet jacks
peat shredder
pipe puller
pneumatic hammer
post hole auger
post pounders
pot filler
potting machines
power rake
powered rollers
powered wheelbarrow
pressure washer
pumps
rototiller
shredder (various types)
skid-steer (various types)
slit seeder
sod cutter
soil screener
steam cleaners
sterilizers
tractors
tree gantry
tree spades
trencher
trimmers (various types)
Trucks (flat bed)
vehicles with blades
walk behinds (various types)
walk-behind aerators
walk-behind snowblowers

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Equipment Attachments

aerator
auger/post hole digger
back hoe
blade
bucket (various types)
cultivator (various types)
de-thatcher
fertilizer spreader
flat deck
forks
graders (various types)
grapple
ladders
landscape rake
leaf vacuum
loaders
mower baggers
mowers
over-seeder
plough
power sweeper
rollers
seeders
snow equipment (various types)
spray equipment
spreader
top dresser
tow behind de-thatcher
tow behind trencher
trailer
tree dollies
tree spade
u-blade
vacuum
water tanker

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Appendix D

Ontario Horticultural Technician Plant List

	Deciduous Trees			
	Botanical Name	**Common Name**	**Family**	**Category**
1.	*Acer griseum*	Paperbark Maple	Sapindaceae (Aceraceae)	Deciduous Tree
2.	*Acer palmatum*	Japanese Maple	Sapindaceae (Aceraceae)	Deciduous Tree
3.	*Acer rubrum*	Red Maple	Sapindaceae (Aceraceae)	Deciduous Tree
4.	*Acer saccharum*	Sugar Maple	Sapindaceae (Aceraceae)	Deciduous Tree
5.	*Betula papyrifera*	Paper Birch	Betulaceae	Deciduous Tree
6.	*Betula pendula*	European Birch	Betulaceae	Deciduous Tree*
7.	*Cercis canadensis*	Canada Redbud	Fabaceae	Deciduous Tree
8.	*Cornus kousa var. chinensis*	Chinese Kousa Dogwood	Cornaceae	Deciduous Tree
9.	*Cotinus coggygria*	Smokebush	Anacardiaceae	Deciduous Tree
10.	*Crataegus x mordenensis* 'Toba' (and/or other cultivars)	Toba Hawthorn	Rosaceae	Deciduous Tree
11.	*Fagus sylvatica*	European Beech	Platanaceae	Deciduous Tree
12.	*Ginkgo biloba*	Gingko	Ginkgoaceae	Deciduous Tree
13.	*Gleditsia triacanthos var. inermis* (and/or cultivars)	Honey Locust	Fabaceae	Deciduous Tree
14.	*Juglans nigra*	Black Walnut	Juglandaceae	Deciduous Tree
15.	*Magnolia x soulangeana* (and/or other cultivars)	Saucer Magnolia	Magnoliaceae	Deciduous Tree
16.	*Malus* (and/or other cultivars)	Crabapple	Rosaceae	Deciduous Tree
17.	*Platanus x acerifolia*	London Plane Tree	Platanaceae	Deciduous Tree
18.	*Prunus serrulata 'Kwanzan' (and/or other cultivars)*	Kwanzan Cherry	Rosaceae	Deciduous Tree
19.	*Quercus rubra*	Red Oak	Fagaceae	Deciduous Tree
20.	*Robinia pseudoacacia*	Black Locust	Fabaceae	Deciduous Tree
21.	*Sorbus aucuparia*	European Mountain Ash	Rosaceae	Deciduous Tree
22.	*Syringa reticulata* 'Ivory Silk' (and/or other cultivars)	Ivory Silk Tree Lilac	Oleaceae	Deciduous Tree*
23.	*Tilia cordata* (and/or other cultivars)	Linden	Malvaceae (Tiliaceae)	Deciduous Tree

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Coniferous Trees				
	Botanical Name	**Common Name**	**Family**	**Category**
24.	*Abies concolor*	Silver Fir	Pinaceae	Coniferous Tree
25.	*Cupressus nootkatensis*	Weeping Nootka Cypress	Cupressaceae	Coniferous Tree
26.	*Larix laricina*	Eastern or American Larch	Pinaceae	Coniferous Tree
27.	*Metasequoia glyptostroboides*	Dawn Redwood	Cupressaceae	Coniferous Tree
28.	*Picea abies* (and/or other cultivars)	Norway Spruce	Pinaceae	Coniferous Tree
29.	*Picea glauca* (and/or other cultivars)	White Spruce	Pinaceae	Coniferous Tree
30.	*Picea pungens* 'Fastigiata' (and/or other cultivars)	Columnar Blue Spruce	Pinaceae	Coniferous Tree
31.	*Pinus banksiana*	Jack Pine	Pinaceae	Coniferous Tree
32.	*Pinus cembra*	Swiss Stone Pine	Pinaceae	Coniferous Tree
33.	*Pinus mugo* (and/or other cultivars)	Mugo Pine, Swiss Mountain Pine	Pinaceae	Coniferous Tree
34.	*Pinus nigra*	Austrian Pine	Pinaceae	Coniferous Tree
35.	*Pinus strobus*	Eastern White Pine	Pinaceae	Coniferous Tree
36.	*Pseudotsuga menziesii var. glauca*	Blue Douglas Fir	Pinaceae	Coniferous Tree
37.	*Thuja occidentalis* '*Smaragd*' Emerald (and/or other cultivars)	Emerald Cedar’	Cupressaceae	Coniferous Tree
38.	*Tsuga canadensis*	Canada Hemlock	Pinaceae	Coniferous Tree
Deciduous Shrubs				
	Botanical Name	**Common Name**	**Family**	**Category**
39.	*Amelanchier canadensis* (and/or other cultivars)	Serviceberry	Rosaceae	Deciduous Shrub
40.	*Berberis thunbergii* (and/or other cultivars) **	Japanese Barberry	Berberidaceae	Deciduous Shrub
41.	*Buddleija davidii* (and/or other cultivars)	Butterfly Bush	Buddlejaceae	Deciduous Shrub
42.	*Caryopteris x clandonensis* (and/or other cultivars)	Bluebeard or Blue Spirea or Blue Mist	Verbeneaceae	Deciduous Shrub
43.	*Chaenomeles japonica (*and/or other cultivars*)*	Flowering Quince	Rosaceae	Deciduous Shrub

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Deciduous Shrubs				
	Botanical Name	**Common Name**	**Family**	**Category**
44.	*Clethra alnifolia (*and/or other cultivars)	Summersweet	Clethraceae	Deciduous Shrub
45.	*Cornus alba 'Elegantissima'* (and/or other cultivars*)*	Silverleaf Dogwood	Cornaceae	Deciduous Shrub
46.	*Cornus sericea 'Flaviramea' (*and/or other cultivars*)*	Yellow twig Dogwood	Cornaceae	Deciduous Shrub
47.	*Cotoneaster apiculatus (*and/or other cultivars*)*	Cranberry Cotoneaster	Rosaceae	Deciduous Shrub
48.	*Deutzia gracilis* (and/or other cultivars)	Slender Deutzia	Hydrangeaceae	Deciduous Shrub
49.	*Euonymus alatus ' Compactus'* (and/or other cultivars) **	Dwarf Burning Bush	Celastraceae	Deciduous Shrub
50.	*Forsythia x intermedia* (and/or other cultivars*)*	Showy Forsythia	Oleaceae	Deciduous Shrub
51.	*Hibiscus syriacus (*and/or other cultivars)	Rose-of-Sharon	Malvaceae	Deciduous Shrub
52.	*Hydrangea arborescens 'Annabelle' (and/or other cultivars)*	Annabelle Hydrangea	Hydrangeaceae	Deciduous Shrub
53.	*Hydrangea paniculata* (and/or other cultivars*)*	Peegee Hydrangea	Hydrangeaceae	Deciduous Shrub
54.	*Hydrangea quercifolia* (and/or other cultivars*)*	Oakleaf Hydrangea	Hydrangeaceae	Deciduous Shrub
55.	*Kerria japonica* (and/or other cultivars)	Japanese Kerria	Rosaceae	Deciduous Shrub
56.	*Ligustrum amurense* (and/or other cultivars)	Amur Privet	Oleaceae	Deciduous Shrub
57.	*Linnaea (Kolkwitzia) amabilis (*and/or other cultivars)	Beautybush	Caprifoliaceae	Deciduous Shrub
58.	*Lonicera* (and/or other cultivars) **	Honeysuckle	Caprifoliaceae	Deciduous Shrub
59.	*Philadelphus coronarius (*and/or other cultivars)	Mockorange	Hydrangeaceae	Deciduous Shrub
60.	*Physocarpus opulifolius (*and/or other cultivars*)*	Ninebark	Rosaceae	Deciduous Shrub
61.	*Potentilla fruticosa (*and/or other cultivars)	Cinquefoil	Rosaceae	Deciduous Shrub
62.	*Prunus x cistena*	Purple Leaved Sandcherry	Rosaceae	Deciduous Shrub

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Deciduous Shrubs				
	Botanical Name	**Common Name**	**Family**	**Category**
63.	*Rhus typhina (*and/or other cultivars)	Sumac	Anacardiaceae	Deciduous Shrub
64.	*Ribes alpinum*	Alpine Currant	Grossulariaceae	Deciduous Shrub
65.	*Rosa (*and/or other cultivars)	Rose	Rosaceae	Deciduous Shrub
66.	*Salix* (and/or other cultivars)	Willow	Salicaceae	Deciduous Shrub
67.	*Sambucus (*and/or other cultivars)	Elderberry	Adoxaceae	Deciduous Shrub
68.	*Sorbaria sorbifolia* (and/or other cultivars)	Ural False Spirea	Rosaceae	Deciduous Shrub
69.	*Spiraea bumalda 'Goldflame' (*and/or other cultivars)	Goldflame Spirea	Rosaceae	Deciduous Shrub
70.	*Symphoricarpos albus*	Snowberry	Caprifoliaceae	Deciduous Shrub
71.	*Syringa meyeri (*and/or other cultivars)	Meyers Lilac	Oleaceae	Deciduous Shrub
72.	*Syringa vulgaris (and/or other cultivars)*	Common Lilac	Oleaceae	Deciduous Shrub
73.	*Syringa x prestoniae (*and/or other cultivars)	Preston Lilac	Oleaceae	Deciduous Shrub
74.	*Viburnum lantana*	Wayfaring Tree	Adoxaceae	Deciduous Shrub
75.	*Viburnum lentago*	Nannyberry	Adoxaceae	Deciduous Shrub
76.	*Viburnum opulus 'Nanum' (*and/or other cultivars*)*	Dwarf European Cranberry	Adoxaceae	Deciduous Shrub
77.	*Weigela florida (*and/or other cultivars)	Weigela	Caprifoliaceae	Deciduous Shrub
Evergreen Shrubs				
	Botanical Name	**Common Name**	**Family**	**Category**
78.	*Buxus sinica var. insularis* 'Green Velvet' (and/or other cultivars)	Green Velvet Boxwood	Buxaceae	Broadleaf Evergreen Shrub
79.	*Chamaecyparis pisifera 'Filifera Aurea' (*and/or other cultivars)	Golden Threadleaf False Cypress	Cupressaceae	Evergreen Shrub
80.	*Daphne cneorum*	Garland Daphne	Thymelaeaceae	Evergreen Shrub
81.	*Euonymus fortunei (*and/or other cultivars)	Euonymus	Celastraceae	Broadleaf Evergreen Shrub
82.	*Juniperus horizontalis (*and/or other cultivars*)*	Horizontal Juniper	Cupressaceae	Evergreen Shrub/ Groundcover

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Evergreen Shrubs				
	Botanical Name	**Common Name**	**Family**	**Category**
83.	*Juniperus communis 'Green Carpet' (*and/or other cultivars)	Green Carpet Juniper	Cupressaceae	Evergreen Shrub/ Groundcover
84.	*Juniperus sabina 'Tamariscifolia' (*and/or other cultivars)	Tamarix Juniper	Cupressaceae	Evergreen Shrub/ Groundcover
85.	*Juniperus scopulorum* (and/or other cultivars)	Rocky Mountain Juniper	Cupressaceae	Coniferous Shrub
86.	*Juniperus squamata* 'Blue Star' (and/or other cultivars)	Blue Star Juniper	Cupressaceae	Evergreen Shrub/Groundcover
87.	*Juniperus virginiana* (and/or other cultivars)	Eastern Red Cedar	Cupressaceae	Evergreen Shrub
88.	*Mahonia aquifolium*	Oregon Grape Holly	Berberidaceae	Broadleaf Evergreen Shrub
89.	*Picea abies 'Pendula'* (and/or other cultivars)	Weeping Norway Spruce	Pinaceae	Coniferous Shrub
90.	*Picea glauca 'Conica'*	Dwarf Alberta Spruce	Pinaceae	Coniferous Shrub
91.	*Pieris japonica (*and/or other cultivars)	Japanese Pieris	Ericaceae	Broadleaf Evergreen Shrub
92.	*Rhododendron (*and/or other cultivars)	Rhododendron	Ericaceae	Broadleaf Evergreen Shrub
93.	*Taxus cuspidata 'Capitata'* (and/or other cultivars)	Upright Japanese Yew	Taxaceae	Coniferous Shrub
94.	*Taxus x media 'Densiformis'*	Dense Yew	Taxaceae	Coniferous Shrub
95.	*Thuja occidentalis* (and/or other cultivars)	White Cedar	Cupressaceae	Coniferous Shrub
96.	*Yucca filamentosa* (and/or other cultivars)	Adam's Needle	Agavaceae	Broadleaf Evergreen Shrub
Vines				
	Botanical Name	**Common Name**	**Family**	**Category**
97.	*Campsis radicans***	Trumpet Vine	Bignoniaceae	Deciduous Vine
98.	*Clematis* (and/or other cultivars)	Clematis	Ranunculaceae	Deciduous Vine
99.	*Hedera helix* (and/or other cultivars) **	English Ivy	Araliaceae	Evergreen Vine/Groundcover
100.	*Hydrangea anomala ssp. petiolaris (*and/or other cultivars)	Climbing Hydrangea	Saxifragaceae	Deciduous Vine
101.	*Lonicera x brownii* 'Dropmore Scarlet' (and/or other cultivars)	Honeysuckle	Caprifoliaceae	Deciduous Vine
102.	*Parthenocissus quinquefolia* (and/or other cultivars)	Virginia Creeper	Vitaceae	Deciduous Vine/Groundcover

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Vines	**Botanical Name**	**Common Name**	**Family**	**Category**
103.	*Parthenocissus tricuspidata 'Veitchi'* (and/or other cultivars)	Boston Ivy	Vitaceae	Deciduous Vine/Groundcover
104.	*Wisteria sinensis (*and/or other cultivars)	Chinese Wisteria	Fabaceae	Deciduous Vine
Perennials				
	Botanical Name	**Common Name**	**Family**	**Category**
105.	*Aegopodium podagraria***	Snow on the Mountain / Goutweed	Apiaceae	Perennial, Groundcover
106.	*Ajuga reptans (and/or other cultivars)*	Carpet Bugleweed	Lamiaceae	Semi- Evergreen Groundcover
107.	*Alchemilla mollis* (and/or other cultivars)	Lady's Mantle	Rosaceae	Perennial
108.	*Allium giganteum (*and/or other cultivars)	Giant Onion	Amaryllidaceae	Bulb
109.	*Aquilegia vulgaris* (and/or other cultivars)	Columbine	Ranunculaceae	Perennial
110.	*Arabis caucasia (*and/or other cultivars)	Rock/Wall Cress	Brassicaceae	Perennial
111.	*Artemisia schmidtiana (*and/or other cultivars*)*	Silver Mound	Asteraceae	Perennial
112.	*Aster (*and/or other cultivars)	Common Aster	Asteraceae	Perennial
113.	*Astilbe (*and/or other cultivars)	Astilbe	Saxifragaceae	Perennial
114.	*Bergenia cordifolia* (and/or other cultivars)	Heartleaf Bergenia	Saxifragaceae	Perennial (Evergreen)
115.	*Brunnera macrophylla* (and/or other cultivars)	Siberian Bugloss	Boraginaceae	Perennial
116.	*Campanula carpatica (*and/or other cultivars) **	Carpathian Bellflower	Campanulaceae	Perennial
117.	*Convallaria majalis* (and/or other cultivars) **	Lily-of-the-Valley	Asparagaceae	Perennial
118.	*Coreopsis verticillata*	Tickseed	Asteraceae	Perennial
119.	*Cornus canadensis*	Bunchberry	Cornaceae	Groundcover
120.	*Crocus* (and/or other cultivars)	Crocus	Iridaceae	Bulb (corm)

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Perennials				
	Botanical Name	**Common Name**	**Family**	**Category**
121.	*Delphinium* (and/or other cultivars)	Perennial Larkspur	Ranunculaceae	Perennial
122.	*Dendranthema* (and/or other cultivars) *(formerly Chrysanthemum)*	Garden Mum	Asteraceae	Perennial
123.	*Dianthus species (*and or other cultivars)	Pinks	Caryophyllaceae	Perennial
124.	*Echinacea purpurea (*and/or other cultivars)	Purple Coneflower	Asteraceae	Perennial
125.	*Euphorbia polychroma* (and/or other cultivars)	Golden Spurge	Euphorbiaceae	Perennial
126.	*Gaillardia x grandiflora* (and/or other cultivars)	Blanketflower	Asteraceae	Perennial
127.	*Geranium species (*and/or other cultivars)	Geranium	Geraniaceae	Perennial
128.	*Hemerocallis (*and/or other cultivars)	Daylily	Liliaceae	Perennial
129.	*Heuchera (*and/or other cultivars)	Coralbells/Alumroot	Saxifragacea	Perennial
130.	*Hosta (*and/or other cultivars)	Hosta	Asparagaceae	Perennial
131.	*Hyacinthus orientalis (*and/or other cultivars*)*	Hyacinth	Asparagaceae	Bulb
132.	*Hylotelephium spectabile (*and/or other cultivars)	Stonecrop or Sedum	Crassulaceae	Perennial
133.	*Iris sibirica (*and/or other cultivars)	Siberian Iris	Iridaceae	Perennial
134.	*Lamium maculatum* (and/or other cultivars) **	Lamium, Dead Nettle	Lamiaceae	Groundcover
135.	*Lamprocapnos spectabilis* (and/or other cultivars) (formerly Dicentra)	Bleeding Heart	Papaveraceae	Perennial
136.	*Lavandula angustifolia* (and/or other cultivars)	English Lavender	Lamiaceae	Perennial
137.	*Leucanthemum x superbum (*and/or other cultivars*)*	Shasta Daisy	Asteraceae	Category
138.	*Liatris spicata (*and/or other cultivars)	Blazing Star	Asteraceae	Perennial
139.	*Ligularia dentata* (and/or other cultivars)	Ligularia	Asteraceae	Perennial
140.	*Lilium* (and/or other cultivars)	Asiatic Lily	Liliaceae	Bulb

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Perennials				
	Botanical Name	**Common Name**	**Family**	**Category**
141.	*Matteuccia struthiopteris* (and/or other cultivars)	Ostrich Fern	Onocleaceae	Perennial
142.	*Monarda didyma* (and/or other cultivars)	Bee Balm	Lamiaceae	Perennial
143.	*Narcissus (*and/or other cultivars)	Daffodil	Amaryilidaceae	Bulb
144.	*Paeonia lactiflora* (and/or other cultivars)	Garden Peony	Paeoniaceae	Perennial
145.	*Papaver orientale* (and/or other cultivars)	Oriental Poppy	Papaveraceae	Perennial
146.	*Perovskia atriplicifolia* (and /or other cultivars)	Russian Sage	Lamiaceae	Perennial
147.	*Phlox subulata* (and/or other cultivars)	Creeping Phlox	Polemoniaceae	Perennial (Semi-Evergreen Groundcover)
148.	*Primula* (and/or other cultivars)	Primrose	Primulaceae	Perennial
149.	*Pulmonaria (*and/or other cultivars)	Lungwort	Boraginaceae	Perennial
150.	*Rudbeckia fulgida var. sullivantii 'Goldsturm'* (and/or other cultivars)	Goldsturm Black-Eyed Susan	Asteraceae	Perennial
151.	*Salvia (*and/or other cultivars)	Salvia	Lamiaceae	Perennial
152.	*Sedum* (and/or other cultivars)	Sedum	Crassulaceae	Perennial
153.	*Sempervivum tectorum* (and/or other cultivars)	Hens and Chicks	Crassulaceae	Perennial
154.	*Thymus pseudolanuginosus*	Woolly Thyme	Lamiaceae	Perennial
155.	*Thymus serpyllum* (and/or other cultivars)	Mother of Thyme	Lamiaceae	Groundcover
156.	*Trollius europaeus (*and/or other cultivars)	Globeflower	Ranunculaceae	Perennial
157.	*Tulipa* (and/or other cultivars)	Tulip	Liliaceae	Bulb
158.	*Veronica spicata* (and/or other cultivars)	Spike Speedwell	Plantaginaceae	Perennial
159.	*Vinca minor (*and/or other cultivars) **	Periwinkle	Apocynaceae	Evergreen Groundcover
	***** may be considered an invasive species in some regions***			

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Ornamental Grasses				
	Botanical Name	**Common Name**	**Family**	**Category**
160.	*Andropogon gerardii*	Big Bluestem	Poaceae	Perennial Grass
161.	*Calamagrostis x acutiflora* (and/or other cultivars)	Feather Reed Grass	Poaceae	Perennial Grass
162.	*Festuca glauca* (and/or other cultivars)	Blue Sheep Fescue	Poaceae	Perennial Grass
163.	*Helictotrichon sempervirens* (and/or other cultivars)	Blue Oat Grass	Poaceae	Perennial Grass
164.	*Imperata cylindrica* 'Red Baron'	Japanese Blood Grass	Poaceae	Perennial Grass
165.	*Miscanthus sinensis* (and/or other cultivars) ** - Not all are invasive	Maiden Grass	Poaceae	Perennial Grass
166.	*Molinia arundinacea* 'Skyracer' (and/or other cultivars)	Tall Moor Grass	Poaceae	Perennial Grass
167.	*Pennisetum alopecuroides* (and/or other cultivars)	Fountain Grass	Poaceae	Perennial Grass
168.	Pennisetum Setaceum 'Rubrum' (and/or other cultivars)	Purple Fountain Grass	Poaceae	Perennial Grass
169.	*Phalaris arundinacea var. picta* (and/or other cultivars)**	Ribbon Grass	Poaceae	Perennial Grass
170.	*Saccharum ravennae*	Hardy Pampas Grass	Poaceae	Perennial Grass
Annuals				
	Botanical Name	**Common Name**	**Family**	**Category**
171.	*Ageratum houstonianum* (and/or other cultivars)	Floss Flower	Asteraceae	Annual
172.	*Antirrhinum majus* (and/or other cultivars)	Snapdragons	Scrophulariaceae	Annual
173.	*Begonia hybrids* (and/or other cultivars)	Fibrous Begonia	Begoniaceae	Annual
174.	*Begonia x tuberhybrida* (and/or other cultivars)	Hybrid Tuberous Begonia	Begoniaceae	Annual
175.	*Canna generalis* (and/or other cultivars)	Garden Canna	Cannaceae	Rhizome
176.	*Celosia argentea var. cristata* (and/or other cultivars)	Cockscomb	Amaranthaceae	Annual

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Annuals				
Botanical Name		**Common Name**	**Family**	**Category**
177.	*Cleome hasslerana* (and/or other cultivars)	Spider Flower	Capparaceae	Annual
178.	*Dahlia* (and/or other cultivars)	Dahlia	Asteraceae	Tuber
179.	*Impatiens walleriana* (and/or other cultivars)	Impatiens	Balsaminaceae	Annual
180.	*Lantana camara* (and/or other cultivars)	Lantana	Verbeneaceae	Annual
181.	*Lobelia erinus* (and/or other cultivars)	Lobelia	Lobeliaceae	Annual
182.	*Lobularia maritima* (and/or other cultivars)	Alyssum	Brassicaceae	Annual
183.	*Pelargonium (*and/or other cultivars)	Geranium	Geraniaceae	Annual
184.	*Petunia (*and/or other cultivars)	Petunia	Solanaceae	Annual
185.	*Plectranthus scutellaroides* (Formerly Coleus) (and/or other cultivars)	Coleus	Lamiaceae	Annual
186.	*Senecio cineraria* (and/or other cultivars) (formerly *Centaurea cineraria)*	Dusty Miller – "Silver Dust"	Asteraceae	Annual
187.	*Tagetes* (and/or other cultivars)	Marigold	Asteraceae	Annual
188.	*Viola* (and/or other cultivars)	Pansy	Violaceae	Annual
Turfgrass				
	Botanical Name	**Common Name**	**Family**	**Category**
189.	*Digitaria sanguinalis*	Large Crabgrass	Poaceae	Turfgrass
190.	*Festuca rubra ssp. Litoralis*	Creeping Red Fescue	Poaceae	Turfgrass
191.	*Lolium perenne*	Perennial Ryegrass	Poaceae	Turfgrass
192.	*Poa pratensis*	Kentucky Bluegrass	Poaceae	Turfgrass

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Invasive Plants- As per Invasive Species List Ontario - Terrestrial Invasive Plants (August 2020)				
	Botanical Name	**Common Name**	**Family**	**Category**
193.	*Campanula rapunculoides*	Creeping Bellflower	Campanulaceae	Invasive species
194.	*Euphorbia escula*	Leafy Spurge	Euphorbiaceae	Invasive species
195.	*Impatiens glandulifera*	Himalayan Balsam	Balsaminaceae	Invasive species
196.	*Iris pseudacorus*	Yellow Flag Iris	Iridaceae	Invasive species
197.	*Leucanthemum vulgare*	Oxeye Daisy	Asteraceae	Invasive species
198.	*Linaria dalmatica*	Dalmatian Toadflax	Plantaginaceae	Invasive species
199.	*Lythrum salicaria*	Purple Loosestrife	Lythraceae	Invasive species
200.	*Tanacetum vulgare*	Common Tansy	Asteraceae	Invasive species

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Appendix E
Glossary

abiotic factors	non-living condition or thing, such as climate or habitat, that influences or affects an ecosystem and the organisms in it. Abiotic variables found in terrestrial ecosystems can include things like rain, wind, temperature, altitude, soil, pollution, nutrients, pH, types of soil, and sunlight. The boundaries of an individual abiotic factor can be just as unclear as the boundaries of an ecosystem.
action threshold	before taking any pest control action, IPM first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic threat is critical to guide future pest control decisions.
aeration	in soil, the process by which air from the atmosphere is brought into the soil. Usually to reverse loss of macropores resulting from compaction.
aggregates	broad category of particulate material used in landscape construction, including sand, gravel, crushed stone, slag, recycled concrete etc.
annual	plant that completes its life cycle, from germination to the production of seed, within one year, and then dies.
anti-desiccants	compounds applied to plants to reduce dehydration
asexual propagation	Asexual propagation involves taking a part of one parent plant and causing it to regenerate itself into a new plant. The resulting new plant is genetically identical its parent. Asexual propagation involves the vegetative parts of a plant: stems, roots, or leaves.
balled-and-burlapped (B&B)	relating to a tree, shrub or other plant prepared for transplanting by allowing the roots to remain covered by a ball of soil around which burlap is tied and sometimes reinforced with a rope or a wire basket.
bedding material	layer of material placed over a compacted base on which interlocking/segmental pavers, flagstone etc. will be installed.
biennial	flowering plant that takes two years to complete its biological lifecycle.

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biodiversity	the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems. Short for biological diversity.
biome	a large, naturally-occurring, community of flora and fauna occupying a habitat.
bioswales	landscape elements used to remove silt and pollution from surface runoff water. They consist of a swaled drainage course with gently sloped sides and filled with vegetation, compost and/or riprap.
biotic factors	refer to the living organisms that affect plant growth and development in various ways. These organisms, both macro- and micro-organisms, are the living components of the environment which influence the manifestation of the genetic factor on phenotypic expression.
blue infrastructure	landscape elements which are linked to water such as pools, ponds and pond systems, wadis, artificial buffer basins or water courses.
botany	scientific study of plants, including their physiology, structure, genetics, ecology, distribution, classification, and economic importance.
brown field reclamation	redevelopment of abandoned, vacant, derelict or underutilized commercial and industrial properties where past actions have resulted in actual or perceived contamination.
bud	small lateral or terminal protuberance on the stem of a plant that may develop into a flower, leaf, or shoot.
bulbs	underground storage structure that is the resting stage of certain seed plants, particularly perennial monocotyledons, that grows into a new plant when growing conditions are favourable.
calibrate	the process of measuring products and adjusting components in order to deliver the desired volume. (Used for sprayers and fertilizer spreaders).
Canadian Landscape Standard (CLS)	Is a document of acceptable Canadian landscape construction practices as agreed upon by the Canadian Society of Landscape Architects, the Canadian Nursery Landscape Association, government authorities and other industry associations. The CLS sets guidelines and makes recommendations for all major aspects of the landscape industry. It is intended that the CLS will set guidelines for landscape construction projects across Canada. It is

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	intended for use by anyone who specifies landscape work, including landscape architects, landscape designers, municipal parks, planning departments, procurement departments, and allied organizations. It is intended for landscape contractors to support them in the bid process and industry-related educational and training programs. Although the standard is not a specification, it will help streamline the specification writing process by referencing one nationally recognized industry standard.
canker	localized diseased or necrotic area on a trunk, branch, or twig of a woody plant, usually caused by fungi or bacteria.
canopy raising	removal of lower branches from the tree crown to provide understorey clearance.
capstone	one of a set of slabs on the top of a wall or structure.
carbon capturing	trapping carbon emissions and storing them away from the atmosphere to prevent climate change.
catch basins	receptacle or reservoir that receives surface water runoff or drainage.
change orders	written order approved by a project owner directing the contractor to change contract amount, requirements, or time.
chemical	any basic substance that is used in or produced by a reaction involving changes to atoms or molecules.
circle check	a circle check is a visual, and sometimes physical, inspection of a piece of equipment (e.g., truck, trailer, forklift, etc.). It involves walking all the way around the equipment to ensure there are no safety concerns.
climate control	Is the process of producing particular conditions to regulate the growing and storage environment for temperature, ventilation and humidity.
climate control systems	adjustable systems installed to grow crops with optimum efficiency. They control the indoor climate including; light, temperature, air exchange, humidity and CO2 concentration. (greenhouse, cold storage facilities etc.).
codes	Are safety standards, construction technologies and techniques that must be complied to and regulated by municipal, provincial and federal codes such as: electrical, building, plumbing and fire codes etc.

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companion planting	close planting of different plants that enhance each other's growth or protect each other from pests.
compost	decayed organic material used as a soil conditioner, amendment or plant fertilizer.
concrete	mixture of gravel, sand, cement, and water that can be spread or formed and forms a stone-like mass upon hardening.
confined space	is a space that is not designed and constructed for continuous human occupancy- it has limited access and may cause atmospheric and ventilation hazards for workers.
coniferous	mostly needle-leaved or scale-leaved, chiefly evergreen, cone-bearing gymnospermous plants of the order Coniferales, such as pines, spruces, and firs.
contaminant	biological, chemical, physical, or radiological substance (normally absent in the environment) which, in sufficient concentration, can adversely affect living organisms through air, water, soil, and/or food.
contract	an agreement between parties to perform work or provide goods, including an agreement or order for the procurement of supplies or services.
corm	rounded underground storage organ present in plants such as crocuses, gladioli, and cyclamens, consisting of a swollen fleshy stem base covered with thin external scale leaves; corms differ from bulbs in having much more stem tissue and fewer scale leaves.
cropping schedule	schedule to grow plants to marketable size at the right time of year.
cultivar	a plant variety that has been produced in cultivation by selective breeding.
cultivation	the planting, tending, improving, or harvesting of crops or plants; or the preparation of ground to promote plant growth.
cut-and-fill	adding or removing to achieve grade whereby the amount of material from cuts roughly matches the amount of fill needed.
cuttings	plant cutting, also known as striking or cloning, is a technique for vegetatively (asexually) propagating plants in which a piece of the stem or root of the source plant is placed in a suitable medium to grow.

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deadhead	remove spent flower heads from a plant to encourage further blooming.
deciduous	trees, shrubs, and herbaceous perennials that shed their leaves for part of the year due to dormancy.
defoliation	to strip (a tree, bush, etc.) of leaves.
desiccation	drying out of a living organism, such as when plants are exposed to sunlight or drought.
design principles	include the component principles of repetition, variety, balance, emphasis, sequence (rhythm) and scale as they are applied to the quality of a design.
dethatch	mechanical removal from a lawn of the layer of dead turfgrass tissue known as "thatch."
dichotomous key	analytical guide to the identification of plants, based on the use of contrasting characters to subdivide a group under study into branches.
disease	abnormal growth or dysfunction of a plant caused by an interruption in the normal life cycles of a plant. Disease can be caused by biotic or abiotic factors.
dormancy	period in an organism's life cycle when growth and development are temporarily stopped, due to low temperatures that slow chemical activity.
ecosystem	biological community of interacting organisms and their physical environment.
efflorescence	white powdery substance on the surfaces of unsealed concrete caused by migrating vapour bringing soluble salts to the surface.
electrical conductivity (EC)	is a measurement of the dissolved material in an aqueous solution, which relates to the ability of the material to conduct electrical current through it.
environmental stewards	individuals who responsibly use and protect the natural environment through conservation and sustainable practices.
fertigation	application of fertilizers, soil amendments, or other water soluble products through an irrigation system.
fertilizer	a chemical or natural substance added to soil or land to increase its productivity.
filtration systems	process of filtering liquids or gases, such as air, through a filter in order to remove solid particles.

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foot baths	a tub or mat containing disinfectants to provide sanitation protection of the footwear of all workers/visitors entering growing area to prevent the introduction of soil-borne pests and diseases from contaminating crops.
gall	abnormal outgrowths of plant tissues caused by many living organisms living on plants including insects, mites, fungi, parasites, and bacteria.
geotextile	permeable synthetic fabrics which, when used in association with soil, have the ability to separate, modify drainage, filter, reinforce, protect, or drain and serves as a weed barrier.
germination	the process by which a plant grows from a seed. Examples include the sprouting of seedlings from a seed of an angiosperm or gymnosperm and the growth of hyphae from fungal spores.
grades	specified elevations of existing terrain or base.
grading	the work of altering existing terrain, base or an elevation or slope to meet specifications for work such as a foundation, base, landscape feature or surface drainage.
green infrastructure	planned and managed technologies that mitigate pollution and provide ecosystems that support healthy living. Green infrastructure takes many forms including but is not limited to the following: urban forests, natural areas, greenways, streams and riparian zones, meadows and agricultural lands; green roofs and green walls; parks, gardens and landscaped areas, community gardens, and other green open spaces; rain gardens, bio-swales, engineered wetlands, rainwater and stormwater management systems and permeable hard surfaces.
green roof	a green roof system is an improvement of an existing roof which includes a water proofing and root repellant system, a drainage system, filter cloth, a lightweight growing medium and plants.
grey infrastructure	includes stormwater management, pipes and sewers, utilities, and buildings.
growing media	the material that plants grow in with three main functions: to supply roots with nutrients, air, and water, to support maximum root growth, and to physically support the plant.
growth habits	general appearance, form (shape) and manner of growth of a plant.
guy	cable designed to add stability to a tree or free-standing structure.

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hardiness	describes a plant's ability to tolerate and survive adverse growing conditions such as cold, heat, drought, flooding, or wind.
hardscape	components of the design and construction of any landscape project that deals with a range of materials that include brick, stone, wood, metals or other natural or fabricated materials used in construction of the built landscape including streets, walkways, structures, walls, street amenities, pools and fountains, and fireplaces and fire pits etc.
heading	cutting back the terminal portion of a branch to a bud. A term whose subcategories include "topping" and "pollarding."
herbaceous	plants or plant parts that are fleshy as opposed to woody and that dies back to the ground at the end of each growing season.
integrated pest management (IPM)	an approach to planning and managing pests that uses a combination of cultural, biological, mechanical and chemical methods to reduce pest populations to acceptable levels and with the least disruption to the environment, starting with the least toxic control first.
invasive species	nonindigenous plants that invade agricultural and natural areas causing serious damage to Canada's economy and environment and sometimes harm to human health.
irrigation controllers	device to operate automatic irrigation systems such as lawn sprinklers and drip irrigation systems and that have a means of setting the frequency of irrigation, the start time, and the duration of watering.
irrigation systems	systems that deliver and distribute water to the landscape and horticultural crops (greenhouse and nursery), for the purpose of growing and maintaining moisture during periods of inadequate rainfall. Components of these systems typically include sprinklers, nozzles, controllers, bubblers, drip emitters, valves, backflow prevention, pipe etc.
joint materials	compounds used to fill the space between adjacent paving units and wall stone. May be bound or unbound. Including: sand, polymeric sand, cement mortars, resin mortars, etc.
layering	propagation method by which a branch/shoot takes root while still attached to the parent plant.
let-it-lie	leave in place, let lie, take no action, not removing natural debris in forested and natural areas.
lifts	layers of soil or aggregate fill.

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liming	treatment of soil or water with lime to reduce acidity (increasing pH) and improve fertility or oxygen levels.
liners	young, immature plants intended for 'growing-on' to mature sizes in nurseries, either by lining-out in the field or in containers. Typically, 1 or 2 years old and often sold bare-root or in small containers.
load distribution requirements	a load distributed evenly over the entire length of a structural member or the surface of a vehicle, trailer, floor, or roof expressed in weight per length or weight per area.
lock-out/tag-out	a safety procedure used in workplaces to protect workers by tagging dangerous tools, equipment and machines and ensuring that the energy source is locked out to prevent accidental use or start up prior to the completion of maintenance or servicing work.
low impact development (LID)	planning and engineering design approach to managing stormwater runoff. Its basic principle is modelled after nature. LID's goal is to mimic a site's pre-development hydrology by using design technologies that infiltrate, filter, store, evaporate and detain runoff close to its source.
microclimate	local climate conditions of a specific area that include temperature, light, wind and moisture and influenced by walls, fences, slope, elevation, exposure and orientation.
micro-propagation	propagation of plants from very small plant parts, tissues or cells grown in a test tube or container where the environment and nutrition are rigidly controlled.
minimum tillage	a soil conservation system with the goal of minimum soil manipulation. It is a tillage method that does not turn the soil over.
morphology	a branch of biology that deals with the form and structure of animals and plants, including reproductive structures, and the pattern of development.
mulch	layer of bark, peat moss, compost, shredded leaves, hay or straw, lawn clippings, gravel, paper, plastic or other material spread over the soil around the base of plants primarily to reduce weeds, decrease evaporation, and promote the soil microbiome and improve aesthetics.
organics	a substance such as a fertilizer of plant or animal origin or a pesticide whose active component is an organic compound or a mixture of organic compounds.

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overseed	to spread grass seed on turf or an established lawn to fill in thin or bare spots.
pathogen	biological agent that causes disease or illness to its host by disrupting the normal physiology. Can be a fungus, virus, bacteria or parasite.
peat moss	spongy organic soil amendment used to increase acidity, organic matter, aeration and water retention of soil. Sphagnum peat moss is generally considered to be highest in quality. Most soilless mix features peat as its main ingredient.
perennial	a non-woody plant which grows and lives for more than two years.
pest	An organism that spreads disease, causes destruction or otherwise a nuisance- reduces the productivity or health of plants
physiology	plant physiology is the study of vital processes and functional activity occurring in plants in relation to its survival, metabolic activities, water relations, mineral nutrition, development, movement, irritability, organization, growth and transport processes.
phytosanitary certificate	is an official document issued by the plant protection organization of the exporting country to the plant protection organization of the importing country. It certifies that the plants or plant products covered by the certificate have been inspected according to appropriate procedures and are considered to be free from quarantine pests and that they are considered to conform with the current phytosanitary regulations of the importing country.
pinching	Is a technique for removing new growth or suckers etc. from a plant to encourage branching or strengthen the growth of the plant.
plant classification	Is way to group plants, while there are many ways to structure plant classification, one way is to group them into vascular and non-vascular plants, seed bearing and spore bearing, and angiosperms and gymnosperms. Plants can also be classified as grasses, herbaceous plants, woody shrubs, and trees.
plant hardiness zone map	the plant hardiness zones map outlines the different zones in Canada where various types of trees, shrubs and flowers will most likely survive. It is based on the average climatic conditions of each area and based on a wide range of climatic variables, including minimum winter temperatures, length of the frost-free period, summer rainfall, maximum temperatures, snow cover, January rainfall and maximum wind speed. In Canada, the map is divided into nine major zones: the

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	harshest is 0 and the mildest is 8. Subzones (e.g., 4a or 4b, 5a or 5b) are also noted in the map legend.
plugs	cylinder of medium in which a plant is grown. The term is generally used for seedlings and rooted cuttings.
plant propagation	Plant propagation is the process of creating new plants. There are two types of propagation: sexual and asexual. Sexual reproduction is the union of the pollen and egg, drawing from the genes of two parents to create a new, third individual. Sexual propagation involves the floral parts of a plant. Techniques of propagation include stem cuttings, hardwood stem cuttings, semi-hardwood stem cuttings, softwood stem cuttings.
positive drainage	grade that ensures that surface water drains away from all structures on a property so as not to damage structures and buildings on a site.
potting-on	transplanting a plant from a smaller container, upgrading to a bigger container in the growing-on process (also called bumping-up).
pruning	the selective cutting and removing of parts of a tree or shrub. It covers a number of horticultural techniques that control growth, shape, remove dead or diseased wood, and may stimulate the formation of flowers and fruit buds. Pruning often means cutting branches back, sometimes removing smaller limbs entirely to preserve or improve plant health and structure.
quarantine	confinement or isolation of plants or plant products suspected of carrying an infectious agent for observation and research or for further inspection, testing and/or treatment for a period of time, in an effort to prevent disease from spreading.
rainwater management	collection and storage of rainwater (often in storage units on rooftops), for reuse on-site, rather than allowing it to run off. Potential uses include water for garden, irrigation, domestic use with proper treatment, etc.
regeneration	Is the process of renewal, restoration and growth of plants, soils and ecosystems.
refugia	area where populations of organisms (plants and animals) can survive through a period of unfavourable conditions.
retention ponds	Retention ponds are ponds or pools designed with additional storage capacity to attenuate surface runoff during rainfall events. They consist of a permanent pond area with landscaped banks and

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	surroundings to provide additional storage capacity during rainfall events.
ribbon tests	simple method used to estimate the percentage of sand, silt and clay in a soil sample.
rootstock	the root or part of a root used for plant propagation. In grafting the rootstock is that part of a grafted plant that supplies the roots.
rotating crops	a system in which crops are grown on different sections of a plot on a three- or four-year cycle to build soil fertility, boost yields and economic returns, and minimize the negative impact of soil-borne pests and diseases.
scarify	to break up and loosen (soil) to a shallow depth. Roughing up the surface of a root ball that has circling roots.
scion wood	short piece of plant tissue taken from one plant and grafted onto the rootstock of another plant.
sexual propagation	involves the reproduction produced from the floral parts of a plant-producing offspring by the fusion of gametes, resulting in offspring with slight genetic difference from the parent or parents. Seeds are typically produced from sexual reproduction within a species, because genetic recombination has occurred.
silt fencing	temporary sediment control device used on construction sites to protect water quality in nearby streams, rivers, lakes and seas from sediment (loose soil) in stormwater runoff.
site assessment	Identification of the existing inventory of elements and features of a site. This may include: roads, neighbouring properties, soil type, drainage, microclimate, compaction, slopes, waterways, existing plants, wildlife, utilities and hazards, access and security requirements etc.
site locates	Information that provides the location of underground utilities existing on a piece of property including lines for telecommunication, electricity distribution, natural gas, cable television, fiber optics, traffic lights, street lights, storm drains, water mains, and wastewater pipes. In some locations, major oil and gas pipelines, national defense communication lines, mass transit, rail and road tunnels also compete for space underground.
smart water technology	irrigation management best practices and components that address landscape needs without overwatering.

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sod	carpet-like sheets of turf that are laid over prepared soil to establish new lawns. Many types of grasses are available.
softscape	parts of a landscape that comprise and support living material such as flowers, plants, grass, trees, soil, mulch, etc.
soil amendment	any material added to a soil/media to improve its physical properties such as water retention, permeability, water infiltration, drainage, aeration and structure.
soil management	Is the application of operations, practices, and treatments to protect soil and enhance its performance such as soil fertility or soil mechanics. It includes soil conservation, soil amendment, and optimal soil health.
soil texture	soil texture is a qualitative classification tool used in both the field and laboratory to determine classes for soils based on their physical texture.
spalling	loss of a fragment/chip or splinter, usually in the shape of a flake, or pitted appearance detached from the edge or surface of a paver or concrete due to a blow or sudden force, or the action of weather, or pressure. Typically caused by poor installation and / or weather factors.
specifications	precise statement of legal particulars or documents that define the detailed qualitative requirements for products, materials, and workmanship upon which the contract for construction is based.
spill containment	where spills of chemicals, oils, sewage etc. are contained within a barrier or drainage system rather than being absorbed.
spill kits	consist of absorbents that are sprinkled on top of the spill or sponge-like fabrics that are placed around the spill in order to contain it. The kit may also include protective equipment, such as goggles and gloves.
standard	a document developed to establish recognized and accepted minimum levels of quality that may be recognized by the owner, user, consultant for material, product, plant, design, system or installation procedure and; to standardize, or simplify such variables as dimensions, varieties or other characteristics of specific products or plants in order to minimize variation in manufacture, production and/or use.

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stems	the main body or stalk of a plant or shrub, typically rising above ground but occasionally subterranean. Slender stalk supporting or connecting another plant part, such as a leaf or flower.
stormwater management	are practices developed to reduce, control, and prevent stormwater runoff through a variety of strategies. These strategies vary in nature and effectiveness and strive to improve water quality and either reduce or control flooding and erosion.
structural integrity	ability of an item to hold together under a load, including its own weight, resisting breakage or bending. It ensures that the construction will perform its designed function, during reasonable use, for as long as the designed life of the item.
subsoil	the stratum of earth or earthy material immediately under surface of topsoil. It contains little or no humus.
subsurface drainage systems	the process of removing excess water away from soils using natural or artificial means.
take-off or quantity take-off	process in which detailed lists are compiled, based on drawings and specifications, of all the material and equipment necessary to construct a project. Estimators use construction blueprints, either manually or electronically, and start "taking off" quantities of items they will need from those blueprints in order to prepare part of the estimate. Examples of possible take offs include the number of plants, linear measurement of pavers, volumes of aggregate, etc. needed to complete the work.
thinning	selective removal of plants/trees to improve to allow sufficient room for the remaining plants to grow. It is a form of pruning that can be small-scale: shoot limb, or branch or large-scale: the removal of an entire shrub or tree to revitalize a plant by removing over-mature, weak, problematic or excessive growth. The process of thinning encourages the formation of new growth that will more readily bear fruit and flowers. This is a common technique in pruning roses and "opening-up" the branching of neglected trees, or for renewing shrubs with multiple branches. A thinned plant becomes more open and is more likely to retain its natural form. More light penetrates a plant that has been thinned, and interior branches and foliage will be retained nearer the center of a tree.

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top-dress	application of soluble fertilizers, fresh soil, or compost to the soil surface around a plant or to lawns to replenish nutrients and to improve plant health.
topping	cutting back of the vertical stem (leader) and upper primary limbs (scaffold branches) on mature trees to achieve a uniform height. Topping is also referred to as heading, stubbing, or dehorning.
turf	the upper stratum of soil bound by grass and plant roots into a thick mat. Any of various grasses (such as Kentucky bluegrass or perennial ryegrass) grown to form turf.
vine	plant whose stem requires support and which climbs by tendrils or twining or creeps along the ground.
wattle	A fabrication of poles interwoven with slender branches uses for walls, fences, roofs
wetland	Is a distinct ecosystem that is flooded by water either permanently or seasonally (i.e. swamps, marshes, bogs). Wetlands typically have aquatic plant vegetation adapted to the unique hydric soil.
whip	a slender, un-branched shoot or plant.
woody	a description of plants that have hard stems that survive above the ground in winter.
xeriscape principles	a landscape design and maintenance concept that conserves water and protects the environment. Its 7 principles include: Planning and design; Soil analysis; Practical turf areas; Appropriate plant selection; Efficient irrigation; Use of mulches; and Appropriate maintenance.

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