

Landscape On Sites

On the job training sessions

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Canadian Nursery Landscape Association

Our Mission

The CNLA, with the Provincial Associations, will develop programs, undertake initiatives, and form alliances in order to achieve sustainable prosperity for members and stakeholders.

Our Vision

A prosperous, professional and ethical industry that is recognized, valued, and utilized by the public, as a result of the environmental, economic, and life-style benefits provided by our member's products and services.

How to Conduct Successful On-Site Sessions

As a supervisor or owner you have an obligation to communicate to each of your employees how to work safely and effectively. CNLA's On-Site sessions have been designed to provide the framework for short, basic training sessions to develop an informed well-rounded employee. It is recommended that you set a specific time aside each week, for example every Tuesday morning at 7:00 a.m., to conduct a 15-20 minute meeting based on the outlines in the On-Site manual.

It is your responsibility to practice what you preach and be a good role model for both safety and work habits on the job site.

8 Key Points to follow when conducting an On-Site session:

1. Plan the meeting
2. Set a time limit
3. Give specific examples, avoid generalizations
4. Wherever possible, demonstrate
5. Keep the discussion on topic
6. Involve everyone in the group
7. Take notes and follow up where necessary
8. Consistently enforce safety rules

1. PLAN THE MEETING

Make notes and think about the message you want to send each week.

Talk loud enough to be heard.

Stand in a place where you can be easily seen.

Demonstrate or illustrate topics wherever possible. Plan the meeting around props (equipment, plants, materials).

Encourage all staff members to attend the meeting so more senior staff members can continue to reinforce the On-Site topic throughout the week.

2. SET A TIME LIMIT

Try to keep the On-Site meeting limited to 15-20 minutes. This should be enough time to cover the material without losing the employees' attention.

Communicate the importance of these sessions by always starting on time, and avoid the temptation to postpone On-Site training during the busiest time of the year. If the meeting is scheduled to begin at 7:00 a.m., then always start at that time.

3. GIVE SPECIFIC EXAMPLES

Don't talk in general terms. Give specific examples to avoid confusion wherever possible.

Don't be afraid to repeat yourself. People remember what they have heard over and over.

4. WHEREVER POSSIBLE, DEMONSTRATE

Wherever possible demonstrate step by step. Break

each job down into smaller steps. Explain each step in detail and repeat the instructions as you go along. Ask employees to explain the job back to you. If they have difficulty, go over the steps once more.

Have the employee demonstrate the job. Make sure they don't leave out any steps and pay attention to personal safety. Have the employee explain each step as they perform it and ask them to go over the key safety points.

5. KEEP THE DISCUSSION ON TOPIC

Use the KISS principle, "Keep It Short and Simple." People will remember more about one or two topics than five or six.

In addition, wandering off topic will lessen the importance and impact of the specific message you are communicating that week.

6. INVOLVE EVERYONE IN THE GROUP

Get specific ideas from your employees. Suggestions and ideas are more likely to be implemented if they come from the crew members themselves.

Encourage participation and constructive discussion. Don't let the discussion get away from the main topic area (see #5 above)

Don't let the meeting turn into a forum for complaints. Keep control of the meeting and schedule a further staff meeting to discuss complaints if necessary.

7. TAKE NOTES AND FOLLOW UP WHERE NECESSARY

If suggestions are recommended and agreed upon by staff, follow up to make sure they are being done.

Make an effort to catch employees performing a task well or following an idea that was discussed at an On-Site meeting and congratulate them for the action.

Be sure to document all your training activities for future reference. In addition, have each employee sign a weekly attendance sheet.

8. CONSISTENTLY ENFORCE SAFETY RULES

Like any other regulation, safety rules must be backed up by constant enforcement and demonstration or they will become ineffective.

Stress that safety is the responsibility of every employee.

Discuss safety as a way of life in the home and on the road as well as on the job.

These eight key points are not inclusive and have been provided as a guideline to help you in conducting effective On-Site sessions.

Further Education and Training

For First Aid and CPR training contact your local branch of St. John's Ambulance:

FEDERAL DISTRICT
439 Churchill Avenue North
Ottawa, Ontario K1Z 5E1

Admin. & Training (613) 722-2002
Brigade: (613) 722-1839
Fax: (613) 722-7024
fd@fdgd.sja.ca

Or visit their website for a training office near you: www.sja.ca

For information on how to become a Certified Horticultural Technician (CHT) please contact the Canadian Nursery Landscape Association office:

Canadian Nursery Landscape Association
7856 Fifth Line South RR4
Milton ON, L9T 2X8
Tel: 1-888-446-3499
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**Canadian Nursery
Landscape Association**

**Association Canadienne des
Pépinieristes et des Paysagistes**



Landscape Canada Code of Conduct

Landscape Canada has developed this Code of Conduct as basic principles to follow everyday in your business practices. Through this and our other projects and endeavors we hope to advance the Landscape industry to its full potential. Landscape Canada is a commodity group of the Canadian Nursery Landscape Association.

- I will dedicate myself to the advancement of the landscape industry.
- I will adhere to honest and fair business practices at all times.
- I will keep my client's best interest in mind.
- I will attract to the profession those who possess honesty, courtesy, integrity and competence.
- I will perform work according to the industry standards.
- I will keep informed to developments in the industry.
- I will encourage others and myself to continually improve knowledge, skills and professionalism.

To learn more about Landscape Canada and the Canadian Nursery Landscape Association please visit:

www.canadanursery.com

VERY SPECIAL THANKS TO:

- Bruce Hunter, CHT, CLD, CLP - Landscape Canada Committee Chair
- Brian Ramor, CHT - Landscape Canada Committee
- Brian Cocks, CHT - Landscape Canada Committee
- Doug Conrad, CLP - Landscape Canada Committee
- Phil Paxton, CHT, CLP - National Certification Committee Chair
- Rene Thiebaud, CLP - Past Landscape Canada Committee Chair
- Christene LeVatte, CLP - CNLA 1st Vice-President /
Member Services Committee Chair
- Sarah Willis - Editorial Director, Landscape Trades Magazine

You Don't Have to Wear a Suit...



...to be a Professional

Be a CHT.



For more information on participating in the Certified Horticultural Technician program in either the Landscape Installation, Landscape Maintenance, Retail Garden Centre or Interior classifications please call the Canadian Nursery Landscape Association at 1-888-446-3499 or visit www.canadanursery.com

Aeration

Objective: to familiarize crew members with the theory and safe operation of an aerator.

Training Materials: aerator, operator manuals, core sampler.

Personal Protective Equipment: work boots, eye protection, hearing protection, gloves, long pants.

Lesson: *Regular aeration is an important factor in the cultivation of a healthy stand of turf grass. Take a core sample before aerating to view the moisture and compaction of the soil and the depth of the thatch layer.*

Aerators have hollow cylinders extending from rotating wheels. The cylinder pulls a core of soil out of the ground which is popped out by the pressure of the next core entering the cylinder. Aerators can be walk-behind, or pulled by a lawn tractor in larger areas.

Benefits of aeration:

- Reduces soil compaction
- Provides increased aeration and moisture to turf roots
- Breaks up thatch

Turf should be aerated in spring or early fall – so the grass plants have time to grow and repair themselves before the onset of temperature extremes. Heavy clay soils can be aerated twice a year, while sandy soils benefit from aeration once a year. Never aerate during the high heat of summer or in times of drought.

Aerating

1. Walk the area you will be aerating looking for any cables and lines buried just beneath the surface.
2. Run the aerator across the lawn. On heavily compacted or clay soils it is advisable to make two passes across the grass at right angles to one-another. Be sure to disengage the rotating tines before crossing hard surfaces or making sharp turns with the aerator.
3. Soil plugs will gradually break down with foot traffic and watering.
4. Water the lawn more often after aerating as it will lose moisture to evaporation, until the turf fills in.
5. Apply fertilizer and seed if needed after aerating.

- *Turf should be aerated in spring or early fall - so the grass plants have time to grow and repair themselves before the onset of temperature extremes.*

- *Grass should be irrigated the day before aeration. Softening the soil will allow the aerating tines to penetrate more effectively.*

Annuals and Perennials

Objective: to explain the different growth habits and uses of annual and perennial plants.

Training Materials: samples of annuals and perennials.

- **Annual** – germinates, grows, flowers, and produces seed in one year. Examples are petunias, salvia and sunflowers. Annuals come in a large variety of colours and most will bloom non-stop throughout the summer. They die with the fall frost and must be replanted each year.

Annuals are used in combinations to create eye catching borders or accents in the summer landscape. They are also ideally suited to growing in containers and hanging baskets.

Annual flowers are easy to replace if several die in the garden. Once an annual planting is established it should crowd out weeds, but until the plants fill in, the beds must be weeded weekly. Many have lush tropical growth that requires regular water. Most annuals will stop blooming if they are allowed to dry out, but will recover and begin to bloom again, once they are watered regularly.

- **Biennial** – A plant with a two-year life cycle. It germinates and grows one year, flowers, produces seed and dies the second year. Foxgloves are biennial.

- **Perennial** – bloom, die back and come up again the following year. Examples are hosta, daylily and phlox. The benefits of perennials are that they are cost effective once established and often require less water than annuals. Most varieties can be dug up and divided to create more plants every three or four years.

Perennials encompass a wide variation of plants with every colour and texture and height imaginable. One big difference between annuals and perennials is that most perennial plants have a shorter blooming period, so care must be taken to select perennials that bloom during different times of the season in order to have flowers throughout the year.

Many perennials are chosen not only for their flower, but for their foliage colour or texture which brings many different shapes and forms to the garden.

Perennials are used in carefully planned borders, but many are now being used to bring a different texture to shrub and evergreen plantings.

- **Tender perennials** are perennial plants that will not withstand a Canadian winter.

Phormium is a tender perennial and is treated as an annual in our climate. Dedicated gardeners can dig up and over winter tender perennials indoors with some success.

- *Annuals are used in combinations to create eye-catching borders or accents in the summer landscape.*

- *Perennials encompass a wide variation of plants with every colour and texture and height imaginable.*

Automatic Irrigation Systems 1

Objective: to familiarize crew members with the major components of an automatic irrigation system.

Training Materials: different types of backflow prevention devices, controllers, pipes.

Lesson: *Backflow Prevention Devices installed near the point of connection (where the irrigation system connects to the water supply) to eliminate the possibility of water contamination.*

Two types of backflow can happen:

1. Backpressure will happen when the pressure in the system downstream is greater than the upstream at the water supply.
2. Backsiphonage is caused by reduced pressure in the system.

Backflow prevention devices must be installed in the correct direction – make sure the arrow points in the direction of flow. These devices must be tested regularly for wear and tear.

Types of Backflow Prevention Devices:

1. To prevent backsiphonage, install a Pressure Vacuum Breaker (PVB) or an Atmospheric Vacuum Breaker (AVB).
2. To prevent backsiphonage and backpressure install a Reduced Pressure Assembly (RPA) or a Double-Check Valve Assembly (DCA).

Controllers: connected to valves by wires and are used to program an irrigation schedule for the site. Controllers should be installed indoors.

Types of Controllers

1. Electro-mechanical uses motors and gears and are simple with limited ability to set watering rates and times.
2. Electronic uses a microprocessor that enables greater programming capabilities and schedules. Also called solid state controllers.
3. Central Control Systems are computer based and allow for system management off-site. They are most often used in conjunction with sophisticated sensors that collect environmental data.

Environmental Sensors:

work with controllers to shut-down the irrigation system when water is not needed. Rain sensors are the most common type that will disable the irrigation system when enough natural rainwater has fallen.

Mainlines: carry water from the connection point to the remote control valves. Usually made from PVC, but galvanized steel and copper pipe may be used.

• *Backpressure will happen when the pressure in the system downstream is greater than the upstream at the water supply.*

• *Local regulations may stipulate the selection and installation of backflow prevention devices in an automatic irrigation system.*

Automatic Irrigation Systems 2

Objective: to continue to familiarize crew members with the major components of an automatic irrigation system.

Training Materials: different types of valves, sprinkler heads and rotors.

Lesson:

Laterals are the smaller pipes that supply water to the sprinklers. PVC or polyethylene pipe is generally used. Laterals are placed in a trench, or installed with a pipe puller that pulls the pipe into place beneath the soil.

Valves: regulate the flow of water in an irrigation system and should be installed with the arrow pointing in the direction of flow. Valves can be operated electronically or manually. Remote control valves are usually closed, and open when power is applied, sending water to a specific zone in the irrigation system. Shut off valves are opened and closed manually. Usually left open shut off valves are used to shut off the entire system for repair or in case of emergency. Quick coupler valves allow the operator to quickly connect a hose or sprinkler to the irrigation system. Below ground valves must be covered with plastic valve boxes, set at grade.

Wiring: The wiring connects the main controller to individual valves for operation. Single strand, 12 or 14 gauge is used for commercial installation and multi-strand wire, 16 or

18 gauge is used in residential systems. All wiring used should be covered with approved burial coating.

Wire is laid beneath the mainline.

Wires connecting the remote control valves to the controller are coloured. A white common wire is used to tie the valves in a series to the controller.

Heads and Rotors: Sprinkler or spray heads are often used to apply water over small distances. Risers (fixed heads mounted on pipes above the plants) are used in shrub beds. Pop-ups (that rise up above the ground when water is turned on) are used in lawns and low planting beds.

Rotors apply water to a larger area and are commonly used for large turf areas. Impact rotors have a spring loaded arm that causes the rotor head to turn a small amount each time the arm swings. Gear-driven rotors are driven by water power and are much more quiet.

- *Shut off valves are opened and closed manually. Usually left open shut off valves are used to shut off the entire system for repair or in case of emergency.*

- *Purple valve boxes and caps on irrigation heads indicate the system is supplied by non-potable water.*

Circle Checks

Objective: to ensure crew members understand the need for, and how to complete a circle check and vehicle inspection report.

Training Materials: truck and trailer, company vehicle inspection report.

Lesson: For safety reasons, vehicle inspection reports – completed by doing a circle check are required by law on every commercial vehicle every 24 hours if the vehicle is in use.

The most logical way to perform this is for the driver of the vehicle to do a circle check and inspection of the vehicle (and attached trailers) every morning before leaving the job site.

Completing a circle check should become part of your automatic safety habits every time you enter a vehicle or piece of large equipment for the first time each day.

With the vehicle inspection report on a clip board, begin at the front on the driver's side and walk toward the back, inspecting and checking off the items on the list. Then proceed up the passenger side from the back of the vehicle inspecting and checking as you go. You are looking to make sure the tires are correctly inflated, the tire tread is adequate, the lug nuts are tightly fastened, the tail gate is up and securely fastened, the towing hitch and safety chain are secure, etc. Check the fluid levels under the hood.

Everything on the list should be inspected carefully.

Next, get inside the vehicle and go through the inside checklist according to the inspection report. How much play does the steering wheel have? Are the mirrors adjusted correctly? Are the trailer brakes functioning? Is the First Aid kit and fire extinguisher on board? Does the horn work? Go through each item on the checklist one by one.

Finally, start up the vehicle and have a co-worker check that all the indicator and brake lights are working correctly.

The vehicle type and number plate of the truck and trailer (if applicable) must be recorded, along with the date and time of inspections and name of inspector. The completed inspection should be kept in the cab of the vehicle for the day (in case a government inspector stops the vehicle and asks to see it) and then must be turned into your supervisor at the end of the day. Vehicle inspection reports must be kept on file according to government regulations.

- *Circle checks should be performed on every piece of equipment before using them. For example, with a lawn mower, it only takes a minute to make sure the spark plug is tight, the fuel tank is full, mowing height is set correctly, the oil levels are correct and the air filter is clean before starting up the engine.*

- *Record and report any defects to your supervisor immediately and do not use the vehicle/equipment until the problem has been fixed.*

Common Sense Safety

Objective: to introduce the concept of common sense safety culture.

Lesson: *In many instances, working safely is simply common sense. By paying attention to your surroundings and using common sense precautions you demonstrate the fundamentals of safety and accident prevention.*

You use plenty of common sense to keep you safe in your day-to-day activities. You look both ways before crossing a busy street. You protect your hands before removing a hot dish from the oven. You have practiced these common sense habits so often that they are now automatic.

On the job it is just as, if not more, important to use common sense to keep you safe at work. Accidents often happen when people are rushed and not focusing on the task at hand. A single lapse of inattention can result in a serious, life-altering injury. Safety starts with common sense and being attentive to your surroundings.

- You wouldn't oil or adjust unguarded moving machinery
- You wouldn't chip or grind without safety glasses
- You wouldn't look for a gas leak with a lighted match

Can you come up with five more common sense safety rules for the landscape site?

Common sense also means using personal protective equipment (PPE) whenever necessary.

Head protection: Staff should wear head protection at all times.

Hearing protection: Wear ear protection when noise levels are over 85 db. Make sure hands are clean before touching insert-type ear protection. Muff or cap-type protection covers the entire ear.

Eye protection: includes glasses and sunglasses with impact-resistant lenses and flexible or cushion-fitting ventilated plastic goggles. Face shields protect against splashes and small flying particles, but not against heavy impact. To improve impact resistance, wear safety glasses or goggles under the face shield.

Foot protection: safety boots should be worn on the job at all times.

Hand protection: leather work gloves provide good gripping power and protects hands.

Sunscreen: Applying waterproof sunscreen several times a day should be considered part of your personal protective equipment during the spring and summer months.

• *Common sense safety also means watching out for the safety of your fellow workers. Speak up if they are putting themselves, or someone else, at risk.*

• *Accidents often happen when people are rushed and not focusing on the task at hand.*

Concrete

Objective: to demonstrate the correct way to pour and lay concrete.

Training Materials: plate compactor, concrete, base material, wood for forms, screed, floats and darbies, edgers, groover, trowel, PPE.

Lesson: *Concrete is a versatile, low maintenance material that has many applications in the landscape. It can be used to create walkways, patios, walls, and other hard surfaces.*

Concrete is a mixture of aggregate (rock), cement and water. It is available in two formulations: Portland cement – mixed with sand, rock and water, and pre-mixed concrete, which is mixed only with water.

To prepare for concrete, the area must be excavated to allow for the thickness of the concrete and the depth of the base material. Crushed stone is used in wet areas, while smaller aggregate base is suitable for drier locations. A plate compactor should be used to firm the base.

A great deal of force must be applied to wet concrete, so it forms strong, well anchored forms must be constructed before pouring into place. In some cases, wire mesh or rebars are used for reinforcement before the concrete is poured.

Too much water weakens concrete, so mix carefully according to the manufacturer's specifications. After concrete has

been poured into the forms, pull the screed (long straight board) across the top of the form to fill in depressions and remove high areas.

The float or darby is used to smooth the surface after screeding. Stop when water begins to puddle to the surface. To create a rough surface pull a stiff bristled broom across the top of the concrete.

To stop a large slab from cracking, control joints can be cut in the surface using a groover. Cuts are made to a depth of 25 per cent of the thickness of the concrete.

Concrete must be cured, or dried slowly for maximum strength and durability. A plastic sheet can be used to cover the surface to avoid fast moisture evaporation.

There are many options when it comes to the visual finish of concrete. A variety of texture, colour and patterns are available and can add a pleasing visual appeal to the project.

- *There are many options when it comes to the visual finish of concrete. A variety of texture, colour and patterns are available and can add a pleasing visual appeal to the project.*

- *Concrete must be cured, or dried slowly for maximum strength and durability.*

Defensive Driving

Objective: to give all crew members an understanding of defensive driving techniques.

Lesson: *Defensive driving techniques assume everyone else on the road is not paying attention and that something unexpected is just about to happen around the corner.*

Driving defensively is a full time job. Do not turn your head constantly, talk on the cell phone or fiddle with the radio when the vehicle is in motion. You need to be alert and constantly watch the road ahead to be prepared for any sudden occurrence.

A defensive driver:

- Makes sure all passengers are buckled up before starting the vehicle.
- Assumes he/she may need to stop or veer suddenly, drives an appropriate speed for road conditions, and doesn't follow too closely. Always use the "three-second following distance."
- Anticipates the mistakes or unsafe moves of other drivers. Keep your eyes moving all the time.
- Assumes the vehicle coming toward you is driven by a careless driver. When another vehicle approaches, be prepared to veer away if

he comes toward you. After a while, checking the side of the road for safe escape routes will become an unconscious habit.

- Assumes someone will run the red light while he/she is waiting at the intersection. When the light turns green look both ways before pulling out into the intersection.
- Doesn't turn his/her wheels while waiting to turn left at an intersection. If you are hit from behind while your wheels are turned you will be pushed into oncoming traffic.
- Follows the rules of the road. Is respectful of other drivers and doesn't try to race other cars during a merge.
- Gives up the right of way to prevent an accident.
- Is continually alert for accident-producing situations in advance. Be cautious when driving by parked cars, watch for sudden lane changes and be careful when driving by bicyclists or children playing close to the road.
- Watches his/her mirror when stopped at an intersection. You might be able to avoid being rear-ended if you keep your eye on the car coming

up behind you. Tapping your brake lights may alert a distracted driver that you are stopped.

- *Driving defensively is a full time job. Do not turn your head constantly, talk on the cell phone or fiddle with the radio when the vehicle is in motion.*
- *Defensive driving is about "keeping an eye on the other guy."*

Dethatching

Objective: to familiarize crew members with the theory and safe operation of a dethatcher.

Training Materials: dethatcher or power rake, operator's manual, core sampler.

Personal Protective Equipment: work boots, eye protection, ear protection, gloves, long pants.

Lesson: *Thatch is the build up of grass clippings and other organic debris at the soil surface. A thin layer of thatch (6 mm) is necessary in a healthy lawn, but can build up to become an impenetrable mass that repels water and harbours insects and pests. The organic matter in thatch also ties up nutrients and horticultural products applied to the turf. Turfgrass roots can grow out of the soil and up into a thick layer of thatch, leaving them extremely vulnerable in event of a drought.*

If this is the case, dethatching, or using a power rake to deeply rake and remove the thatch layer is recommended. A dethatcher is a vertical mower with lots of short blades that slice thinly into the soil and tear up the thatch layer.

Turf should be dethatched in early spring or fall when the thatch exceeds 1.2 cm in thickness. The grass plants need time to repair themselves before the onset of temperature extremes. Never dethatch during the high heat of summer or in times of drought.

A core sampler is a tool to help determine the depth of the thatch layer.

Dethatching

1. Allow turf to dry out before dethatching.
2. Mow the turf grass to half its normal height.
3. Adjust blade depth on power dethatcher so that it barely cuts into the soil and dethatch the lawn in several passes at 90 degree angles.
4. Rake and remove the thatch from the lawn.
5. Water turf well.
6. Apply fertilizer and seed if needed.

- *Turfgrass roots can grow out of the soil and up into a thick layer of thatch, leaving them extremely vulnerable in event of a drought.*

- *Turf should be dethatched in early spring or fall when the thatch exceeds 1.2 cm in thickness.*

Edging

Objective: learn about different types of landscape edging and considerations when installing them.

Training Materials: different edging materials: aluminum, plastic, brick, wood, string, stakes, spade, hammer, sledgehammer, PPE.

Lesson: *Edging is used to create and define areas and spaces like turf or plant beds, reduces maintenance in the garden, and keeps mulch within a prescribed space. Installing edging is fairly straightforward but there are some issues to consider when choosing and installing your material.*

1. Is the area even or curved? You may want to stay away from materials such as steel that is hard to bend and shape to uneven ground and curved shapes.

2. Do you need the edging to be durable? If you do, stay away from natural materials such as wood that will rot and deteriorate over time.

3. Concrete and brick can be used to create pattern and texture for a pleasing aesthetic.

4. When installing edging, ensure it is even with the top of the turf and surrounding area to avoid lawnmower damage and improve safety.

5. If you install a metal edging, apply a plastic capping to the edge. This will prevent injury from stepping on the metal.

6. Edging can create a dam, causing drainage problems. Leaving small gaps between edging strips will allow water to drain through the gaps instead of building up behind the edging.

7. Don't pound the top of the edging with the hammer edge of the sledgehammer, as it can dent the edging and create sharp edges. Use the flat end of a tamper or the top of a sledgehammer.

8. Don't lay edging down on grass in the hot sun. It can heat up enough to kill the grass.

Use stakes and strings to mark out straight lines. A garden hose or spray paint can delineate curved lines.

All types of edging, except for steel, requires a trench dug with a spade. To install steel edging use a pick to loosen soil along the edging line.

All edging strips are secured in the ground. Some use metal stakes, some use U-shaped pins that fit over the edging and plastic edging is secured with spikes driven through the bottom at 45 degree angles. Backfill with soil, leaving enough edging exposed so turf is flush with the top of the edging.

- *Edging is used to create and define areas and spaces like turf or plant beds, reduces maintenance in the garden, and keeps mulch within a prescribed space.*

- *Use stakes and strings to mark out straight lines. A garden hose or spray paint can delineate curved lines.*

Fertilizer Application

Objective: to explain and demonstrate the correct way to apply lawn fertilizer.

Training Materials: fertilizer samples, broadcast spreader, sprayer, drop spreader, PPE.

Lesson: *There are several types of fertilizer spreaders: Broadcast spreader holds fertilizer in a hopper, where it drops down onto a spinner and is broadcast over a wide area in each pass. Broadcast spreaders may be hand-held (for small areas), walk-behind or motorized for large areas.*

Drop spreader also holds fertilizer in a hopper, where it drops straight down through an opening in the bottom. The opening can be adjusted to apply different rates of fertilizer. A drop spreader only covers an area as wide as the spreader, so more passes are needed.

Liquid fertilizers are applied with a sprayer. Liquid applications should be avoided during windy conditions, as it will result in uneven application.

To get an even application, spread the fertilizer in two passes over the lawn (at right angles to each other), using one-half the recommended rate both times. This will avoid uneven streaks in the lawn as the grass colours.

Granular spreaders should be filled on a paved area in case the product spills. Make sure the spreader is closed before filling. Make sure the fertilizer spreader

is moving before opening the bottom of the hopper. When using a granular fertilizer, follow the watering instructions on the product package.

Calibrating a spreader will let you know how much product is actually applied over a measured area.

1. Read the product label and the spreader's product manual. Set the spreader opening at the recommended rate.
2. Measure and mark off an area of lawn, for a drop spreader an area of 50 m² is fine. To calibrate a broadcast spreader, use 100 m².
3. Weigh a quantity of the fertilizer and add it to the hopper.
4. Apply the product to measured area, using two passes at right angles to each other.
5. Weigh the remaining product in the hopper and determine how much fertilizer was applied.
6. Calculate the application rate in kg per 50 m². Compare this with the recommended rate, and adjust the opening in the hopper accordingly.

Spreader Maintenance:

Always read the product label for cleanup instructions and wear appropriate PPE while cleaning the spreader.

1. Return any remaining product back to the original packaging.
2. Place the spreader on a lawn area for cleaning.
3. Remove any debris from the openings
4. Rinse well with a garden hose.
5. Lubricate moving parts.

• Always read the product label for cleanup instructions and wear appropriate PPE while cleaning the spreader.

• Calibrating a spreader will let you know how much product is actually applied over a measured area.

Fertilizer

Objective: to explain the elements and timing of fertilizer.

Training Materials: sample fertilizers, PPE.

Lesson: *Fertilizer consists of three macro-nutrients and many micro-nutrients. The macro-elements are Nitrogen (N), Phosphorous(P) and Potassium (K).*

N is needed for top growth in plants and is responsible for the green colour of leaves. Nitrogen is required in larger amounts than the other two macro-nutrients.

P is required for healthy root growth and to promote development of flowers.

K helps plants use N and P and provides resilience against stress caused by drought, disease and wear and tear.

Micro-nutrients include calcium, magnesium, iron, manganese, boron, zinc and other elements needed for healthy plant growth in small amounts.

Fertilizer is usually labeled with numbers that identify the percentage of each of the macro-nutrients. For example, a lawn fertilizer with 21-3-9 contains 21 percent N, 3 percent P and 9 percent K. The rest of the contents are inert materials used to help with the distribution or time-release of the fertilizer nutrients.

There are many different ratios of fertilizer that are used to address specific nutrient needs. For example, a fertilizer to encourage plants to flower has a 15-30-15 formulation, as phosphorous (P) is needed for flowering. A turf starter fertilizer might have a 10-25-10 formulation, high in phosphorous to help develop strong root growth.

Recent research shows the best time to apply fertilizer to turf is in early autumn, just as the grass plants begin their fall growth flush. The turf plants use the nutrients to strengthen themselves for the winter and store enough nutrients for the early spring flush of growth.

The next best time to apply fertilizer is just after the spring growth flush (mid-May to mid-June, depending on where you live). High levels of nitrogen applied too close to the summer dry period encourages lush, watery growth that is easily stressed in summer heat and drought.

An early spring fertilizer application is recommended on young turf (planted last season) or where the grass has a lot of winter injury.

- *Fertilizer frequency and rates depend on whether the turf is irrigated regularly, the type of soil and the amount of use the surface is subject to.*

- *Recent research shows the best time to apply fertilizer to turf is in early autumn, just as the grass plants begin their fall growth flush.*

Fire Extinguishers

Objective: to familiarize crew members with the appropriate and safe use a fire extinguisher.

Training Materials: different types of fire extinguishers.

Lesson:

- Always call 911 before using a fire extinguisher.
- Keep a clear escape route available if needed.
- If the flames reach the ceiling (workshop) or spread quickly within the vehicle – move away from the area immediately.
- A natural reaction is to aim the extinguisher at the flames, but the correct way to use an extinguisher is to aim it directly at the fuel.

Fires need fuel, oxygen and heat in order to burn.

Fire extinguishers contain a smothering material that either cools the burning fuel, or starves the fire of oxygen. Pulling out the safety pin and holding down the lever at the top of the cylinder releases the pressurized contents of the extinguisher.

Extinguishers are mounted in various accessible locations.

Use the P.A.S.S. method to put out a fire

- Pull the Pin at the top of the extinguisher to allow you to squeeze the lever.
- Aim at the base of the fire, not the flames. To put out the fire you must extinguish the fuel.
- Squeeze the lever slowly to release the pressurized contents. Releasing the handle will stop the discharge.
- Sweep from side to side. Move the hose of the extinguisher from back and forth until the fire is completely out.

The fire extinguisher should always be recharged or replaced immediately after use.

• *Give crew members time to read the labels and become familiar with all different types of extinguishers on site.*

• *Fires need fuel, oxygen and heat in order to burn.*

Fire extinguishers contain a smothering material that either cools the burning fuel, or starves the fire of oxygen.

Grading and Drainage

Objective: to explain how to read grading plans.

Training Materials: sample grading plans.

Lesson: *Grading means reshaping the topography of a site. Grading can add interest to a landscape site, solve many problems and promote proper drainage.*

The landscape drawing that shows how the surface of the site is to be shaped is known as a grading plan. Lines on the grading plan called contour lines indicate the surface features or topography of a site. Grading plans show both existing and proposed contours, so the landscape contractor can see where to remove soil (cut) and where to add more soil (fill).

Understanding Contour lines

All points on a contour line have the same elevation. Contours that are equally spaced apart symbolize an evenly sloping surface.

Contours that are far apart symbolize a slight grade. Contours that are closely spaced together symbolize a steep slope.

Water drains perpendicular to contour lines.

Every fifth contour is called an index contour, it is a heavier line and makes the landmarks easier to read.

Some or all the contours on a map will be labeled with their elevation.

Grading for drainage means that the contours of the land are shaped to move excess surface water and snowmelt away from areas where it could cause problems.

Correct grading and drainage prevents soil erosion and stops water from accumulating in undesirable places and keeps roads and sidewalks safe in wet conditions. The two types of drainage systems are surface drainage and subsurface drainage.

Surface drainage is usually preferable to installing pipes for subsurface drainage as it is more economical, the volume of surface water gradually decreases as it is absorbed into the ground and underground drain pipes can clog. Grading is a major factor in the success of surface drainage, which is usually accomplished by creating slopes and grassy swales.

Subsurface drainage involves installing a perforated pipe buried underground in a bed of gravel. The pipe is sometimes covered with fabric to filter out fine sediment that can clog the drain.

- *Correct grading and drainage prevents soil erosion and stops water from accumulating in undesirable places and keeps roads and sidewalks safe in wet conditions.*

- *On grading plans, existing elevations are shown as dashed lines and solid lines are proposed elevations.*

Interlocking Concrete Paving Stones

Objective: to instruct the correct and safe method of laying interlocking paving stones.

Training Materials: shovel for excavation, base material, sand, interlocking paving stones, edging material, plate compactor, bristle broom, level.

Personal Protective Equipment: gloves, eye protection, hearing protection, dust mask.

Extend excavation beyond edge of project:

- To support the edging.
- To support the outside pavers.
- To allow room to square the sides of the project.

Lesson: Use site plan to determine proper measurements for area and excavation depth. $\text{Excavation depth} = \text{height of paver} + \text{thickness of sand layer} + \text{depth of base material}$.

Outline area of walkway with spray paint or stakes. Remove all soil to the desired depth, taking care not to disturb the soil below the excavated site. Remove soil 15 cm beyond the finished dimensions of the project.

Pavers are installed on a two per cent slope away from buildings to ensure proper drainage and that water does not gather/pool on the pavers. Use a 2x4 and a level to determine grade. A two per cent slope has a drop of 2 cm/metre.

Add base material in 5-7 cm layers across the entire excavated area, smoothing and compacting thoroughly after each layer. Keep checking to maintain the correct slope.

Edging can be installed after the base is complete and anchored with 1x25 cm spikes. Some edging is installed after pavers are installed.

Add a 2.5 cm layer of coarse concrete sand on top of the compacted aggregate base. Sand should be screeded with a 2x4 so it is smooth and level.

Square or rectangular paver patterns are laid from a corner out. If laying a circle pattern, start in the centre and work outward. Do not slide pavers across the sand base. Instead, hold each new paver against the ones already in position and slide it straight down.

Pavers are cut by several methods: masonry saw, guillotine, brick chisel and hammer. Mark cutting line with chalk. Always use dust mask, ear and eye protection when cutting stone. At this point, pavers will sit 6 m above the final grade.

When all pavers are cut and laid, make one pass over the surface with a plate compactor. Spread sand or filler material over the surface and sweep into cracks with a stiff broom. Make a final pass with the plate compactor to settle the sand between the cracks.

Finally, backfill up to edging and sod or plant grass as needed.

• *Pavers are installed on a two per cent slope away from buildings to ensure proper drainage and that water does not gather/pool on the pavers.*

• *Always call for utility locates before beginning excavation.*

Integrated Pest Management 1

Objective: to familiarize crew members with the concept of Integrated Pest Management (IPM).

Training Materials: IPM monitoring tools: hand lens, pocket knife, coffee can with both ends removed, soap flush bottles, plastic bags and vials for collecting samples, weed counting grid, clipboard and data collection forms, pest profile chart or phenology indicator chart.

Lesson: *Integrated Pest Management (IPM) is an ecological approach to the management of plant health problems. The founding principle of IPM is to prevent pest problems from occurring by providing ideal conditions for healthy plant growth. IPM managers monitor sites regularly and if pest problems warrant intervention, the least toxic control is considered first.*

Steps in IPM plan:

1. **Manage** the ecosystem, soil and plant health to prevent pest problems.
2. **Inspect** the plants regularly for signs of disease and insect infestation.
3. **Monitor** the pest populations.
4. **Decide** whether control is necessary.
5. **Control** pests using reduced-risk products.
6. **Evaluate** the effectiveness of control methods.

Managing the ecosystem correctly creates the best opportunity for plant growth. In an established landscape, rebuilding a healthy soil may take several years. Correct pruning, watering, mowing, fertilizing practices are all tools

in the optimization of healthy plant growth. Healthy plants are better able to outcompete weeds, and withstand minor infestations of diseases and plant pests.

Regular **inspection** of the landscape for signs of diseases, weeds or insects are another keystone in the IPM process. Identification skills are important skills, as the IPM technician needs to be able to positively identify both the plant and the disease or insect associated with it. Pest profile charts or phenology indicator charts are helpful in determining what pests to look for in the landscape.

Pest populations must be **monitored** to determine what are called 'action thresholds' (the level of infestation at which action should be taken). Careful inspection and record keeping is important to help evaluate and predict the patterns of pest infestation. IPM monitoring tools include a hand lens, soap flush bottles, counting grid and sticky traps.

- *Phenology is the science of using plant biological indicators to predict the onset of pest populations.*

Eg: when horsechestnuts are in early bloom, look for viburnum leaf beetle larvae, cedar leaf miner larvae and lilac borer adults and eggs.

- *The founding principle of IPM is to prevent pest problems from occurring by providing ideal conditions for healthy plant growth.*

Integrated Pest Management 2

Objective: to familiarize crew members with the concept of Integrated Pest Management (IPM).

Training Materials: IPM monitoring tools: hand lens, pocket knife, coffee can with both ends removed, soap flush bottles, plastic bags and vials for collecting samples, weed counting grid, clipboard and data collection forms, pest profile chart or phenology indicator chart.

IPM is a decision making process based on correct plant management techniques, monitoring for pests, careful record keeping and controlling pests using reduced-risk products only when necessary.

Technicians familiar enough with the plants and individual site will get to understand the difference between 'damage threshold' (pests present, but no action required) and 'action threshold' (level of pest requires treatment). Once an action threshold has been reached, a **decision** to treat the plant and/or area must be made.

IPM mandates that the least toxic **control** options be chosen first. This means using biological, mechanical and cultural controls to try to reduce pest populations to acceptable level. If pest levels are not affected by the first level of treatment, a targeted application of pesticide can be used. The least toxic pesticide should be used. Only licensed technicians can perform pesticide treatments.

Once the IPM program is in place, it should be **evaluated** regularly. IPM is a management process that should be constantly tweaked and reevaluated. Through careful record keeping, IPM managers can determine the most effective times and techniques to sustain healthy plant growth and manage pest populations.

The green industry has developed an IPM Accreditation process to reduce our reliance on pesticides and promote the discipline, philosophy and careful practice of IPM. Companies undertaking the accreditation process are evaluated by a third-party auditor to ensure their compliance with these principles.

Resources:

www.ontarioipm.com
(accreditation process in Ontario)

www.healthylawns.net

www.pestinfo.ca

www.nbhta.ca/sustainable_turf_manual.htm

Coincide: the Orton System of Pest Management, by: D.A. Orton for phenology indicators.

- *The green industry has developed an IPM Accreditation process to reduce our reliance on pesticides and promote the discipline, philosophy and careful practice of IPM. Companies undertaking the accreditation process are evaluated by a third-party auditor to ensure their compliance with these principles.*

- *IPM is a decision making process based on correct plant management techniques, monitoring for pests, careful record keeping and controlling pests using reduced-risk products only when necessary.*

Irrigation Repair

Objective: to explain and demonstrate how to repair breaks in irrigation lines.

Training Materials: pieces of PVC and poly pipe, PVC primer and cement, clamps, couplings, tools to tighten clamps, poly cutter, PVC saw, rags.

Personal Protective Equipment: work boots, hard hat, gloves.

Lesson: *Occasionally a landscape crew will cut an irrigation line. A simple line break should be quickly repaired before more damage to the surrounding landscape occurs from water loss in the line. If you have cut it by digging, the break can be easy to spot, but sometimes the weight of equipment on the surface can cause a line break below that is more difficult to pinpoint.*

A break in the line is repaired by cutting out the piece of damaged pipe and replacing it – rather than trying to patch the hole which may not stand up to the pressurized water in an irrigation system.

You may have to dig carefully for a few feet before finding the break. Excavate a hole big enough so you can work and use the pipe cutter comfortably. Digging a deeper sump hole beneath the actual break will provide a place for water to drain from the cut pipe without muddying up your repair. When excavating, maintain a professional attitude and carefully remove and replace sod, mulch and plants – and use

a tarp for the excavated soil. The work area should be kept as clean and dry as possible – mud and dirt will contaminate glued joints. Use buckets to drain the excess water and mud away from the joining areas. Wipe and clean the cut pipe ends with rags. The earlier in the repair process that you can clean the area and allow it to dry, the better.

1. Cut out the damaged section of pipe, making cuts that are square to the pipe.
2. Clean all burrs and rough edges from the end of the pipe.
3. Dry-fit all components to assure a proper fit, alignment and placement.
4. With **PVC pipes**, apply primer to both the pipe and the coupling. Allow primer to sit as per the directions. Then apply a coating of cement to the pipe end and the coupler. Assemble both parts with a twisting motion. Repeat to attach a coupling to the other section of pipe. Attach the new section of pipe to the couplings using the same procedure. Allow sufficient time for the joint

to cure. The minimum time you should allow before pressurizing the joint is 1.5 hours.

5. **Poly pipes** are joined with clamps that tighten around couplings that are secured around the new piece of pipe. Repairing a poly pipe is usually easier because of the flexibility of the pipe.
6. Test the system for leaks.
7. Backfill and cover the repair area.

- *Keeping a box with the cutters and tools and solvents necessary to repair a broken line in the truck, along with an assortment of fittings and small lengths of pipe will save time and trips to obtain parts in the case of an accidental break.*

- *A break in the line is repaired by cutting out the piece of damaged pipe and replacing it.*

Landscape Fabric

Objective: to familiarize crew members with reasons and method for installing landscape fabric.

Training Materials: landscape fabric, pins, x-acto knife, plants, mulch, sample spec.

Personal Protective Equipment: work boots, gloves.

Lesson: *Landscape fabric is a tool to reduce garden maintenance. It creates a physical barrier that blocks light, so weeds cannot grow. If weeds do grow up through the fabric, they are reacting to light coming through tiny holes in the fabric, so the most effective landscape fabric is a non-woven synthetic product with very small holes that don't let a lot of light through.*

Landscape fabric needs to be strong enough so it doesn't rip during installation, but must also be porous enough so that water and oxygen will filter through to the plant roots. When first installed water may bead on the new fabric, but the material becomes water permeable after several hours.

Generally used in shrub beds, rather than annual or perennial borders. Holes are cut in the fabric to accommodate the plants, so with an annual planting many holes need to be cut in the fabric which allow weeds to grow through. Many perennial plants spread out as

they grow and are constricted by the fabric around their crown.

If landscape fabric is specified in the landscape plan, the specs must be followed for installation.

Otherwise:

1. Remove weeds from soil surface, rake and level soil
2. Unroll the fabric over the soil. Cut it to fit around existing plants.
3. Overlap pieces by 15 cm.
4. Secure fabric with anchor pins.
5. To install plants, cut an X, peel back fabric and plant, being careful to fold the landscape fabric back over the root zone after watering.
6. A layer of mulch (bark, decorative stone or rock) is usually applied over top of the fabric to improve the aesthetic. Mulch can be applied more thinly over landscape fabric – usually a 2.5 cm layer is sufficient.

- *Landscape fabric needs to be strong enough so it doesn't rip during installation, but must also be porous enough so that water and oxygen will filter through to the plant roots.*

- *Organic mulches gradually break down creating a medium for weed seed germination. These weeds will have shallow roots and be easy to remove.*

Large Equipment Maintenance

Objective: to familiarize crew members with routine maintenance tasks of large equipment.

Training Materials: piece or pieces of large equipment, operator manuals for each, sample circle checklist, sample equipment maintenance log, rag, grease gun.

Personal Protective Equipment: hard hat, work boots, gloves.

Lesson: *Companies make a significant investment in large equipment – and each piece must be maintained properly to keep it operating efficiently and safely. Basic maintenance checks should be part of the circle checklist that is completed before the operator starts up the engine each day.*

General daily maintenance guidelines for large equipment:

- Check fuel levels.
- Check oil levels and check for leaks.
- Check coolant levels while vehicle is cold.
- Are tires inflated to the correct level?
- Is seat belt webbing secure?
- Grease fittings should be lubricated daily.
- Check belts for correct tension and wear and tear.
- Check air filter for dirt build-up.
- Make sure guards are in place. Never operate a tractor if the PTO shield is off.
- Check the hydraulic levels and lines for leaks or loose fittings.

In addition to the daily circle check, each vehicle has its own maintenance schedule that recommends more in depth maintenance procedures – in the case of large equipment; this is usually after a specific number of hours of operation. This includes replacing the fuel filter, changing the hydraulic filter and oil, adjusting the parking brake, sharpening mower blades, checking the gearbox oil level and other tasks that require more than a basic knowledge of machinery.

- *Instructor should demonstrate the correct daily maintenance tasks on a piece of machinery and have crew members repeat the demonstration, explaining each step they complete.*

- *If any problems are found during the circle check, tell your supervisor, and do not operate the vehicle until the fault has been corrected.*

Laying Sod

Objective: to explain and demonstrate the correct way to prepare soil and lay sod.

Training Materials: sod, hard rake, rototiller, ballast roller, fertilizer, PPE.

Lesson: *Discuss what PPE should be worn when sodding.*

Sod should be laid as soon as possible after it is delivered, as it will heat up if the rolls remain on the skid. Only use good quality, weed-free sod that does not tear or break during handling.

To prepare the fine grade, soil amendments should be rototilled in and the surface raked to a level finish. The final grade should be 2.5 cm below the level of hard surfaces such as patios and sidewalks to allow for the depth of the sod.

Rolling the soil with a light ballast roller will firm the soil and show up depressions in the surface that should be filled in.

Turf starter fertilizer can be applied according to the rates on the bag before the sod is laid.

Begin by laying sod around the perimeter of the area. Next, lay along the longest, straight edge. Use string to create a straight edge if necessary. Stagger the rolls of sod in a brick pattern by half a length of the sod. Use full-sized pieces as much

as possible. If you have to cut pieces, use the small cut pieces inside the lawn, not on the edges. Use a sharp knife to cut sod cleanly around curves and sprinkler heads.

Butt the ends and edges of the rolls together tightly making sure the ends are not curled and there are no gaps. Gaps allow the sod to dry out and look unprofessional.

After sod is laid it should be rolled with a light ballast roller to remove air pockets and firm the sod into contact with the soil below.

Sod should be watered thoroughly after laying. Apply enough water to soak the soil 6"-8" deep. Newly laid sod should be watered deeply and daily for the first two weeks until new roots are established in the soil. Then watering can be cut back.

Sod can be mowed when the grass is rooted in the soil. Mow when grass is dry and in a diagonal pattern to the seams. Only remove 1/3 of the grass blade height when mowing.

- *Sod should be laid as soon as possible after it is delivered, as it will heat up if the rolls remain on the skid.*

- *Sod can be laid at any time during the growing season as long as it will be maintained until established.*

Leaf Blowers

Objective: explain the safe and courteous use of leaf blowers.

Training Materials: leaf blower, manufacturers operating manual.

Personal Protective Equipment: hard hat, hearing protection, eye protection, long sleeves and pants, gloves, work boots.

Lesson: *Leaf blowers are an efficient labour-saving tool used to clean up leaves, or remove grass clippings and debris from paved areas. A leaf blower is much more cost efficient and labour efficient than using a rake or a broom. Unfortunately the over use and abuse of leaf blowers has led some cities to try to ban them, or at least place restrictions on their use. For the landscape industry to continue to use leaf blowers, we must use them with care and courtesy to neighbours and passers-by.*

Before using the blower, conduct a circle check to make sure the controls, parts and safety devices are not damaged and are working properly.

Pay attention when using a leaf blower. Don't point an operating blower in the direction of people or pets. Make sure bystanders, including other operators, are at least 15 meters away. Stop blowing if you are approached.

Never operate a blower standing on a ladder, rooftop, tree or other unstable surface. Use nozzle attachments to reach high places.

Let the blower cool for a few minutes before refueling.

Operating Courtesy

1. Don't use leaf blowers very early in the morning, or late in the day. A good guideline to follow comes from the City of Vancouver's leaf blower restrictions that say backpack leaf blowers may not be used within 50 meters of residences, except between the hours of eight a.m. to six p.m. on weekdays, and nine a.m. to five p.m. on Saturdays.
2. Do not blow debris toward open windows or doors.
3. Always be considerate of people passing by and of property.
4. Do not leave the blower running when unattended.
5. Never point the nozzle or blow debris toward people, pets, cars or houses.

To reduce noise levels when using a blower, use the lowest possible throttle speed to do the job. Check the condition of the leaf blower muffler, air intakes and air filter to make sure they're in good operating condition. Use nozzle attachments that help reduce sound.

Reducing dust and improving efficiency:

Practice controlling the air velocity at the end of the nozzle to lift leaves without lifting dust. Start with nozzle close to the ground at first – then raise it to a height where it does not generate dust. Use up and down and left and right motions starting close to the ground and the debris, but not close enough to lift excessive amounts of dust.

Information provided by the Outdoor Power Equipment Institute, www.opei.org.

- *Instructor should demonstrate correct way to start and use a leaf blower, then crew members should show they understand how to start the blower and practice blowing a paper cup without moving dust in the yard.*
- *Work carefully. You need to be safe, courteous and responsible.*

Levels and Leveling

Objective: to explain the concept and basic principles of leveling.

Training Materials: sample landscape plan, tripod, builders or laser level, leveling rod, manufacturers instructions.

Lesson: *Reshaping or grading the surface of the land (see Grading and Drainage) requires exact vertical and horizontal measurements so that the landscape designer's planned grade changes can be made correctly. Surveying, using a level, is an accurate way to take vertical measurements.*

Differential leveling is the method we use to determine the difference in heights (or elevation) between two points in the landscape. Leveling requires a tripod mounted telescope, called a level and a large measuring stick, called a rod.

Before you can determine any elevation on the project site, you must first establish a point of known elevation (benchmark), so that all other vertical measurements on the project are created in relation to the benchmark elevation. If a permanent benchmark isn't available, a temporary benchmark can be assigned to a permanent point on the job site – and all other elevations are created relative to this point.

To read a level, the tripod is set securely on the ground between

the two points to be measured, and the leveling instrument (telescope) is screwed carefully on top of the tripod. To take correct readings, the instrument must be leveled by turning the leveling screws so the bubble in the leveling vial is in the exact centre.

The leveling rod looks like a large ruler. It is a long pole with gradations that are read through the telescopic level. Someone holds the rod on top of the point you need to measure and you look through the instrument and note where the cross wires line up with the markings on the rod.

Elevations can be taken with one person using a laser level. This highly accurate level projects a laser beam that intersects with the leveling rod.

- *A network of permanent brass surveying markers (benchmarks), called geodetic markers, is placed all around the country. Each one is labeled with its elevation above sea level, as well as latitude and longitudinal position. They are used in navigation, mapping and surveying, but for our purposes, we most often only need to know the difference in heights between two points - not the height of the point above sea level.*

- *Differential leveling is the method we use to determine the difference in heights (or elevation) between two points in the landscape.*

Maintaining Healthy Turf

Objective: to explain the principles of maintaining a healthy lawn.

Training Materials: lawn mower, fertilizer, core sampler.

Personal Protective Equipment: work boots, eye protection, hearing protection (while mowing).

Lesson: *A healthy lawn will out compete weed and disease infestation and reduce the need for preventative chemicals. In addition, correct maintenance practices help create a lawn that has a greater tolerance to the effects of heat and drought.*

Steps to healthy turfgrass:

1. Most cool season grasses should be mown to a height of 7.5 cm. Keeping grass on the long side promotes healthy root growth. Cutting grass too short, or removing too much at a time, can weaken or stress the turf - it will grow thinly and weeds can find a foothold in exposed soil surface.
2. Grass should be cut often enough, so that no more than 1/3 of the blade height is removed at one time, for more details, refer to Mowing.
3. A general guideline is that a lawn should receive at least 2.5 cm of water a week. Irrigation rates can be calculated by placing a tin can on the lawn while the sprinklers are operating and timing how long it takes to fill the tin with 2.5 cm of water. Watering less frequently and deeply is much

more effective than sprinkling the grass lightly every other day. Deep watering promotes deep root growth, which creates a lawn that can withstand dry conditions.

4. Fertilize according to the results of a soil test. Fertilizer is usually applied two or three times a year.
5. Aerate and overseed an established lawn once a year (see Aeration). Aeration reduces compaction and improves oxygen and water levels in soil.
6. A core sampler will show the thatch level in the turf and whether the lawn warrants dethatching (see Dethatching).

- *A healthy lawn will out compete weed and disease infestation and reduce the need for preventative chemicals.*

- *Promoting healthy turfgrass is a critical element in the practice of Integrated Pest Management (see IPM 1 and 2).*

Mowing

Objective: to instruct crew members in the safe and efficient operation of lawn mowers.

Training Materials: Different mowers (riding, walk behind), operator manuals.

Personal Protective Equipment: hard hat, eye protection, gloves, hearing protection, gloves, safety vest (if working near the road), long pants and boots.

Lesson: *Before starting the mower check that the spark plug is connected, the engine filter is clean and the gas tank and oil reservoir are full.*

Before mowing walk the entire area, checking for debris and watching for irrigation heads that are too high.

Avoid refueling over a grassy area. Never smoke while operating or refueling equipment. Turn off the engine and let it cool before refueling. Stow gasoline safely on trucks or trailers with lids tightly secured.

Disable the engine by disconnecting the spark plug before making adjustments, repairs, or unclogging the discharge chute.

Use caution when mowing wet grass which can make lawns slippery and clog the chute.

For a professional look, mow in straight, long lines. Vary mowing patterns each visit to reduce compaction and grain.

Mowing height is determined by grass type but never cut more than 1/3 of the leaf at a time, which will place stress on the turf.

Do not leave large amounts of clippings or rows of clippings as it will kill the grass beneath. Use a blower or rake to spread out thick areas

On Hillsides:

- Mow horizontally with walk behind mowers to prevent slipping and the mower rolling away from or on top of you
- Mow vertically (up and down the hill) when using a riding mower to prevent roll overs. Hills with a slope greater than 30 degrees should be cut with a walk-behind mower.

- *Before mowing walk the entire area, checking for debris and watching for irrigation heads that are too high.*

- *Watch that the discharge chute does not point toward another crew member or passerby, stones and debris can be flung out at over 100 km/hr by the mower blades.*

Nightlighting

Objective: to familiarize crew members with various nightlighting techniques.

Training Materials: sample lighting plan, different outdoor lighting fixtures.

Lesson: *Adding outdoor lighting to a well designed landscape can bring a new dimension to the plantings. In addition, a carefully designed lighting plan can increase safety and security around the home.*

For the most part the landscape industry uses low voltage lighting in residential systems. Low voltage is a versatile option that runs on 12-volt current. It doesn't require a licensed electrician to install, and changes and repairs are more simple than with line voltage systems. With low voltage lighting, the electric lines can be buried 15-20 cm below the surface of the soil.

With low voltage lighting, the lines are wired into a transformer that converts the home's power from 120 volts to 12. The number of lights per transformer should be taken into consideration. Energy slows as it moves along a wire, causing the lights farthest away to be dimmer.

A line voltage system uses 120 volts (the same as a home), must meet local building codes and requires the use of a licensed electrician. Line voltage wires are often buried in a conduit and changes are costly. This type of system is used on a commercial landscape,

where there is the need to power extremely bright lights to illuminate large areas.

Lighting effects: There are many types of outdoor light fixtures. Each creates a different effect and ambience. A creative lighting plan will combine any number of these fixtures resulting in a striking garden at night.

Pathlighting: low lamps used to illuminate walkways and stairs.

Uplighting: also known as spotlighting. The fixture is placed on the ground and directed up to highlight a plant or other feature in the landscape.

Downlighting: also known as moonlighting. One of the most common, yet effective techniques. Two or three downlights in a large tree can light an area or path effectively, reducing the need for a lot of smaller ground fixtures.

Backlighting: Lighting a wall or fence from behind. Creates a silhouette that is particularly effective with taller plants and a light coloured background.

Shadow casting: directing a light at a shrub or tree in front of a wall – creates depth and drama.

- *An effective way to sell nightlighting is to visit the client's garden in the evening and demonstrate the effects of various lights as night falls. Alternately, computer software programs offered by lighting manufacturers allow us to scan in a photo of the client's garden and create lighting effects digitally.*

- *Be aware of light trespass, where unwanted light shines on a neighbour's property.*

Plan Reading

Objective: to learn the basics of plan reading and taking accurate measurements from a site plan.

Training Materials: Sample landscape plan, metric scale, engineer's scale, architects scale.

Elements of a Landscape Plan:

Title block: contains information about the project, site, client name, designer name, date and any other pertinent information.

Compass: often a compass or north arrow appears on the plan to indicate orientation of buildings, plants etc.

Legend: This contains a list of symbols used on the plan and what each symbol represents. It helps to identify trees, buildings, property lines and more.

Drawing Scale: The plan represents actual distances and sizes on the site and the drawing scale allows you to calculate the actual measurements.

Specifications: a list of instructions and requirements that the landscape contractor must follow when implementing a design. Can include guidelines for site preparation, mulching, excavation, soil preparation and planting techniques.

Drawing scales:

Landscape plans are created to scale – this means there is a direct relationship between the distances on the drawing and the actual distances on the site. Scales are used to measure distances on plans.

There are three different scales commonly used. They look like a triangular shaped common ruler.

Architect's Scale: Used to measure architectural units (read in feet, inches and fractions of inches).

Engineer's Scale: Used to measure decimal units (read in feet and tenths of a foot).

Metric Scale: Used to measure in metric units (read in meters or millimetres).

To determine a distance on a plan, use the specified scale to measure between two points on the plan. Then apply the scale's ratio to the measured distance to calculate the actual distance. For example, if the scale on a drawing is 1:100, then a walkway measuring one centimetre long on the plan is actually 100cm (or one metre) long on the actual site.

• *Landscape plans are created to scale - this means there is a direct relationship between the distances on the drawing and the actual distances on the site. Scales are used to measure distances on plans.*

• *To estimate quantities or layout beds and walkways from a plan you must be able to take accurate measurements from a drawing.*

Plant Growth and Development

Objective: to explain basic principles of plant growth.

Training Materials: samples of different classifications of plants.

Lesson: *Ornamental plants are categorized as either woody or herbaceous.*

Herbaceous plants have soft stems, while woody plants have hard rigid stems.

Herbaceous plants include annuals, some vines and some perennials, while most woody plants are perennials, shrubs and trees. Trees and shrubs that lose their leaves in the fall and winter are called deciduous, while those that retain their leaves year round are evergreen.

Most plants have the same basic structure.

Roots are normally underground and are for structural support and absorption of water, nutrients, and storing carbohydrates (plant food). Water and nutrients are absorbed by tiny microscopic root hairs.

The shoot is above ground and consists of stem(s), leaves, buds, and flowers.

Cells and Tissue:

Xylem – plant tissue that conducts water up and down the length of the plant

Phloem – plant tissue that conducts food up and down the plant.

In woody plants, the phloem is part of the bark, while the xylem forms growth rings. Removing or wounding some of the bark can disrupt the flow of nutrients to the roots and leaves.

Plant Growth:

Plants absorb water and nutrients through their roots. The leaves absorb light and carbon dioxide where photosynthesis takes place. This is the transformation of light, carbon dioxide and water into carbohydrates or plant sugars. Byproducts of photosynthesis are oxygen and water, which are released to the atmosphere through the leaves in a process called transpiration. It is through these two amazing chemical processes that plants filter carbon dioxide out of the air and replace it with fresh oxygen while creating their own food.

- *Ornamental plants are categorized as either woody or herbaceous. Herbaceous plants have soft stems, while woody plants have hard rigid stems.*

- *Horticulture is the art and science of growing ornamental plants.*

Plant Handling & Transportation

Objective: to explain and demonstrate the correct way to transport plants to the job site.

Training Materials: various sizes of plants, burlap, tarp, truck or trailer.

Personal Protective Equipment: work boots, gloves.

Lesson: *Plants should be protected during delivery to the job site so there is no damage to the branches, root ball or desiccation of leaves (dry out). Where ever possible plants should be transported in an enclosed truck. Large trees in the back of a truck or trailer, should be covered with a mesh tarpaulin to prevent damage and windburn.*

Plants should be placed and spaced securely so damage to the bark and branches is avoided. Avoid stacking plants on a truck or trailer.

When using bare root plants (in a dormant condition) care must be taken to keep the roots moist. The roots should be wrapped in moist peat moss, shingletoe or straw and protected at all times from frost, wind and sun.

Handle with care:

1. Bare root plants should be covered and protected from frost, freezing, sun, and wind.

2. Plants in pots should be handled by the container in order to reduce breakage of branches or leaves. Container plants shall not be held by the tops, stems or trunks.

3. Ball & burlap trees and shrubs should be handled with caution to maintain the firmness of the root balls. Protect against damage to trunk, stems and branches.

4. Wire basket trees should not be lifted by the trunk. Lift by attachments to the basket at three to four points or by supporting the tree below the root ball.

5. When unloading large wire-basket trees, the bark should be protected against chafing from chains, cables, equipment or other trees by a wrapping with cardboard or burlap.

6. If the branches of evergreens and larger plants have been tied up, do not remove the twine until after planting.

- *Plants should be placed and spaced securely so damage to the bark and branches is avoided. Avoid stacking plants on a truck or trailer.*

- *All plants should be unloaded immediately on arrival, checked for damage and watered if necessary. If the plants are not going to be installed that day, they should be stored in an upright position out of direct sunlight.*

Plant Installation

Objective: to ensure crew members understand and can demonstrate how to install a plant correctly.

Training Materials: plants in plastic and fibre pots, secateurs, shovel, spade, peat moss, compost, transplant fertilizer.

Personal Protective Equipment: work boots, gloves, sunscreen.

Lesson: *Plants are usually one of the final elements to be installed in the landscape. They should be delivered to the job site on the day they are to be planted. If the plants cannot be installed the day of delivery they should be watered and placed in a protected area out of the wind and direct sun.*

Plants should be handled carefully and picked up by the container when moving. Never carry a plant by its trunk.

The planting hole should be dug at least 12 cm larger than the root ball on all sides to allow for the addition of soil amendments (examples: peat moss, compost, composted manure, triple mix). The planting plan will specify the soil amendments recommended for the particular site. If the planting bed has been already prepared by digging in or rototilling amendments, the hole should still be dug larger than the root ball so it can be backfilled and soil firmed carefully around the root ball to avoid the formation of air pockets.

Fibre pots are left on the plant during installation. The paper will rot away in the soil.

However it is necessary to tear off the pot rim below soil level so it doesn't wick moisture away from the roots. To help the roots and water break through the pot, make three cuts halfway up from the bottom before planting.

Plastic pots should be removed carefully before planting by holding onto the plant near the base of the soil and tapping the bottom of the container. Place the rootball in the hole with as little disruption to the roots as possible. If the roots are very matted, or have been growing in circles around the pot, make several vertical cuts 1.5 – 2.5 cm deep through the root mass.

Plant the tree or shrub no deeper than it grew in the nursery.

Damaged branches should be pruned and all nursery labels removed after planting.

If mulch is specified by the planting plan, it should be added after the plants have been slowly watered.

Transplant fertilizer is a formulation high in phosphorous, which promotes root growth, ex: 10-52-10. If specified, it can be added after planting in liquid or granular form.

- *Triple mix is a combination of topsoil, peat moss and compost or manure.*

- *Creating a saucer of soil around the root ball will stop irrigation water from running away from the root zone.*

Plant Layout

Objective: to demonstrate the correct way to layout plants from a planting plan.

Training Materials: planting plan, architect scale, shovel, tape measure, plants.

Personal Protective Equipment: work boots, gloves, sun protection.

Lesson: *Installing the plants is usually one of the final steps in landscape construction. A planting plan is prepared by the designers to show the correct placement of plants in the landscape.*

An attached plant list will specify the type, location, size, spacing and number of plants to be installed in each instance. To be able to layout the plants you must be able to take accurate readings from the plan and interpret them using a scale (see Plan Reading).

There are different ways to depict plants on a plan, some are shown as circles, while other designers use more complex symbols to represent trees, shrubs and other plants. The size of the plants on the plan are not the size they will be when planted, but rather show how full the planting bed will be when the plants grow near to maturity.

A cross or large dot is drawn at the centre of the plant to show the exact spot where the plant should go. Ground covers are not shown individually, but are represented as a block of different texture on the

plan. The spacing at which groundcovers are planted is indicated on the plant list. The measurements given are taken from the centre of each plant.

Example: If the planting plan specifies Hedera helix at 30 cm apart, the ivy is planted so that the centres are 30 cm apart. Groundcovers, annuals and massed perennials are placed in rows, with the second row offsetting the first.

While the planting plan should be followed as closely as possible, there are some instances when the contractor must use some judgment when following them. It is up to the installer to make sure the side of the plant that faces out is the best one. In addition, sometimes minor adjustments need to be made, for instance if the plant is located over an underground utility or too near a sprinkler head it should be moved slightly, and in a way to that no other element in the landscape is disrupted.

The largest plants are installed first, then smaller shrubs and evergreens working from the back to front of the bed.

- *There are different ways to depict plants on a plan, some are shown as circles, while other designers use more complex symbols to represent trees, shrubs and other plants.*

- *A planting plan may include planting details that cover specific instructions for soil preparation, planting techniques or mulching.*

Plant Selection 1

Objective: to help the employee understand factors affecting plant selection.

Lesson: *Matching the right plant to the right place is one of the keys to creating a successful landscape. Some of the factors to consider when selecting plants include:*

HARDINESS

In our climate tolerance to cold is an important factor in plant selection. Agriculture Canada has created hardiness zones based on a number of climatic conditions including minimum winter temperature, frost-free days, summer rainfall, annual snow cover, elevation and other factors. Plants are assigned a rating in the hardiness zone where they are best suited. Use only plants with a zone rating equal to or less than the hardiness zone you are working in. A map and more information about plant hardiness zones can be found at: <http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/intro.html>. Note that plant zones in the United States do not correspond to hardiness zones in Canada.

MICROCLIMATE

Site conditions can vary even on a small site because of microclimates. The microclimate of an area is created by the physical characteristics such as walls, fences, large buildings and bodies of water that may slightly change the climate in a specific area. For example, an overhang may create a dry spot in the garden, or tall trees or

fences often create a protected area that can support more tender plants.

EXPOSURE

This refers to the prevalence of conditions such as sunlight, wind, water and salt. Certain plants do better in more sunlight and others in shade. It is important to know the shade and sun patterns of the site to help determine what plants to use. Some plants require little water and others require frequent watering. Salt tolerant plants should be selected for placement near the ocean or close to a street where they will be subject to salt spray during the winter.

SOILS

Soil conditions can vary greatly between different locations in the same area and even on the same site. It is very important to analyse the soil where you are planting. Soil texture affects how much oxygen, drainage and nutrients plant roots will receive. A loam soil that contains equal parts of clay, soil and silt (soil particles that are larger than clay and smaller than sand) is considered the best for plants. Clay soils drain poorly, but hold nutrients well, and can be improved by adding organic matter to improve drainage. Sandy soils can be improved with organic matter to slow quick drainage and help hold nutrients.

Soil pH refers to the acidity or alkalinity of the soil. pH of 7 is neutral, while lower pH is acidic and pH higher than 7 is alkaline. Soil pH has an effect on nutrient availability. Some plants are known as 'acid-loving' because they prefer an acidic pH. These include: rhododendrons, azaleas, oaks, heathers, daphne and Japanese pieris. Soil pH is difficult to change, so it is best to select plants that are naturally adapted to the pH of the indigenous soil.

- *In our climate tolerance to cold is an important factor in plant selection.*

- *Choosing the right plant for the right place is key to healthy plant growth.*

Plant Selection 2

Objective: to help the employee understand factors affecting plant selection.

URBAN AND RURAL PLANTINGS

Urban planting conditions hold specific challenges to plants including air pollution, road salts, confined root space and heavily compacted soil from either pedestrian or vehicular traffic. Be sure to choose plants that can overcome these limitations.

Shallow rooted plants cause cracks in pavement and building foundations.

Pay attention to the mature height of trees and shrubs, both for design considerations as well as safety. Even though plant size can sometimes be controlled by pruning, you don't want to plant a large tree beneath a power line, or too close to a house. For rural planting, the prevalence of wildlife can be a major consideration. Animals such as deer and rabbits can damage shrubs and plants, so you may want to use species that they avoid, or create barriers using fences or netting.

ORNAMENTAL FEATURES

In addition to the environmental factors that surround plant selection, there are many different ornamental features to take into consideration as well. Foliage, flowers, fruit and form, as well as bark and growth characteristics all play an important role in choosing plant

material to best suit your clients needs and desires. Other factors designers consider include the form, line, texture, motion, balance and proportion that plants bring to the landscape.

PEST AND DISEASE RESISTANCE

Pests and diseases are inevitable among living things. Complete control is not realistic, nor is it advisable under Integrated Pest Management (IPM). Selecting the right plant for the right place provides optimum growing conditions and creates healthy plant growth that will fend off pests and diseases. In addition, native plants, if appropriate for the site, offer natural pest and disease resistance.

- *Urban planting conditions hold specific challenges to plants including air pollution, road salts, confined root space and heavily compacted soil from either pedestrian or vehicular traffic.*

- *Selecting the right plant for the right place provides optimum growing conditions and creates healthy plant growth that will fend off pests and diseases.*

Plate Compactor

Objective: to familiarize crew members with the safe operation of a plate compactor.

Training Materials: plate compactor, operator's manual, aggregate, sand or pavers, shovel, rake.

Personal Protective Equipment: work boots, hard hat, gloves, long pants, hearing protection.

Lesson: *The secret to success with interlocking paving stones is to start with a well compacted base. Plate compactors are a heavy piece of equipment used to vibrate and tamp the base layer when laying pavers.*

When running a plate compactor over the aggregate, sand or pavers, overlap each pass by about 10 cm. Start at the outside of the area and work toward the centre. Passes should be made at 30 degree angles. If the base material is dry it can be watered, which will help speed compaction. Each layer requires three to four passes to compact thoroughly. Compact only a 7-8 cm layer of base material at a time.

The base should be compacted so that walking on it leaves no footprints.

Once the pavers have been laid, the compactor is run over the pavers again to vibrate them, force the bedding sand into the joints, tighten and 'lock' the pavers into place. Finally, sand is swept over the pavers and the compactor is run over them several more times to make sure each joint is tight and filled with sand.

Safety tips

1. Don't operate a compactor unless you have been properly trained, have read the operator's manual and are wearing the correct PPE.
2. Always conduct a circle check before starting up the machine. Check the fluid levels, spark plug wire, radiator fins, etc.
3. Prolonged exposure to heavy hand-arm vibration is associated with Raynaud's phenomenon – a condition similar to carpal tunnel syndrome. To decrease the risk of this condition, keep plate compactors well maintained. Wearing vibration-dampening gloves (available with gel in the palm) and keeping hands warm and dry while using the compactor in cold weather will help.
4. Crew members should take turns using the compactor, so no one person is overexposed to the vibration of the machine.
5. Do not refuel engine over turfgrass. Turn off engine and let it cool for several minutes before refueling. Never smoke while refueling.

- *Some types of interlocking pavers get scuffed when exposed to a plate compactor.*

To protect the pavers, a rubber or neoprene pad can be used on the compactor's plate, or a layer of woven geotextile (landscape fabric) can be laid on the pavers before the compactor is used.

- *Plate compactors are a heavy piece of equipment used to vibrate and tamp the base layer when laying pavers.*

Personal Protective Equipment (PPE)

Objective: to familiarize crew members with the need for and use of personal protective equipment to create a safe work experience.

Training Materials: different types of PPE, gloves, hearing protection, eye protection, face shield, work boots, sunblock, hard hat, safety vest, back belt, dust mask, respirator, knee pads.

Lesson: *Wearing PPE on the job should be treated as a part of your working uniform.*

Complaints and excuses such as “it’s too hot,” “it’s too heavy,” “it hurts my eyes” are not valid. A hockey player wouldn’t think of playing without a helmet, shoulder or shin pads as protection. In the same way, outdoor workers need to accept protective equipment to keep themselves safe while on the job.

Using PPE is only one factor in our company’s total safety program, but is an important strategy to minimize the risk of injury through an accident. The protection provided is dramatically reduced if workers remove the PPE even for a short period of time.

Gloves: lessen the vibration of power equipment and protects hands from cuts and scratches.

Hearing Protection: protects against damage done by high decibel equipment.

Eye Protection: protection against branches while pruning, or against flying stone chips while cutting pavers.

Face Shield: protection against stone chips while cutting pavers.

Work Boots: should be worn at all times.

Sun Block: protects outdoor workers from damaging sun rays.

Hard hat: protects head

Reflective safety vest: used when working in a high traffic area.

Back Belt: reduces back strain during long periods of heavy lifting.

Dust Mask: protects lungs, nose and mouth while cutting stone.

Respirator: acts as a barrier while cutting stone.

Knee Pads: protect knees while laying pavers or concrete.

Long sleeves and pants: protects arms and legs from cuts, scratches, flying stones and mosquito bites.

PPE should be cleaned and checked regularly and repaired or replaced if worn.

- *Using PPE is only one factor in our company’s total safety program, but is an important strategy to minimize the risk of injury through an accident.*

- *PPE will not prevent an accident, but may lessen or prevent an injury resulting from an accident.*

Pruning

Objective: to explain basics of pruning, how, when and why.

Training Materials: Secateurs, loppers, pruning saw, sample plant material, PPE.

Lesson: *Trimming or thinning branches from trees and shrubs is called pruning. It is carried out to improve the health or control the growth of a plant. Pruning is also done to prevent safety hazards, such as removing tree limbs that overhang a house, or removing a weak, narrow crotch.*

Three pruning techniques are called Heading Back and Thinning Out and Cleaning.

Heading Back cuts back a portion of a branch to the bud. This stimulates a bushy and compact re-growth.

Thinning Out removes the branch resulting in a longer growth for the remaining branches.

Cleaning removes branches that are dead, diseased, dying or crossing in the crown of a tree.

DO

- Prune early flowering shrubs in late spring after flowering.
- Prune summer flowering shrubs early in spring before growth starts.

- Prune evergreens in mid-summer.
- Apply disinfectant to pruning equipment to prevent the spread of disease from plant to plant.
- Cut just to the outside edge of the collar.
- Cut lateral branches back to the branch collar.

Do Not

- Paint pruning wounds. Wounds heal better without pruning paint.
- Cut into the collar. The collar is the slightly raised area at branch connection point and cutting into it slows the sealing of the pruning wound.
- Leave a branch stub, this can begin to rot and become a portal for disease
- Prune trees that bleed sap (birch, walnut, maple) in Spring. Prune in mid-summer to reduce bleeding.
- Remove more than one-third of old wood in one year. Removing too much growth at one time promotes excessive stem regrowth.

• *Trimming or thinning branches from trees and shrubs is called pruning. It is carried out to improve the health or control the growth of a plant.*

• *Remember pruning tools are designed to cut wood, and can just as easily cut flesh and bone.*

Quick-Cut Saw

Objective: to explain and demonstrate the safe operation of a quick-cut saw.

Training Materials: quick-cut saw, stone, chalk or marking pencil, rules, sample blades, manufacturer's operating manual.

Personal Protective Equipment: hard hat, goggles, face shield, dust mask, ear protection, gloves, long pants, work boots.

Lesson: *Quick-cut saws are powerful, portable tools used to cut concrete and stone in the landscape industry. They use diamond-tipped, carbide-tipped blades or abrasive disks to cut material. Diamond abrasive disks must be water cooled as they generate a great deal of heat while cutting. Once the engine is running it exhausts poisonous fumes, so should never be operated indoors.*

Don't use a saw unless you have been properly trained in its safe operation and are wearing the right protective equipment. The sound from a quick-cut saw can exceed 105 db. Always wear hearing protection when cutting. Before using the saw, make sure the blade is covered with a working guard.

The saw blade or disk can spin at 15,000 rpm. A piece of material or shattered blade will be thrown out at up to 290 km/hr causing serious injury to the face and other parts of the body. This is why a face shield is used in conjunction with goggles as eye protection.

Start the quick-cut saw on a smooth hard surface. Place one foot on the rear handle of the saw and one hand on the top handle to lift the blade of the surface. Use the other hand to pull the starter cord. Never hold the saw with one hand and start it in a standing position.

Make sure the material being cut is supported so the blade will not bind in the cut and kickback toward you. Grip the saw firmly with one hand on each handle. Hold your forward arm straight to keep the saw from kicking back.

To ensure blades don't break, always use disks for the materials they are designed to cut. Do not apply excessive pressure when cutting. Don't make long continuous cuts with dry cutting blades. Never try to change the direction of a cut part way through. Replace damaged disks immediately.

Turn the saw off before you move around the job site.

As with any piece of small equipment, let the engine cool for a few minutes before refueling.

The main safety hazards with quick-cut saws are:

- Kickback and pull-in.
- Cuts and entanglement.
- Airborne dust, carbon monoxide and noise.
- Flying particles.
- Fire from refueling and sparks.

• Instructor should demonstrate the correct way to wear PPE and how to use the saw. Each crew member should in turn demonstrate they understand the correct way to wear PPE and use a quick-cut saw.

• Guards and intakes must be cleaned regularly in accordance with manufacturer's recommendations.

Refueling

Objective: to ensure all crew members understand how to refuel small power equipment safely.

Training Materials: gasoline, gas/oil mix, funnel samples of small equipment, operators manuals.

Personal Protective Equipment: work boots, eye protection, gloves.

Lesson: *Gasoline must be handled carefully. It is highly flammable and volatile.*

Gasoline should only be stored in red jerry cans that are marked for that purpose. The lid should be hand tightened and the cans properly secured in vehicles while traveling. Do not leave gasoline cans on a truck or trailer overnight.

Use the correct fuel or fuel oil mix. Two-cycle engines use a gasoline: two-cycle oil mix in a very specific ratio. Four-cycle engines have separate gasoline and oil tanks. Check the operator's manual for the gas:oil ratio.

If refueling on the jobsite, allow the engine to cool for a few minutes before filling. Loosen the cap slowly to relieve the pressure in the tank.

Never refuel a hot or running engine. A hot engine can ignite fuel vapours and cause a flash fire.

Always refuel on a paved surface. Pour slowly to avoid spilling, but if gasoline spills wipe the engine dry before using.

Put the cap back on the fuel can securely and store back in its place on the truck or trailer.

Restart the equipment at least three metres away from where you refueled.

Never smoke while handling fuel! As well, make sure any co-workers are not smoking near the refueling area.

- *Gasoline should only be stored in red jerry cans that are marked for that purpose. The lid should be hand tightened and the cans properly secured in vehicles while traveling.*

- *Know where the fire extinguishers are located at your shop and on company vehicles. Know how to operate them.*

Retaining Walls

Objective: to familiarize crew members with different types of retaining walls.

Training Materials: different retaining wall products, concrete blocks, timber, rock, construction detail of wall, geogrid, local building code requirements for retaining walls.

Personal Protective Equipment: work boots, hard hat, gloves, long pants, knee pads, eye protection (while cutting), dust mask or respirator (while cutting).

Lesson: *Retaining walls have many uses in the landscape. They can be used to create level planting areas, raised beds, to physically separate areas of the garden, and have a great aesthetic impact on the landscape.*

Local building codes must be adhered to regarding height and construction. In addition, if the wall meets specific criteria: more than 1.2 m high; or there are slopes or structures behind the wall; or it is subject to water or wave pressure or there are concerns about drainage or runoff the wall, an engineer must be consulted.

The most common types of retaining walls are made from segmental block, pressure treated lumber and rock.

Segmental blocks are engineered to interlock without the use of mortar and have a built in setback. Blocks come in a wide variety of colours and textures. Gravity and the weight of the wall holds it in to place. Geogrid, a synthetic netting, can be installed in horizontal layers

to further reinforce the backfill behind the wall.

Timber, or pressure treated lumber walls have a more natural look. They must be set back manually and are secured into the landscape with tiebacks and deadmen (see detail). Timbers are secured with rebar and spikes. Timber walls are less expensive than block or rock, but do not last as long.

Rock retaining walls lend themselves to a natural landscape. They are often used in conjunction with natural stone steps. Careful placement and gravity holds rock retaining walls in place.

Base preparation and drainage are key factors in the success of any retaining wall. All walls begin by digging a level trench (call to locate buried utilities in advance). A layer of gravel is leveled and compacted to support the first course of the wall. The first course or row of the wall must be level, as any irregularities will be compounded as construction progresses.

• *Gravel is used as backfill behind walls to provide drainage. Sometimes a drainage system is installed behind the first course of the wall.*

• *Local building codes must be adhered to regarding height and construction.*

Safety Guidelines for Large Equipment

Objective: to ensure crew members understand how to work safely in and around large equipment.

Training Materials: any piece or pieces of large machinery - backhoe, skid steer, forklift, trencher, tractor, manufacturer's models for each.

Personal Protective Equipment: work boots, hard hat, hearing protection.

Lesson: *The use of skid steers, tractors and backhoes save many hours of hard labour on the job site. But with these work horses come an increased risk of accidents and injuries. Safety must always be the number one priority when operating large equipment.*

Some general guidelines to keep in mind when operating any large piece of machinery:

1. Never use a piece of equipment unless you have been properly trained, have read the operator's manual, and are wearing the appropriate safety gear.
2. Perform a circle check of the vehicle before entering the cab to ensure all parts are in working order.
3. Ensure you are the only person on, in or around the machinery.
4. Stay seated inside the cab while operating the vehicle. Use a seatbelt if one is provided.
5. Don't get out of or off the equipment while it is moving.
6. Never let anyone ride on the forks or in the bucket of a loader.
7. Transport cargo with the load kept as low as possible. Tilt the mast back while transporting a load. Raise the loader only when ready to unload the cargo.
8. One quarter of forklift injuries occur when the operator is getting on or off the vehicle. Don't jump down, always keep one foot and two hands in contact with the equipment, and face the machine when climbing up and down.
9. Move slowly in the vehicle to avoid roll over or tipping on uneven ground. If working on a slope, avoid swinging the bucket to the downhill side to reduce the risk of tipping.
10. Only turn on the engine indoors if you are in a well-ventilated area.
11. After you park the vehicle, lower the backhoe, loader or other attachment to the ground, ensure it is shut off properly, the parking break is on and all levers are in the neutral position.

- *An equipment maintenance checklist is a good way to keep track of large equipment and ensure it stays in good working condition. Go over all the items on the checklist such as oil and fuel levels, hydraulics, grease and lubrication, radiator, safety attachments, tires, etc. Use the checklist daily before operating any equipment.*

- *The use of skid steers, tractors and backhoes save many hours of hard labour on the job site. But with these work horses come an increased risk of accidents and injuries.*

Safety Guidelines for Small Equipment

Objective: to ensure crew members understand how to operate small equipment safely.

Training Materials: various pieces of small equipment: trimmer, edger, lawn mower, quick-cut saw, etc., manufacturers' manuals for each.

Personal Protective Equipment: work boots, hard hat, gloves, long pants, eye protection, hearing protection, face shield.

Lesson: *The importance of working safely cannot be stressed often or strongly enough. Safe work habits should become automatic – but it is important to still keep safety in mind at all times while on the job. There are many potential hazards to working with small equipment, but with common sense and good, safe work habits our job sites can remain problem-free.*

Some general guidelines to keep in mind when using any piece of small equipment:

1. Only use equipment that you have been properly trained to operate.
2. Read the manufacturer's operating manuals of every piece of equipment you use.
3. **Do not operate any piece of mechanical equipment without wearing the correct Personal Protective Equipment.** The moment it takes to put on protective eye wear could save your eyesight from a flying piece of stone.
4. Take a minute to perform a circle check of every piece of machinery before you use it.

5. Be aware of the danger zone around you and your equipment. Make sure bystanders are a safe distance away.
6. Know how to quickly shut off the engine in case of emergency.
7. Shut off the equipment while changing locations around the job site.
8. Don't operate any piece of equipment if the protective guards or shields are loose or missing.
9. Don't make any adjustments or do any routine maintenance tasks on the machine while it is running.
10. Never alter or by-pass any safety device produced by the manufacturer.
11. Disconnect the spark plug wire before cleaning or adjusting any moving parts on the machine.
12. Wear sturdy gloves with good gripping power to help keep hands firmly on the machinery.

13. Let gasoline engines cool for a few minutes before refueling. Never refuel equipment while the engine is running.
14. If operating electric equipment, always make sure the power cord is plugged into a grounded outlet.
15. Be aware of the power cord at all times when operating electric equipment, severing the cord can cause electrocution.
16. Always make sure you have solid footing when operating any piece of machinery.

• *There are many potential hazards to working with small equipment, but with common sense and good, safe work habits our job sites can remain problem-free.*

• *Which pieces of PPE do you need to wear to operate each piece of machinery?*

Sand, De-icing & Anti-icing Products

Objective: to familiarize crew members with different types of de-icing and anti-icing products.

Training Materials: examples of sand, de-icing and anti-icing products, WHMIS sheets for de-icing and anti-icing material, applicators for granular and liquid product.

Personal Protective Equipment: work boots, gloves.

- *Snow removal contracts will specify the type of abrasive, de-icing or anti-icing product to be used on a property.*

Lesson: *Snow removal contracts will specify the type of abrasive, de-icing or anti-icing product to be used on a property.*

Sand is an abrasive material applied to icy surfaces to improve traction. It works consistently at all temperatures, however large stockpiles of sand can freeze solid in the winter. Mixing salt into the sand will reduce the potential for freezing. In the spring, accumulations of sand must be cleaned up and can clog sewers and storm water drains.

De-icing chemicals are applied to melt surfaces on roads and walkways. **Salt** is a widely available and the most inexpensive de-icer, but is extremely corrosive to vehicles and damaging to plants and the environment. Government has introduced regulations to reduce the amount of salt applied to roads during the winter. Salt can be prewetted with liquid de-icing agents to both reduce the amount of salt needed and make it more effective at melting

snow and ice.

All chemical de-icers work by lowering the freezing point of water, but some products are more effective than salt at lower temperatures.

Anti-icing chemicals are proactively applied to the surface before a storm and significantly reduce the freezing point of water below its normal threshold. Pretreating a surface with anti-icers before a big storm prevents snow and ice from sticking, making removal easier.

Anti-icing products can be applied before a big storm to enhance road safety over the life of the storm. Liquid anti-icers are not applied in a heavy wash over the road, but more lightly. Using anti-icers reduces the need for abrasives such as sand and requires less clean-up in spring.

- *Because of the corrosive qualities of chemical de-icers, vehicles and spreaders should always be washed down after being used to apply de-icing products.*

Small Equipment Maintenance

Objective: to ensure crew members understand the basics of small equipment maintenance.

Training Materials: small equipment used by your company – lawn mower, string trimmer, quick-cut saw, chain saw, etc., operator’s manual.

Personal Protective Equipment: work boots, gloves.

Lesson: *General daily maintenance circle check: Before loading equipment on the truck or trailer for the day, take a minute to perform a basic circle check to make sure the equipment is functioning properly.*

Your company may have a list of required maintenance activities that should be done at prescribed intervals:

Engine oil – is it filled to the correct level?

Fuel level and mix – is the specific fuel mix for the equipment on the truck?

Filters – are they clean? Paper filters can be blown clean with compressed air, but should be replaced when they are very dirty. Foam filters can be washed with dish soap and water, dried with a rag and then a bit of oil worked through the foam before replacing. Gas filters should be clear.

Guards – are they secure and correctly in place?

Tires – are they properly inflated?

Blades or tines – are they sharp and straight? Is the cutting height set correctly? Make sure the spark plug cap is disconnected before lifting a mower to check the blade.

Grease fittings – are they well lubricated?

Hoses and pipes (applies to blowers and vacuums) – are they intact and secure?

Shoulder straps – are they worn and properly adjusted for the operator?

Belts and pulleys – check for proper tension. Replace worn or frayed belts before they break.

Spark plugs – is the wire secure? Spark plugs should be replaced when recommended by the manufacturer.

Pull ropes should be checked for signs of wear and replaced if they are fraying.

- *When lifting a lawnmower on its side, always lift with the carburetor side up. Tipping the lawnmower on its side with the carburetor down will cause oil and gas to spill.*

- *Never run a small engine without the air filters, doing so will ruin the engine.*

Snow Blower Safety & Maintenance

Objective: to ensure crew members understand and can demonstrate the safe operation of a snow blower.

Training Materials: snow blower, operator's manual.

Personal Protective Equipment: insulated work boots, hat, warm gloves, layers of clothing, eye protection and hearing protection.

Lesson: *Snow blowers are an efficient way of removing snow from paved surfaces that are too small for a larger plow to reach. Snow blowers shouldn't be used on gravel surfaces as they can pick up and throw the stones at high speed.*

Plan snow clearing patterns around the direction of the prevailing winds. While this can be difficult on some days, snow blowing is more efficient and visibility is improved when you blow with the wind.

Direct blowing snow away from people, buildings and vehicles.

Maintenance tips:

Always perform a circle check on the blower before loading it on the truck or trailer.

Be sure to take enough gasoline in an approved container. Disconnect the spark plug wire before performing any maintenance tasks.

Check the oil levels and top up if necessary.

Check the air filter regularly and clean or replace if necessary. Refer to the operator's manual

for regular maintenance recommendations.

Safe operating tips:

1. Don't use a snow blower unless you have been properly trained and have read the operator's manual.
2. Wear warm footwear with good traction on slippery surfaces.
3. Know how to stop the engine quickly in case of emergency.
4. Scan the area to be plowed and remove visible debris.
5. Be aware of the 15 m danger zone around the blower and make sure no bystanders are near.
6. Make sure you are working in enough light to see where you are going.

• Each year emergency rooms see patients with severed or mangled fingers because they didn't think before putting their hands in the snow blower chute to clear blocked snow. Always turn the engine off, disconnect the spark plug and be sure the auger has stopped rotating before attempting to clear a blocked chute.

• Plan snow clearing patterns around the direction of the prevailing winds. While this can be difficult on some days, snow blowing is more efficient and visibility is improved when you blow with the wind.

Snow Removal

Objective: to familiarize crew members with the basics of snow removal.

Training Materials: site plan, snow blower, plow, shovel, sample snow removal contract for the site.

Personal Protective Equipment: insulated work boots, warm gloves, hat, layers of clothing, sunglasses, safety glasses, eye and hearing protection (for snow blower).

Lesson: *Snow removal contracts are extremely specific documents created so there are no misunderstandings about the responsibilities of the property owner and the snow removal contractor. They outline when and how often the contractor will be on site to remove snow. The contract also specifies which ice melting products are to be used.*

The bulk of snow removal is completed using a blade mounted onto a truck, tractor or skid-steer loader. Snow blowers are used in smaller spaces where the truck or skid steer can't reach, and shovels are used only in the tightest areas or in the case of a light snow fall.

Before the snow falls it is important to familiarize yourself with the sites you will be plowing. Note any obstacles that could get in the way or be damaged by the plow. Marking the edges of curbs or unusual configurations in parking lots with flags in the autumn will help operators and save time and reduce accidental property damage during snow clearing.

Fire hydrants should be marked so they are not buried.

Take note of the best places to pile snow. Wherever possible snow should be piled in a low area near a drain.

Several different plowing techniques are used in different situations:

Windrowing is used to clear large open areas. The driver makes repeated passes across the area with blade of the plow angled to throw snow forward and off to the side.

Backdragging is used to pull snow away from buildings. The blade is raised and the plow driven up to the building, where the blade is then lowered and the operator backs up, dragging the snow away. Backdragging is less effective than plowing forward, so should only be used to clear snow from small areas until the vehicle or plow can be driven forward.

When finished, the cleared area should be checked for icy patches and to make sure fire hydrants are buried and that storm drains are not covered with snow.

- *Discuss the appropriate safety equipment that should be contained in the truck, including cell phone, first aid kit, flares, spare socks and gloves, flashlight, shovel, ice scraper, jumper cables, food and water, windshield washer fluid and appropriate repair kit specific to the blade you are operating.*
- *Careful and accurate record keeping is critical during snow removal. Accurate records helps evaluate the success of particular products, timing or techniques, but may also be valuable in the case of a lawsuit due to a slip and fall claim.*

Soil Preparation

Objective: to explain and demonstrate the reasons for, and correct methods of, soil preparation.

Training Materials: triple mix, peat moss, compost, composted manure, shovel, rake, rototiller, operator's manual.

Personal Protective Equipment: Work boots, gloves, hard hat, hearing protection, eye protection.

Lesson: *No matter what or where you're planting, the soil is a critical element on any landscape site. The healthiest plants will suffer if the soil in which they are growing is lacking in some form. Soils can be improved with the addition of amendments before plants are installed.*

Soil is made up of various amounts of sand, silt and clay, but should include space for water and air. If the spaces for holding moisture and oxygen are too little or large, the roots won't have adequate access to the vital nutrients essential for growth.

The planting plan of a landscape design will usually specify what soil amendments are required for the site. This can include combinations of triple mix (topsoil, peat moss and composted manure), sand, compost, peatmoss, and fertilizer as determined by a soil test. Using sterilized topsoil and manure will ensure no new weed seeds and pathogens are introduced to the landscape.

Remove any stones, twigs and other large debris before spreading the new amendments on the soil surface. It is not necessary to remove large quantities of the existing soil before planting, as mixing the old soil and new amendments together creates a more natural environment that will encourage roots to eventually grow out into the surrounding soil.

The new amendments should be dug in or rototilled as deeply and thoroughly as possible. When finished the bed level may look high, but the soil will settle when it is watered. The beds should be raked smooth and level and again any rocks and debris removed before planting.

- *Both clay and sandy soils can be improved by the addition of organic matter (compost, peatmoss, manure). Organic matter will improve the water holding capacity of sand and help break up compacted clumps in clay soil.*

- *Soil is made up of various amounts of sand, silt and clay, but should include space for water and air.*

Trailers

Objective: to ensure all crew members have an understanding of the legal requirements and safe operation of trailers.

Training Materials: truck, trailer, sample circle check form, vehicle log book, traffic cones.

Lesson: *Licensing requirements for driving trucks and trailers depend on the combined weight of the two vehicles. In addition, there may be annual inspections required if the truck and trailer is registered for a specific gross weight.*

Always complete a daily circle check to ensure the truck and trailer is in safe operating condition. The checklist should be filled out and signed every day before starting the vehicle.

Trailer brakes are required if the trailer and load has a combined gross weight of _____ (fill in your province's weight requirement). In addition, a secondary safety chain or cable that can hold the weight of the trailer must be used above this weight.

Make sure the safety cable is securely attached.

Test trailer brakes. Make sure the battery for the brakes is fully charged.

Check the tongue height and make sure the trailer is level before loading and unloading.

Once the truck and trailer is parked and brakes are set, use chocks or blocks to secure the trailer. Place traffic cones at the front and rear corners of the trailer on the side that faces traffic. This warns motorists to steer clear of the trailer and the material being handled.

Make sure chocks are removed before moving the trailer.

Backing up with a trailer should always be done with caution. Check behind the vehicle by walking around it to make sure the area is clear.

Turn on flashers before backing up, and sound the horn if the vehicle is not equipped with backup beeper.

Back up slowly, using rearview mirrors and have another crew member guide you.

The trailer will turn in the opposite direction of the truck as you move backwards. Backing a trailer takes practice. Common errors are oversteering and turning the steering wheel too long, which can cause the trailer to jackknife.

- *Always complete a daily circle check to ensure the truck and trailer is in safe operating condition. The checklist should be filled out and signed every day before starting the vehicle.*

- *Make sure everything on the trailer is securely positioned and the weight load is balanced.*

Tree Planting 1

Objective: to demonstrate the correct method of planting a tree.

Training materials: shovel, tape measure, secateurs, container plant, B&B plant.

Lesson: *First, check the site plans, as designers will use different planting specifications. Dig the planting hole at least twice the diameter of the root ball and no deeper than the height of the root ball. In extremely compacted soils the root ball can be even wider. Use the shovel to roughen the edges of the hole.*

Prepare backfill mix of 2/3 excavated soil and 1/3 composted organic material.

Container Plants

1. Remove the pot or fibre container.
2. Using a sharp shovel, score the roots on the side of the root ball in three or four locations to encourage the pot bound roots to spread out in the planting hole.
3. Place the tree in the hole, being careful to lift with your legs.
4. Make sure the 'best' side is the most visible and that the trunk is straight.

Ball & Burlap Plants

1. Lifting the tree by the root ball, not the trunk, place the ball in the hole, being careful to lift with your legs. The soil surface of the root ball should be at the same level where the plant was growing in the field.

2. Make sure the 'best' side is the most visible and that the trunk is straight.
3. Remove or peel back the wire basket if present.
4. Remove all twine from the root ball to allow the plant room for growth.
5. Cut burlap off the top ½ of ball. When backfilling, be sure all the burlap is buried well beneath the soil surface, so it doesn't wick moisture from the soil.

Backfill the planting pit a few inches at a time, firming and watering the soil after each addition to remove air pockets. While backfilling, be sure the tree remains vertical. Firm soil around the root ball with feet. Create a saucer to hold water by building a 10 cm wall of soil around the perimeter of the root ball.

Corrective pruning is all that is done at this time. Prune off dead, diseased or damaged branches.

Add 5 - 7.5 cm layer of mulch to planting site, keeping the mulch away from the trunk of the tree.

- *Dig the planting hole at least twice the diameter of the root ball and no deeper than the height of the root ball.*

- *What PPE should be worn when planting a tree?*

Tree Planting 2 – Staking and Guying

Objective: to demonstrate and ensure crew members have an understanding of why and how to stake a tree.

Training Supplies: tree stakes or T-bars, wire, rubber or nylon tree straps, PVC pipe or high visibility tape, PPE.

Lesson: *Staking or guying newly-transplanted trees is necessary in sites that are exposed to high prevailing winds. Small trees (up to 2" in diameter) rarely require staking. Trees planted in very sandy or very wet clay soil should also be staked. Other reasons for staking include protection against vandalism, lawnmowers and other types of equipment. However, short stakes placed strategically around the tree can provide the same protection against mechanical damage from equipment, without the guy wires.*

Research has shown that unstaked trees had a greater trunk diameter than corresponding trees that were not staked. It is thought the subtle movement of the trunk in unstaked trees promotes the translocation of fluids up and down the trunk causing greater growth.

If staking is necessary, follow the planting specification for number of stakes, the height of ties and stake and tie materials.

Trees under 2.5 m tall can be supported by two stakes. The

stakes are placed in line with the prevailing wind direction and driven into undisturbed soil. Ties are attached to the tree, usually at the lowest branch.

Larger trees are supported with guy wires. Guy wires are attached to three stakes driven 45 cm into undisturbed soil, with one stake placed in the direction of the prevailing wind. Ties are attached to the tree as high as is practical, with each attachment point 15 cm apart from each other. The axis of the stake should be at 90 degree angle to the axis on the pull of the guy wire.

Install PVC pipe around guy wires for protection and visibility. If this is not possible, tie flags or tape to the wire so it is more visible.

- *Staking or guying newly-transplanted trees is necessary in sites that are exposed to high prevailing winds.*

- *Guy wires and stakes and ties should always be removed after one growing season. Leaving them on will result in girdling of the trunk.*

Trencher Safety & Operating Procedures

Objective: to familiarize crew members with the safe operation of a trencher.

Training Materials: trencher, manufacturer's manual.

Personal Protective Equipment: work boots, hard hat, gloves, long pants, eye protection, hearing protection.

Lesson: *There are two types of trenchers: ride-on and walk-behind. Walk-behind trenchers are better suited for tight spaces. Both types have three basic operations systems to be aware of:*

- 1. The ground drive which moves the machine while digging the trench.*
- 2. Trenching articulation including boom and chain-drive controls.*
- 3. An auger that places trenched soil beside the trench for backfilling.*

The teeth of the chain do the actual digging. There are different teeth for different soils and applications. Cupped teeth do well in most soils, and carbide teeth are suitable for hard ground or soil with a lot of buried debris.

Proper tension on the chain is critical (just like a chain saw). Poorly adjusted chains wear out quickly. The operator's manual will specify the correct tension for the trencher model. Tension should be checked and adjusted regularly as chains stretch with normal use. Oiling chains is not recommended as it attracts dirt particles and increases wear and tear.

Safety concerns

Wearing the correct Personal Protective Equipment is important when operating a trencher. Eye protection must be worn.

Never operate a trencher unless you have been properly trained in its correct and safe use. Always complete a circle check before starting the trencher each day.

Call before you dig!!

Do not remove protective shields or guards. Lower the trencher boom to within a few inches of soil. Engage the chain at slow speed. Make sure you have control of the trencher when engaging the chain.

Never make sharp turns while digging.

When raising the boom, disengage the chain just as it clears the trench.

Make sure the engine is turned off before performing any adjustments, maintenance or to clear a jammed chain.

• It cannot be repeated often enough, before trenching any site, make sure the underground utilities have been located! Don't take any chances - never dig without calling for a location.

• Proper tension on the chain is critical (just like a chain saw). Poorly adjusted chains wear out quickly.

Trimmers

Objective: to ensure all crew members understand how to operate a trimmer safely.

Training Materials: trimmer, operator's manual, spare blade and/or nylon line, tools to change blade or line.

Personal Protective Equipment: hard hat, eye protection, hearing protection, gloves, long pants, work boots.

Lesson: *Trimmers are labour saving tools used in landscape maintenance to trim grass and brush in places where lawn mowers can't reach.*

Before starting any trimmer, perform a circle check to ensure guards and shields are in place, spark plug is connected, blade is sharp or nylon line is long enough. To start the trimmer, lay it down in a clear area where the blade or line does not come into contact with the ground. Hold the trimmer down firmly while pulling the starter, never crank the engine while the unit is harnessed to you, or held above ground level.

To avoid arm burns, operate the trimmer with the muffler side of the engine away from your body.

If you must cut near people or cars, cut at a reduced throttle speed to reduce the velocity of any thrown objects. Consider the area 15-metres around you to be a danger zone in which people could be hit by thrown objects so be aware of people entering that danger zone at all times.

Never raise the cutting head above knee height. This raises the cutting head more in line with your face, making it vulnerable to thrown objects.

Shut the machine down immediately if it begins to vibrate or shake. Don't start up again until the problem has been identified and corrected. Before going near the cutting head, wait until it stops rotating completely. Always disconnect the spark plug before working on the machine to ensure it doesn't start accidentally.

- *Hold the trimmer so that cut debris is thrown away from you. This means knowing whether the cutting or line head turns in a clockwise or counter clockwise direction and tilting the machine slightly away from that direction. If it turns in a clockwise direction, tilt slightly to the left so that debris is thrown out away from you. If the line head rotates counterclockwise, tilt the head to the right while cutting.*

- *Instructor should demonstrate the correct way to start and use the trimmer. Each crew member should in turn demonstrate they understand the correct way to wear PPE and start and use a trimmer.*

Turfgrass Seed

Objective: to explain and demonstrate the correct way to prepare and apply turfgrass seed.

Training Materials: seed, core sampler, rototiller, rake, spreader/seed drill/sprayer & hydroseeder, PPE, ballast roller.

Lesson: Discuss what PPE should be worn when seeding.

If sown too early in the season, the soil is too cool and seed will not germinate. Turfgrass seed can be applied when soil temperatures reach 15 C – ideally mid-May to mid-June. However, the best time to apply is in mid-August to mid-September when the soil is warm and the nights are cool.

Using the core sampler, test soil for pH and nutrient shortages. This will help determine the amendments that need to be added, as well as what fertilizer will be best for the soil.

Prepare the area for seeding by removing debris and existing grass, plants and weeds with a hard rake. Spread 3-5 cm of Triplemix® or other amendment determined by soil test and rototill in. Spread fertilizer that was also determined by testing the soil.

Rake the soil to create a level grade with a fine surface. Remove rocks and debris.

Apply the seed at the rate listed on the grass seed bag. Seed can be applied in several different ways depending upon the size and topography of the site.

Broadcast seeding – small areas can be broadcast by hand, for larger spaces use a fertilizer spreader. Apply in two passes at right angles, using half the application rate. After spreading seed it can be covered by lightly raking surface or by going over the area with an empty ballast roller to press the seed into contact with the soil.

Seed Drill – this will drill the seed into the ground at a specified depth. Usually only practiced on very large fields or untilled areas.

Hydroseeding – a mixture of seed, fertilizer and water are sprayed onto the soil. After a mixture of mulch and water is applied over top of the seed. Used most often on large slopes, where broadcasted seed may wash away.

The amount of seed used depends on the species. It ranges from 2lb–6lb per 1000 sq. ft.

Keep seed bed moist for the first two weeks. This should include a watering a few times each day. Do not mow before the grass reaches at least 8-10 cm (3-4") in height.

- *The best time to apply is in mid-August to mid-September when the soil is warm and the nights are cool.*

- *Keep traffic off seedbed as much as possible during the first few weeks.*

Water Features

Objective: to explain the basic principles of water gardening.

Training Materials: sample grading plan for pond, sample pond liner, pump and filter, plants if available.

Lesson: *Water features are a popular addition to landscapes, as people are drawn to the soothing and tranquil sound of running water. Popular water features are ponds, fountains and waterfalls.*

Water features should be situated so they receive as much sun as possible. Plants can then be used to shade and cool the water which will help keep algae under control. There are preformed plastic ponds and waterfalls available or you can create a free-form pond in any shape using a heavy PVC pondliner to hold the water. If using a PVC or EPDM liner to make a pond be sure it has been manufactured specifically for this purpose as some PVC plastic used in roofing is treated with chemicals which may harm fish and water plants. Extreme care must be used when installing a liner, as any flaw will result in a leak that can be difficult to detect and correct.

Submersible pumps are used to keep the water moving and running through a filter to maintain water quality. They are matched to the size of the pond, keeping in mind the height of a waterfall (if any) and the amount of aeration needed.

In our area ponds should be at least ___ metres deep if fish are to overwinter without freezing. Within the pond, ledges can be created at different depths to house different kinds of water plants.

There are three different types of plants for ponds: oxygenators, floating plants and marginal plants.

1. Oxygenators are necessary for water quality as they compete with algae for nutrients and, in the process, keep the water pure and clear. Examples are: hornwort that can be dropped into the water without planting, elodea or aquatic mint.

2. Floating plants include water hyacinths, duckweed and water lettuce. These help keep the pond clear of algae by shading the water and using up nutrients. Floaters and water lilies should cover about 60 per cent of the water surface. Water lilies come in two types, those that are hardy and can survive a Canadian winter in a pond, and tropical water lilies that have larger blooms but will die if left in the pond over winter. Tropical lilies need to be washed off, brought indoors and stored in damp sand over the winter.

3. Marginal plants are usually perennial marshland plants that are planted around the edge of ponds. These include cattail, sweet flag, arrowhead, water iris and marsh marigold.

Goldfish, orandas and koi (both cousins of goldfish) are popular and hardy enough for ponds. However, koi and large goldfish are tough on plants in a pond and can ruin the roots of floating plants while rummaging for food.

- *Goldfish, orandas and koi (both cousins of goldfish) are popular and hardy enough for ponds. However, koi and large goldfish are tough on plants in a pond and can ruin the roots of floating plants while rummaging for food.*

- *Water features should be situated so they receive as much sun as possible.*

What to do if Someone is Injured

Objective: to provide employees with guidelines to follow in case of injury.

Lesson: *The first rule of first aid is that if you don't know how to give it, don't try to. You may do more harm than good. In the case of an injury, sometimes knowing what NOT to do is just as important as knowing what to do.*

For instance, don't try to move an injured person unless you are sure that moving him will not worsen the injury. Improper moving can increase the severity of an injury, in the case of a fracture or broken bone it's usually best to let the victim lie where he is until competent help arrives.

If you are on the scene of a serious accident and there is no first aid at the scene, use the following steps to take control of the situation until qualified help arrives.

1. In all cases requiring emergency medical treatment, immediately call, or have a co-worker call, to request emergency medical assistance.
2. Don't move the victim unless absolutely necessary.
3. Keep the victim on his back or side.
4. Restore breathing.
5. Stop bleeding.
6. Treat for shock.

An emergency on the job site:

Give first aid/attend to the emergency first.

Let the client know about the injury as soon as possible and request any help needed.

Smaller injuries are more common on the job site – nicks, cuts and scratches. The tendency is to ignore these minor injuries, but left untreated, they can develop into serious infections. Even if a trip to the doctor is not necessary, an employee injury statement report should be completed.

Employees should know where all first aid kits and eye wash stations are located in the shop. All company vehicles must be equipped with a fully stocked safety kit and fire extinguisher.

Show employees locations of first aid kits, eye wash stations, fire extinguishers, as well as list of emergency contacts in shop and vehicles.

- *Employees should know where all first aid kits and eye wash stations are located in the shop. All company vehicles must be equipped with a fully stocked safety kit and fire extinguisher.*
- *Identify all staff who are trained in first aid, so employees know who to turn to in case of an accident/emergency.*

What to do in Case of a Car Accident

Objective: to ensure employees know what to do if they are involved in a car accident on the job.

Lesson: *Despite defensive driving techniques, accidents occasionally happen. Every accident must be reported, whether by calling the police, or, if damage is minimal, accompanying the other driver to an accident reporting centre. It is illegal to leave the scene of any accident without identifying yourself*

Determine the extent of injuries and whether a call to 911 is necessary. If anyone is seriously injured, don't move any of the victims unless it is necessary to move them from the risk of fire. If a crew member is trained in first aid they can help victims until professionals arrive.

Move onlookers away from the scene, and make sure they don't remove or destroy evidence such as parts of vehicles or skid marks.

If there are no serious injuries, call the police and then the office immediately. Then, collect as much information at the scene as possible.

Take the license plates of all vehicles involved, as well as the names and addresses of the drivers and passengers. List the companies that insure the vehicles, and record the names and addresses of any witnesses to the accident.

If you have a camera, take pictures of the accident scene from different angles.

Never argue with occupants of the other car. People are emotionally upset at an accident and may argue without making sense. Keeping a level head will help you record all the facts correctly.

If the accident involves a parked vehicle and you cannot locate the owner, leave a note in a prominent place. Call the police and ask if you should remain at the scene, then call the office.

As soon as there is time, you will be required to write an account of the accident as you remember it. Your description may be used by the police, insurance company, or by your employer to help prevent such accidents from happening again.

AT THE ACCIDENT SCENE:

If possible, move the vehicle as far off the road as possible. Set up pylons and/or flares to warn on-coming traffic of the accident. Turn on vehicle flashers. Locate fire extinguishers in vehicles.

- *Move onlookers away from the scene, and make sure they don't remove or destroy evidence such as parts of vehicles or skid marks.*
- *Take the license plates of all vehicles involved, as well as the names and addresses of the drivers and passengers.*

WHMIS

Objective: to familiarize crew members with the Workplace Hazardous Materials Information System.

Training Materials: Product label and corresponding Material Safety Data Sheet.

Lesson: *WHIMIS is short for Workplace Hazardous Materials Information System. It refers to legislation that covers hazardous materials used in Canadian workplaces. Hazardous materials are biological or chemical agents that can cause or inflict injury or possibly death, if not properly handled. All employees have the right to know about any hazardous materials on their jobsite. WHIMIS is intended to give workers knowledge and information they can understand and use to protect their health and safety every day.*

Hazardous materials covered by WHIMIS include:

- Dangerously reactive material
- Flammable and combustible material
- Compressed Gas
- Oxidizing material
- Poisonous and infectious material
- Corrosive material

WHIMIS mandates that each employee handling materials covered by WHIMIS legislation be aware of the Material Safety Data Sheet (MSDS) for the specific product, as well as how to implement the safe procedures indicated

WHIMIS training is two-fold and includes education about the hazardous products as well as training in work procedures including use, storage, handling, disposal, emergencies and spills.

Always be familiar with the hazards of a product before you start using it. You should look at a MSDS, match the name of the chemical on your container to the one on the MSDS, know the hazards, understand safe handling and storage instructions, as well as understand what to do in an emergency.

Information included on the MSDS:

1. Product information: product identifier (name), manufacturer and suppliers names, addresses, and emergency phone numbers
 2. Hazardous Ingredients
 3. Physical Data
 4. Fire or Explosion Data
 5. Reactivity Data: information on the chemical instability of a product and the substances it may react with
 6. Toxicological Properties: health effects
 7. Preventative Measures
 8. First Aid Measures
 9. Preparation Information: who is responsible for preparation and date of preparation of MSDS
- Under WHIMIS law, a MSDS for

a controlled product must be updated every three years. If new information becomes available before the three years has elapsed, the supplier is required to update the product label and MSDS.

- *The Material Safety Data Sheet (MSDS) must be readily available to the workers who are exposed to the controlled product and to the health and safety committee or representative.*
- *WHIMIS is short for Workplace Hazardous Materials Information System.*

Winterizing Irrigation Systems

Objective: to provide an understanding of why and how to winterize an automatic irrigation system.

Training Materials: air compressor, irrigation system, operator manual for pump, backflow prevention device.

Personal Protective Equipment: work boots, hard hat, gloves, long pants.

Lesson: *In our climate, irrigation systems must be winterized to prevent damage caused by water freezing in the pipes, valves and heads. Taking care in the late fall to shut the system down properly will avoid expensive repairs the following spring.*

The key factor in winterization is to remove all the water from the system. The most effective way to do this is to blow it out with an air compressor.

1. Turn off the water supply with the master shut-off valve. Make sure the backflow prevention device is isolated, so you are not blowing compressed air through it. The backflow prevention device should be winterized in accordance with the manufacturer's recommendations. Generally it is best to leave the ball or valve on the backflow preventer half-open. Wire tie the shut-off valve in an off position so it is not tampered with throughout the winter.

2. Turn off the irrigation controller. Do not unplug it for the winter.

3. Manually open the highest, or furthest valve from the point of connection, and leave it open throughout this process so the mainline does not become overcharged.

4. Using an air compressor that is sized according to the largest pipeline in the irrigation system, manually attach the air hose to the irrigation system and slowly introduce air to the system. 75 – 90 psi is ideal pressure.

5. It is best to manually open each control valves in sequence so you know each zone is clear of water. Open the next valve first before closing the valve that has just been blown clear of water.

6. When only a fine mist is coming from the system, it is free of water. Disconnect the compressor air hose and close any manually opened valves.

7. Remove the top of the rain sensor and store it inside the controller cabinet until the following spring.

8. If a pump is connected to the system it should be winterized according to manufacturer's recommendations. Pumps should be stored where they will not freeze over the winter.

- *In our climate, irrigation systems must be winterized in the late fall to prevent damage caused by water freezing in the pipes, valves and heads.*

- *Do not stand over irrigation heads while the system is pressurized with air.*

Xeriscaping

Objective: to explain the concept and basic principles of xeriscaping.

Training Materials: plants appropriate for xeriscape.

Lesson: *Xeriscaping is the concept of saving water in attractively landscaped areas. It is not necessarily a dry, rocky arid-looking landscape, but uses several different principles to create a striking landscape with reduced water requirements. Xeriscaping combines the Greek word xeros – meaning dry, with landscaping.*

By definition, Xeriscape means some water applied in well-controlled amounts and locations in the landscape.

1. Through water-wise planning and design, groups of plants with similar cultural requirements (water, exposure) are placed together. Steep slopes that require greater amounts of water are terraced to reduced irrigation requirements.

2. As in any healthy garden, soil plays a vital role. Clay soils drain very poorly, while sandy soils drain too quickly, so improving the soil with the addition of organic matter is necessary.

3. Native, or indigenous, plants are naturally adapted to local soils and rainfall, but xeriscape gardens can include other types of plants as well. Perennials and herbs that come from the Mediterranean are suited to

water wise gardens, as are many annuals that originated in Australia and Africa. Remember that plants with like moisture requirements should be grouped together.

4. Turf areas, that require large amounts of water, should be minimized. Think of xeriscaping as 'less-lawn landscaping.' A more drought-tolerant grass blend should be chosen for the lawn in the spirit of xeriscaping.

5. Water the landscape efficiently. Make sure water only falls on landscaped areas. Water in early morning or evening to reduce loss from evaporation.

Adjust the watering times of automatic irrigation systems at least once a month to meet the seasonal water needs.

Install different irrigation zones for trees, shrubs and planting beds. Using water efficient drip irrigation applies a low volume of water that will soak deeply into the soil.

6. Mulching exposed soil areas will help keep soil cooler, retain more water and reduce runoff.

7. While xeriscape landscapes are not no-maintenance, they often have reduced maintenance requirements. Avoid high levels

of fertilizer and frequent lawn mowing, to encourage longer, drought-tolerant turf. Monitor for disease and insect infestations, to manage outbreaks early.

A xeriscape does not have to be a boring mono-culture of spiny plants in rocks and gravel. With careful planning a xeriscape can be a lush colourful garden with a diverse mix of plants - and require a lot less water.

Examples of xeriscape plants;
Trees: ash, honeylocust, Kentucky coffee tree, catalpa, burr oak

Shrubs: pea shrub, cotoneaster, sea-buckthorn, juniper, potentilla, sumac, yucca

Perennials: Yarrow, thrift, coreopsis, Echinacea, Gaillardia, lavender, penstemon, Rudbeckia, sedum

Annuals: marigolds, zinnia, cockscomb, verbena, portulaca, amaranthus

• *Xeriscaping is the concept of saving water in attractively landscaped areas.*

Notes: