



Parks and Open Space Management

*Saskatchewan Parks and
Recreation Association Inc.*

Tree Planting Handbook





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Introduction and Disclaimer of Liability for Use of the Document

This Parks and Open Space Management Handbook, provides a description of procedures associated with maintenance activities performed within park settings.

The concept of maintenance standards requires the application of best practices within the local operation system. To assist with the establishment of such standards, this resource provides guidelines to aid staff in addressing their daily management operations. There are, however, situations where the standards outlined may require revision by those staff implementing the procedure, to best meet their needs. Specific site conditions, operating budgets, available human resources, and capacity to offer training associated with the practices outlined in this document may warrant alterations to the procedures.

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Tree Planting Introduction

It was mid-morning and your crew had just arrived at your third planting site of the morning. As you made your way up the walk to deliver the information sheet on the two trees, you were met at the front door by three kids and their dog. You then explained to the kids why the crew was there and asked them if they could give the information sheet to one of their parents.



As you headed down the steps, the dog ran past and you could hear the kids close behind. The tallest boy spoke up, “My name is Daniel, this is my brother Mark and my sister Melissa and our dog’s name is Champ.” You glanced back at the crew to see them trying to lure Champ back near the house, when Melissa stated, “Mom and Dad told us we were getting two new trees”, with an angelic smile on her face. “That’s right”, you responded. “Have you kids ever seen a tree being planted?”

Mark spoke up for the first time, “We’ve done better than that – we’ve planted trees”. “You have?”, asking with great curiosity.

The kids all belonged to a local Scout Troop. They proceeded to share their adventures of tree planting with you. “Scouts Canada has been running the Scoutree Program for 30 years and has planted more than 70,000,000 trees,” Daniel said very matter-of-factly.





Tree Planting Introduction Continued....



“Not big trees like those ones though”, Mark piped in as he watched the Bobcat carrying the tree towards them. You saw Melissa’s grip tighten around Champ as he was getting a little nervous with all the commotion and equipment around.

“Maybe you should put Champ in the house and I will go help the guys finish up and you kids can get back to enjoying your summer”, you said as heading back to the crew.

The crew was just beginning the second planting. Everyone was working diligently and with purpose...like a fine oiled machine.



The looming rain was their motivation; and you remembered it gets pretty messy and muddy trying to plant in the rain. In no time at all the second tree was planted and the site was clean.

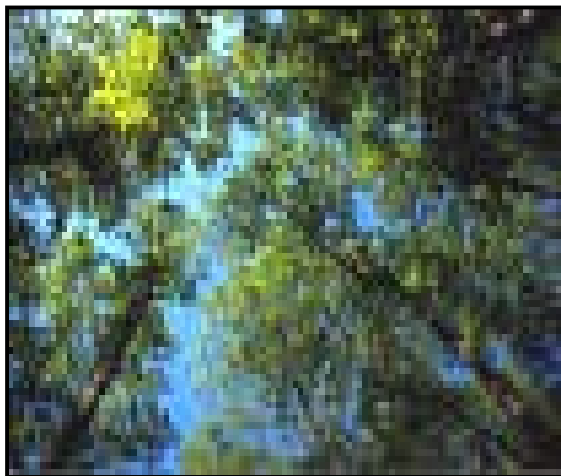
Waving to the four new friends you made and wishing them well with their own tree planting, you now knew it was time to move to your next location.





Tree Planting Overview

In order to maintain a healthy and vibrant urban forest, it's important to have a variety of trees that vary in size and age. This includes continually planting new trees to replace those lost to drought, old age, disease, insects, and injury. Why you ask? Well, if you eliminated all tree planting, you would risk losing your valuable urban forest and the many benefits it provides on a daily basis.



Trees are natural pollution-control devices. They absorb carbon dioxide, which is a by-product of burning fossil fuels, and they return oxygen to the air. Their leaves, branches, and trunks help slow the runoff of storm water. They also provide sound buffering, shade, and measurably cooler temperatures on hot summer days. The savings that result from these environmental benefits can add up.

Research has shown that substantial increases in the number of trees can reduce storm-water and pollution-control expenditures by millions of dollars.

There are a few different methods used for transplanting trees or shrubs. These methods are: bareroot planting, container planting, balled and burlapped planting (which may have its root system supported by a wire basket) and tree spaded planting.





Tree Planting Overview Continued....

The balled and burlapped planting method is the most common method used to plant trees. The ideal time to transplant a tree is during the dormant season in the spring, before bud-break, or in the fall after the tree has lost its leaves. Spring planting and cooler temperatures allow the plants to establish roots in the new location before spring rains and summer heat stimulates new top growth. Planting during the summer can also be successful but has a greater risk and requires more watering.



Planting can be done in the fall as well. When trees are dug in the nursery they have already lost a significant amount of their root mass (up to 95%). This puts the tree under tremendous stress. Regardless of the method, trees should be transplanted when the leaves fall from the tree or when they are in a dormant state or you will risk damaging or losing the tree.

Unfortunately, there's more involved than simply planting more trees. You also have to keep them alive - and that's where the aftercare of planting comes into play. In this module you will learn to tag the trees, build tree wells, stake trees and record the plantings so that the new trees can be added to the tree inventory and watering schedule.

Did you know that trees produce 30% of the oxygen in the air that we breathe?



Common Trees Planted

Acer negundo - Manitoba Maple
Acer rubrum 'Northwood' - Red Maple
Acer saccharinum – Silver Maple
Acer x freemanii 'Jeffersred' – Autumn Blaze Maple
Eleagnus angustifolia - Russian Olive
Fraxinus americana 'Jefnor' - Northern Blaze (White) Ash
Fraxinus mandshurica – Manchurian Ash
Fraxinus nigra 'Fallgold' – Fallgold (Black) Ash
Fraxinus pennsylvanica 'Rugby' – Prairie Spire® Ash
Fraxinus pennsylvanica 'Patmore' - Patmore Green ash
Gleditsia tricanthos inermis 'Dursan' – Prairie Silk® Honeylocust
Larix laricina - Siberian Larch
Malus spp - Thunderchild, Selkirk, Snowdrift and Big River Crabapple
Picea pungens - Colorado Spruce
Picea sylvestris - Scots Pine
Populus x canescens 'Tower' - Tower poplar
Populus 'Assiniboine' - Assiniboine Cottonwood
Populus 'Manitou' - Manitou Cottonwood
Prunus maackii – Amur Cherry
Prunus virginiana 'Shubert' – Shubert Chokecherry
Quercus macrocarpa – Bur Oak
Sorbus aucuparia 'Rossica' - Russian Mountain Ash
Sorbus decora - Showy Mountain Ash
Syringa reticulata - Japanese Tree Lilac
Tilia americana - American Linden (Basswood)
Tilia mongolica "Harvest Gold" – Harvest Gold (Mongolian) Linden
Tilia x flavescens 'Dropmore' – Dropmore (Hybrid) Linden



Your Day Begins





Safety Equipment Overview

From your past experience you know the importance of wearing the correct clothing and safety equipment. You recall the standard safety gear used by the department and its staff.

Safety Gear



Hard Hat - Required *(never worn backwards or over another hat)*



Safety Vest - Required *(wear on all roadways)*



CSA Approved Safety Boots - Required



Work Gloves - Required



Safety Glasses - Required



Ear Plugs - Required



Safety First!

Remember to put out any warning signs, barricades or pylons required to meet the safety standards when working on or near roadways.





Equipment Checks

Circle Checks

Before leaving the depot for your day of tree planting, perform a circle check on all your equipment. Your department may use a daily log book for any vehicle that you “ride in” or “ride on”. Before leaving the depot at the beginning of your shift you are required to complete the circle check provided in the operators daily log book.

Remember to check to make sure you have safety vests, warning signs, barricades or arrow board, and pylons required to meet all safety standards when working on or near roadways.

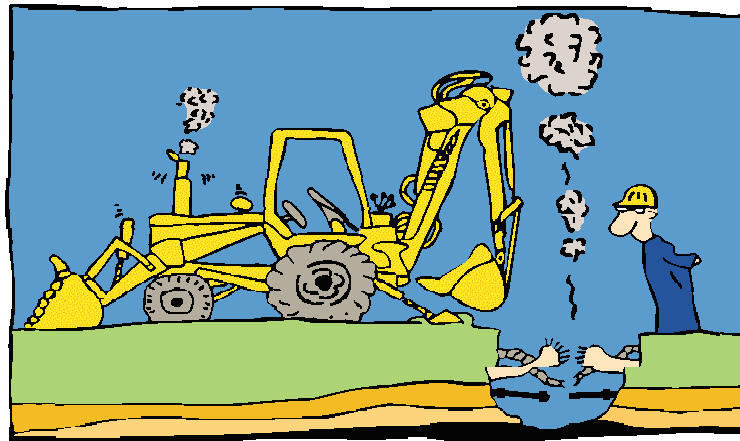
Maintenance Checks

From your experience you understand the importance of maintaining the equipment used by the department. You will recall from your equipment training what you will look for when performing your maintenance checks on specific pieces of equipment. If you find that a piece of equipment is damaged or in need of regular maintenance, let your supervisor know and it can be booked in for maintenance.



Site Preparation

If a homeowner is calling in and requesting a tree be planted on their property, or a new subdivision has been developed and the department is starting to landscape it, or trees are being added for a sound barrier along the highway ...you ALWAYS DIAL BEFORE YOU DIG – anywhere! This is important to stop you from accidentally digging through or damaging underground power or gas lines.



When planting is going to be done on residential sites a planting notice should be delivered to residents informing them that the department will be planting a tree(s) on the municipally owned portion of the property in the next 2 – 6 weeks. It should explain that the department will mark the proposed location with bright colored paint or a small wooden stake. The tree may be planted on either side of the marking, but not in front or behind it. This should also be reviewed in case there are any planting restrictions impacting the site.





Site Preparation Continued...

Leaflets describing the trees that are going to be planted, as well as planting information should be delivered to all the houses where the residential plantings are to be done. Residents with underground sprinklers must be provided with a telephone number to call if the planting site is near any underground irrigation lines. If the plantings are being done on non-residential sites, it is not necessary to deliver leaflets.

Arrangements must also be made for the underground utilities and cables to be marked. The Forestry Technician or another appropriate member of the department should visit the site to mark the planting site with the wooden stake or spray paint in the location the tree is to be planted. There are minimum setback standards for underground utilities and other infrastructures elements that impact the planting site. When marking a site, these are some of the things that need to be considered:

- What types of trees already exist in the area?
- Does the tree location fall within a sightline area as per associated bylaws or other restrictions?
- Will the full grown tree interfere with overhead power lines? If so, smaller species containers should be used.
- Where are the underground utilities located?
- Where are the building and fence setbacks?
- Where are the street setbacks (signage, snow clearance, boulevard widths – minimal widths to plant)?
- Where are the amenity setbacks (tennis courts, benches, play grounds, and proximity of the tree planting to the bordering private property)?
- Where are the private property setbacks with respect to the tree species and proximity of the tree planting to the bordering private property?
- Are there underground irrigation lines?
- Where are the water and sewer service lines?





Things to Consider When Planting

- Remember to take into consideration the size of the tree when it becomes full-grown.
- The tree should not obstruct the view of motorists approaching traffic signs or lights, typically a tree should not be planted within 10 meters of an intersection. (Site line triangle – Traffic Bylaw)
- The tree should not obstruct the view of motorists or pedestrians approaching or leaving an intersection, walkway or alley. (Traffic Bylaw)
- Large trees should not be planted close to traffic lanes.
- Trees on boulevards that will block the view of motorists and pedestrians should be avoided.
- Only smaller types of trees can be planted under canopies, power lines and overhead signs.

Trees should NOT be planted in the following areas:

- loading, taxi, bus, police or handicap zones;
- storm channel floodways, stormwater ditches and on top of flood dikes;
- on the reading side of regulatory signs (i.e. stop and yield signs, school zone signs, no parking signs, etc.);
- in front of doorways, entrance walkways, show windows (unless spacing requirements permit it);
- where they may obstruct parking meters;
- on major arterial roadways where the boulevard is less than 6 meters wide.





Spacing of Trees

When planting young trees, it is important to consider how large the trees will be at maturity. From your experience you already know that each tree variety will have certain size and shape characteristics. In order for your trees to thrive in the urban landscape, they must be given enough space to grow to their adult size. Also, they should be properly planted where site conditions closely match the tree's environmental requirements.

Spacing between trees:

- ☑ 8 meters between crab apples, cherries, spruce, willows and any other ornamental tree types on residential streets.
- ☑ 10 meters between shade trees like maple, ash, elm, linden, willows, poplar and birch on residential streets.
- ☑ 6 meters between trees planted in a single row on boulevards.
- ☑ 10 meters between trees planted in a double row on boulevards. Trees must be at least 3 meters in from the curb.

Trees must be planted no less than:

- ☑ 1 1/2 meters from the city sidewalk.
- ☑ 2 meters from underground utilities (sewer, water, gas, secondary cables).
- ☑ 5 meters from major underground utilities (main gas lines, primary cables and concrete ducts).
- ☑ 1 meter from street light cables.
- ☑ 4 1/2 meters from alleys.





Spacing of Trees Continued...

- ☑ 5 meters from street lights.
- ☑ 5 meters from traffic signs.
- ☑ 2 meters from fire hydrants and bus stops.
- ☑ 10 meters from overhead power lines for trees that grow to a height of 10 meters. 5 meters from overhead power lines for trees that grow to a height of 5 meters.
- ☑ 5 meters from adjacent private property – except for poplar which require 10 meters minimum because of their strong spreading root system.





Nursery

Inspecting the New Planting at the Nursery

The department will only want to plant the healthiest trees in our neighbourhoods, and parks and open spaces, so all trees and shrubs are to be inspected prior to planting.

Make sure to tell your supervisor if you find any of the following:

- Check main branches for any broken or dead branches. You want to be sure that they are healthy.
- Look closely at leafbuds and flowerbuds. If they are dry, brittle and fall off easily, it's a sign that the tree has been allowed to dry out.
- Signs of insect or disease problems.
- Discoloration of bark and shriveled branch texture.
- Signs of poor or damaged root systems; roots are very dry, tree trunk moves separately from the root ball, wire basket may not be firmly on the root ball or the root ball may not be properly covered with burlap.
- Make sure that the trees have been adequately watered before leaving the nursery and taking the trees to the site. This is especially important when the plantings are containerized nursery stock. The soil used in these types of plantings is modified and dries out quickly.





Loading and Transporting the Trees

The trees that you are planting must be handled carefully. They are already under the stress of being uprooted at the nursery so here are a few things that you can do to make the transplanting less stressful for the trees.

Containerized trees can be loaded by hand into the back of the truck. Again, make sure that the nursery staff has adequately watered the plant material before taking the trees to the site. Stack standing up, not on their sides.

Bareroot trees can be loaded by hand into the back of the truck as well. When transporting bareroot plantings, they are to be watered and covered with mulch or soil and a tarp. Do not leave the root system exposed at the planting site. It is critical that the root system is not allowed to dry out. Bareroot trees should be heeled-in under a blanket of soil or mulch, and transporting in cooler weather will help to reduce desiccation of the fine root hairs if they cannot be planted right away.

Balled and burlapped trees will have to be loaded with the help of a Bobcat or tractor. These types of trees will either have burlap wrapped around its root system or burlap and a wire basket.



If the tree has a burlapped root ball, you should lay the sling on the ground beside the tree. Then using a gentle rocking, wiggling motion, you will work the root ball onto the sling. Be careful not to damage the root ball. There are metal rings on each corner of the sling. Gather together two of the rings on each side of the root system and then the sling can be attached to the forks on the Bobcat. The sling will cradle the tree as it's transported to the back of the truck. The Bobcat operator will raise the forks on the Bobcat, lifting the tree into the truck box.





Loading and Transporting the Trees Continued...

A crew member inside the truck box should help guide the tree as it is set down on the floor of the truck box. Make sure that your hands and feet are out of the way of the root ball so they don't get crushed.

You will then slide the metal rings off the hook on the forks of the Bobcat and using the same rocking, wiggling motion as earlier, you will work the trees root system off the sling.

If the tree has a wire basket on its root system, you will notice loops along the top of the wire basket. There may be a hook attached to the front forks of the Bobcat and the loops enable the Bobcat Operator to slip the hook through and lift the tree into the box of the truck.

- Be careful not to drop the soil ball. If the soil ball is broken, many of the small roots will be severed from the trunk and the plant may die.
- Always pick the planting up by the soil ball – never by the trunk.
- Always be sure that the soil ball does not dry out or is exposed to hot summer or freezing winter temperatures for an extended period of time before planting.

Tree spaded trees are dug and transported to the site with the tree spade truck. The hole at the site should already have been dug, when the tree spade truck arrives at the site with the tree, it can be transplanted immediately.



Safety First!

Be alert and be aware of your surroundings. The Bobcat operators vision can be obstructed at certain times so make sure you know where he is and stay a safe distance away.



Procedure for Planting

Bareroot Plantings

Bareroot plantings are nursery grown plants that are harvested and shipped without soil, usually of small caliper. When you are transplanting bareroot trees it is important to plant them as quickly as possible, and keep their root system moist and cool. This is key to the survival of the tree or shrub.

Here are the steps to follow when planting a bareroot tree:

1. Confirm arrangements for delivery or pick-up of the trees from the nursery.
2. Check to make sure you have a proper invoice or requisition form, completed and authorized, with you before you pick up the trees from the nursery for that days planting only.
3. Digging the correct size of planting hole (depth, hole size and shape) is vital to help ensure adequate root growth. The hole should be 1' – 2' wider than the size of the root system. Planting depth is critical too. For compacted, clay soils, trees should be planted at or slightly higher than the depth they grew in the nursery – check for water/soil marks on the tree trunk. Dig the hole using a shovel and create a mound of soil for the tree to sit on. The sides of the hole will be glazed from the shovel cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil somewhat to ensure easy root penetration, especially in compacted soil. Keep in mind that the hole has to be larger than the planting's root system.



Bareroot Plantings Continued...

4. Prune off any damaged roots and branches before planting.
5. When you are placing the tree in its new hole, you gently fan the roots out making sure the root system is not twisted, bent or kinked which will cause girdling roots to form. The root flare should be even with the soil line. Again, if you find that the hole is too small, do not cut back the root system so that it fits into the hole. Instead, make the hole larger to fit the roots. If you just stuff the root system into a hole that is too small, you will damage the roots. As well, because the soil is traditionally quite hard packed, it's good that there is some room left over in the hole for some new, less compacted soil that will allow the new roots to get better established.
6. One crew member should hold the tree upright in the hole while other crew members backfill the hole with top soil. While the tree is being backfilled, the person holding the tree should gently pull the tree up and down to help settle the new soil around the root system and ensure that it remains at or slightly above the soil grade level.
7. Compact the new soil by stepping around the base of the planting; this will help to remove any air spaces that may remain in the hole.
8. It is important to plant the new tree at the same depth or slightly above the soil level, as it was grown in at the nursery. Insert the trunk in the same direction, (a mark is normally placed on the north side of the tree prior to it being dug up).
9. You should tag the tree, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule. These steps are all included in the Aftercare Section of this module.





Balled/Burlapped Plantings

Balled and burlapped trees must be handled with care, or you could damage the trunk or roots inside the rootball. These trees should always be handled by the rootball and not by the trunk.

Here are the steps for planting a balled/burlapped type planting:

1. Confirm arrangements for delivery or pick-up of the plantings from the nursery.
2. Check to make sure you have a proper invoice or requisition form, completed and authorized, with you before you pick up the trees from the nursery for that days planting.

3. Depending on the size of the tree you will either dig the hole about 1' – 2' larger than the root ball using a shovel (just as you did with the bareroot type planting) or if it is a larger planting, the hole will be dug using a tree spade.



4. From your experience you know that the sides of the hole will be glazed from the blades cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil somewhat. You may need to add some planting soil in the hole in order to set the root ball to the proper depth.





Balled/Burlapped Plantings Continued...

5. Once the hole is ready, the Bobcat operator should spring into action. Watch out for him! Crew members should help to attach two rings of the sling to the Bobcat. To do this you should lay the sling down in the box of the truck. While holding the tree by the trunk you will use a rocking motion to move the root ball onto the sling. There are metal rings on each corner of the sling. Gather together two of the rings on each side of the tree and then the sling can be attached to the forks on the Bobcat. The sling will cradle the tree as it's transported from the back of the truck to the hole that was dug.



6. The tree should be gently lowered into the hole. One crew member can hold the tree in the proper position as the sling is removed. Give the Bobcat operator a minute to get out of the way, and then members of the crew can cut away and remove strings and any extra burlap.

7. The remaining burlap is then folded over and tucked into the hole alongside the root system. The burlap must be below the soil surface from the top 1/3 of the root system or it will end up drawing moisture away from the tree. The burlap is normally bio-degradable (unless it's treated burlap - green in color), so it can be left on the root system. Over time it will break down in the soil.





Balled/Burlapped Plantings Continued...

8. Now that you have gotten the root ball of the planting all nicely tucked away in its new home, you can begin backfilling the hole using the planting soil from the “soil truck”.



9. Once you have backfilled the hole, compact the soil by walking on it or you can use the back of your shovel combined with a pressing down – tamping motion.

10. Similar to the bareroot type planting, it is important to plant the new tree at the same soil level and insert the trunk in the same direction, (a mark is normally placed on the north side of the tree prior to it being dug up), as it was grown at the nursery.

11. You should tag the planting, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule.





Wire Basket Plantings

This type of planting method is exactly the same as the balled and burlapped method except for when you are lifting the plantings out of the crane truck and transporting them to the hole that has been dug for the tree.

1. You will notice the loops of the wire basket that are folded around the top of the root ball, these loops will enable the Bobcat to slip a hook which may be attached to the forks on the front of the Bobcat and this is how the wire basket plantings are transported to the hole that has been dug for the tree.
2. Once the tree is lowered into the hole you will have to remove the top ring of the basket and cut the second ring in 3 or 4 different places. Don't leave any sharp edges that could damage the root system as it's growing.
3. Then, just as is done with the balled and burlapped type planting, you should backfill the hole using the soil from the "soil truck", compact the soil, tag the planting, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule.





Tree Spade Plantings

This type of planting method uses a tree spade to first dig the hole to transplant the tree into and then to dig up the tree at the nursery, transport it, and transplant it in its new planting site.

A tree spade is a machine that uses hydraulics to force triangular blades into the ground so a narrow tapered plug of earth can be removed. Larger tree spades are mounted on modified trucks with outrigger stabilizers that support and level the four blades. The two rear blades are mounted on a hinged framework that allows the back of the machine to swing open when approaching a tree. Tree spades come in a variety of sizes to accommodate a wide range of tree caliper widths. It is important that the correct size of tree spade be matched to the size of the trees being dug. This ensures that the adequate amounts of roots are retained to ensure transplanting success.



1. The steps when planting this type of tree are much the same as the balled and burlapped method, but of course you will not have any wire basket or burlap on the root system. From your experience you know that the sides of the hole will be glazed from the blades cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil so the roots are able to penetrate through the ground better. Clean out the hole prior to transplanting to ensure the plant fits properly in the hole. Remember, slightly higher is better than too deep.



Tree Spade Plantings Continued...

2. Now, once the tree spade has set the tree in its hole, the steps are the same for backfilling the hole and compacting the soil. It may be necessary to fill the voids or cracks around the edge of the planting hole to eliminate any air pockets that could cause the roots to dry out. This may also need to be done following irrigation as the soil may sink.
3. Same as with the bareroot, balled and burlapped type planting, it is important to plant the new tree at the same soil level and insert the trunk in the same direction as it was grown in at the nursery.
4. You will tag the planting, form a tree well, stake the tree if necessary and record the planting information and arrange for it to be added to the watering schedule.

The following tables show the appropriate size of tree baller or tree spade to be used in relationship to the size of the tree being transplanted.

Tree Spade Transplanting:

Tree Spade Size	Trunk Diameter Deciduous Trees	Height Of Coniferous Trees
* 76cm / 30"	* Up to 5cm / 2"	* Up to 1.8m / 6'
112cm / 44"	Up to 8cm / 3"	Up to 2.1m / 7'
152cm / 60"	8cm to 13cm / 3"-5"	2.1m – 3.7m / 7'-12'
213cm / 84"	13cm to 20cm – 5"-8"	3.7m – 6.1m / 12'-20'

* Bobcat with spade attachment.



Cleaning Up the Planting Site

The last thing you will have to do is clean up the planting site.

- Sidewalks are swept.
- Lumps of grass and soil are either picked up by hand or shoveled up from roadways and grass areas.
- Planting debris such as wrapping, parts of wire baskets, synthetic cords and dead or broken branches that have been removed from the tree are picked up.



Basically, when you leave the site, no one should be able to tell that you were there, except of course, for the beautiful tree you have left behind.



Often, the soil that is removed from where the hole has been dug is collected in one area. Either you or another crew should pick up the excess soil. Typically the soil should be taken back to the nursery and used to fill the holes from which the trees that you are planting came from.



Aftercare

The care given to the newly planted trees will greatly affect their chances of surviving their first few years.

Tagging the Plantings

New plantings should be tagged at the time they are planted. Each year a different tag should be used as it will help the department in their efforts to maintain an urban forest. The tag should tell how old the planting is, and therefore when you should remove any tree guards and / or tree stakes. This type of protection is put on at the time of planting and typically is removed after its first few years, after the plant gets established.



For instance, the department may have used green tags in 2003, so in 2005 they would know what trees should have the guards and / or stakes removed. Essentially, you could track the entire history of the tree by referencing the number on its tag. That's why it is so important to record the planting information. To take it one step further, that is why any information with regards to change of location, damage or disease should be recorded.





Watering

Any new plantings should be recorded and then added to the list for watering on a regular basis. If it is a tree that is planted on a residential site, the water truck will water it once or twice. After that it should be the responsibility of the homeowner. When planting a tree for a homeowner, a leaflet should be left in their mailbox that tells them about the type of tree they are now the proud owners of and the care it will require.



New plantings in parks should also be recorded and added to the list for watering. Water them for the first three years. The plantings should not be fertilized the first year. They are already under a lot of stress from transplanting and if you start to encourage them to grow faster with fertilizer it adds more stress to the planting. They should be fertilized in year two and

three with a 20-20-20 mixture that is premixed.

After the plantings are established, natural rainfall may be enough for these trees to survive, although supplemental watering may be required during periods of drought.





Tree Stakes

Staking is done at the time of planting to help stabilize the tree from the effects of strong winds. The purpose of staking is to lessen the movement of the root ball. Proper staking should allow the tree to gently sway in the wind. This also allows the trunk to increase in taper as it grows.

Most trees over one inch in trunk diameter should be braced with stakes to hold them upright. Staking should occur low on the tree trunk, about $1/2 - 2/3$ the height of the trunk.



Staking higher on the tree prevents natural movement of the tree resulting in the tree becoming dependant on the stake. Trees that are stake dependant will develop weakened trunks and have slowed root development. Trees with weakened trunks will not be able to support the weight of the tree canopy, thus it can simply fall over or break off.

Staking is not permanent. Typically, stakes remain on bareroot, balled and burlapped trees for 2 – 3 years, and 1 year on wire basket type plantings. The wire basket offers stability to the root system while buried in the ground. This brings us to another common problem - leaving the stakes on too long. Leaving the stakes in place longer develops a weaker tree. Once again, the tree becomes stake dependent and damage can occur during periods of high winds or heavy ice or snowfall.





Tree Stakes Continued...

Lastly, one of the most common problems with tree stakes is trunk damage. This arises from improper installation. Young trees quickly expand in trunk diameter. Making sure the ties fit loosely around the trunk, allows for natural growth of the tree. To help prevent this problem, staked trees should be checked often during the growing season. Wire with the protective covers that are too tight or left in place for extended periods will girdle the tree, restricting the movement of nutrients and water. When this happens, the tree can be choked to death.



Wires used to support the young tree should not come in contact with the bark. Run the wire through plastic tubing to ensure the wire isn't damaging the tree. Also, make sure no part of the stake or wire rubs the bark, injuring the tree.

Staking is recommended for young trees and important in establishment. It is your responsibility to make sure it is done properly.

- Use steel stakes instead of wood – they will not break or rot.
- Stakes must be imbedded into firm ground.
- Stakes are not to be put through the root ball of the planting.
- Stakes are to be tied to the tree at 1/2 – 2/3 of the tree's height.
- Use a rubber hose on all guy wires to protect the tree at the point of contact.
- Put one stake on the northwest side of the tree because most prevailing winds come from the northwest and the second one on the southeast side of the tree.





Tree Stakes Continued...

From your experience you know that a stake is used to support a tree – not straighten a crooked one.

Here are the steps when installing tree stakes:

1. Using the staking tool you will pound the metal stakes into firm ground – not through the root system of your planting. Make sure that one of the stakes is on the northwest side of the tree to protect it against northwest winds!



2. Once the tree stakes are in place you can loop the guy wires around the trunk of the tree about 1/2 – 2/3 the way up the tree. From your experience you know the importance of slipping the guy wires through a piece of rubber hose before you tie them around the tree trunk. This will prevent the guy wire from coming in direct contact with the tree trunk and causing any damage.



Tree Stakes Continued...

3. Use your pliers to twist the wires together at the metal stake and leave a little slack in the wires.



4. Pull one of the wires over top of the other creating a circle in the middle that you are able to insert the handle of your pliers through. Once you have one handle through the circle, hold the other handle of the pliers and twirl the pliers around. This will cause the guide wire to twist and become taut.



Tree Guards

Tree guards can increase the survival rate of trees by protecting the trunks from damage caused by weather, animals and equipment.

During the winter, voles, mice and rabbits can injure the bark and twigs of young trees by feeding on the bark. The damage they cause may permanently disfigure or even kill a tree. Young and thin-barked trees are most vulnerable to animal damage.



Where required, tree trunks can be protected from the damages of voles, mice and rabbits by placing a white wrap cylinder or plastic drainpipe around the trunk. It should extend 2" to 3" below the ground for mice control and 18" to 24" above the anticipated snow line for rabbit control. This protective ring should be removed each spring, or at least checked; to ensure that it does not hinder the tree trunk as it grows.

Remember that protecting young trees before they are damaged is the key. Little can be done after rodents have chewed the bark off all the way around the trunk of the tree! In unmulched sites, short green tree guards can be installed at the base of any tree 6" in diameter or less to protect the tree from mower and string trimmer damage.





Tree Wells

A tree well is a raised ring of soil formed around the edge of the root ball to create a basin that can be filled with water. It also helps to avoid damage from mowers and string trimmers.

When doing plantings at residential sites or in tree and shrub beds, the tree wells are formed by building up the soil about 1 1/2" – 2" in a circle around the base of the tree. The tree well should be built the same circumference as the hole that was dug to plant the tree. Forming this well around the base of the tree will help stop water from draining away from the root system.



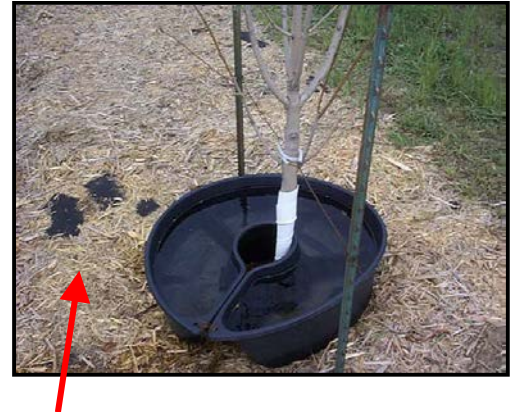
Trees that are planted singly, usually along roadways, often have tree wells. Tree wells and tree beds are often also mulched to provide additional benefits. These include improving the plant's health and development by reducing competition presented by grass and weeds that grow around the base of trees and from reduced soil compaction and mechanical damage caused by mowing equipment. They also reduce the high maintenance requirements for controlling the growth of weeds and turf around the base of trees.



Tree Rings

Some trees, again, usually on major arterial roads, also may use a tree ring. Tree rings are used to collect and slowly release the water, which allows it to soak in the soil better. The holes in the ring must be cleaned before watering the tree.

Once the rings have been on the young trees long enough, usually a couple of years, they can be removed and moved to some newly planted trees.



Mulched Bed

Mulching

Mulching helps to retain moisture, prevent wide temperature fluctuations in the soil and provides a favourable environment for beneficial soil organisms. It also protects the tree from lawnmower or string trimmer damage, and reduces water and nutrient competition while slowly releasing nutrients into the soil as it decomposes.

When mulching beds or individual tree plantings;

- Keep mulch back 6" – 8" from around the tree trunk. If the mulch is too close to the trunk it encourages habitat for mice and voles that may feed on the bark and roots, girdling the trunk and killing the tree. Keeping the mulch back from the trunk helps prevent the build up of excessive moisture around the tree trunk that causes root rot.
- The depth of the mulch should be between 2" – 4" and spread out to the drip line of the tree.



Pruning

Very little pruning is required on new plantings. The tree requires all the above ground foliage to photosynthesize and produce more food for the disturbed root system and aid in the tree's recovery from transplant shock.

Typically, the trees would have received any corrective pruning required by the staff at the nursery. The most you will have to do is remove any broken, dead, wounded, diseased, rubbing, co-dominant or poorly angled branches you may see. Proper sharp pruning tools and cuts must be used when pruning.



At the End of the Day

On your way home you drive by your neighbourhood park, coincidentally, where you planted your first tree. You pull your car over to the curb and shut off the engine. You can't resist the urge to get out of the car and take a stroll over to "your" tree. A smile begins to play on your lips as you approach the tree.



You think back to the enthusiasm that Daniel, Mark and Melissa showed when they spoke of their tree planting adventures with Scouts – 70,000,000 trees! That really is remarkable!

When you finally reached your tree you can see that it's vibrant and healthy. You knew it would be though. After all, this isn't the first time you've checked on it. As you gaze up into the branches you draw a deep breath as you think about the oxygen that is produced by trees and the beauty and benefits they provide to our environment. "Thank You", you say aloud. Your reward is seeing these trees develop into strong healthy specimens and the creation of an awesome urban forest in the middle of the prairies.





Tree Planting – Job Aid Safety Equipment Overview

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From your past experience you know the importance of wearing the correct clothing and safety equipment. You recall the standard safety gear used by the department.

Safety Gear

-  Hard Hat - Required *(never worn backwards or over another hat)*
-  Safety Vest - Required *(wear on all roadways)*
-  CSA Approved Safety Boots - Required
-  Work Gloves - Required
-  Safety Glasses - Required
-  Ear Plugs - Required

Remember to put out any warning signs, barricades or pylons required to meet the safety standards when working on or near roadways.





Tree Planting – Job Aid Circle and Maintenance Check

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Circle Check

Before leaving the depot for your day of tree planting, you should perform a circle check on all your equipment. The department may use a daily log book for any vehicle that you “ride in” or “ride on”. Before leaving the depot at the beginning of your shift you are required to complete the circle check provided in the Operators Daily Log Book.

Remember to check to make sure you have safety vests, warning signs, barricades or arrow board, pylons required to meet the safety standards when working on or near roadways.

Maintenance Check

From your experience you understand the importance of maintaining the equipment used by the department. You will recall from your equipment training what you will look for when performing your maintenance checks on specific pieces of equipment. If you find that a piece of equipment is damaged or in need of regular maintenance, let your supervisor know and it can be booked in for maintenance.





Tree Planting – Job Aid

Loading and Transporting the Trees

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Containerized trees can be loaded by hand into the back of the truck. Make sure that the nursery staff has adequately watered the plant material before taking the trees to the site. Stack standing up, not on their sides.

Bareroot trees can be loaded by hand into the back of the truck as well. When transporting bareroot plantings, they are to be watered and covered with mulch or soil and a tarp. Do not leave the root system exposed at the planting site. It is critical that the root system is not allowed to dry out. Bareroot trees should be heeled-in under a blanket of soil or mulch, and transporting in cooler weather will help to reduce desiccation of the fine root hairs if they cannot be planted right away.

Balled and burlapped trees will have to be loaded with the help of a Bobcat or tractor. These types of trees will either have burlap wrapped around its root system or burlap and a wire basket.

If the tree has a burlapped root ball, you will lay the sling on the ground beside the tree. Then using a gentle rocking, wiggling motion, you will work the root ball onto the sling. Be careful not to damage the root ball. There are metal rings on each corner of the sling. Gather together two of the rings on each side of the root system and then the sling can be attached to the forks on the Bobcat. The sling will cradle the tree as it's transported to the back of the truck. The Bobcat operator should raise the forks on the Bobcat, lifting the tree into the truck box.





Tree Planting – Job Aid

Loading and Transporting the Trees


A crew member inside the truck should help guide the tree as it is set down on the floor of the truck box. Make sure that your hands and feet are out of the way of the root ball so they don't get crushed.

You will then slide the metal rings off the hook on the forks of the Bobcat and using the same rocking, wiggling motion as earlier, you will work the trees root system off the sling.

If the tree has a wire basket on its root system you will notice loops along the top of the wire basket. There should be a hook attached to the front forks of the Bobcat and the loops enable the Bobcat operator to slip the hook through and lift the tree into the box of the truck.

- Be careful not to drop the soil ball. If the soil ball is broken, many of the small roots will be severed from the trunk and the plant may die.
- Always pick the planting up by the soil ball – never by the trunk.
- Always be sure that the soil ball does not dry out or is exposed to hot summer or freezing winter temperatures for an extended period of time before planting.

Tree spaded trees are dug and transported to the site with the tree spade truck. The hole at the site should already have been dug, when the tree spade truck arrives at the site with the tree, it can be transplanted immediately.

**Safety First!**

Be alert and be aware of your surroundings. The Bobcat operators vision can be obstructed at certain times so make sure you know where he is and stay a safe distance away.





Tree Planting – Job Aid Bareroot Planting Procedures

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When you are transplanting bareroot trees it is important to plant them as quickly as possible, and keep their root system moist and cool. This is key to the survival of the tree or shrub.

Here are the steps to follow when planting a bareroot tree:

1. Confirm arrangements for delivery or pick-up of the trees from the nursery.
2. Check to make sure you have a proper invoice or requisition form, completed and authorized, with you before you pick up the trees from the nursery for that days planting only.
3. Digging the correct size of planting hole (depth, hole size and shape) is vital to help ensure adequate root growth. The hole should be 1' – 2' wider than the size of the root system. Planting depth is critical too. For compacted, clay soils, trees should be planted at or slightly higher than the depth they grew in the nursery – check for water/soil marks on the tree trunk. Dig the hole using a shovel and create a mound of soil for the tree to sit on. The sides of the hole will be glazed from the shovel cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil somewhat to ensure easy root penetration, especially in compacted soil. Keep in mind that the hole has to be larger than the planting's root system.
4. Prune off any damaged roots and branches before planting.





Tree Planting – Job Aid

Bareroot Planting Procedures

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5. When you are placing the tree in its new hole, you gently fan the roots out, making sure the root system is not twisted, bent or kinked which will cause girdling roots to form. The root flare should be even with the soil line. Again, if you find that the hole is too small, do not cut back the root system so that it fits into the hole. Instead, make the hole larger to fit the roots. If you just stuff the root system into a hole that is too small, you will damage the roots. As well, because our soil is traditionally quite hard packed, it's good that there is some room left over in the hole for some new, less compacted soil that will allow the new roots to get better established.
6. One crew member should hold the tree upright in the hole while other crew members backfill the hole with top soil. While the tree is being backfilled, the person holding the tree will gently pull the tree up and down to help settle the new soil around the root system and ensure that it remains at or slightly above the soil grade level.
7. Compact the new soil by stepping around the base of the planting; this will help to remove any air spaces that may remain in the hole.
8. It is important to plant the new tree at the same depth or slightly above the soil level as it was grown in at the nursery. Insert the trunk in the same direction, (a mark is normally placed on the north side of the tree prior to it being dug up).
9. You should tag the tree, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule. These steps are all included in the Aftercare Section of this module.





Tree Planting – Job Aid

Balled / Burlapped Planting Procedures

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Balled and burlapped trees must be handled with care, or you could damage the trunk or roots inside the rootball. These trees should always be handled by the rootball and not by the trunk.

Here are the steps for planting a balled/burlapped type planting:

1. Confirm arrangements for delivery or pick-up of the plantings from the nursery.
2. Check to make sure you have a proper invoice or requisition form, completed and authorized, with you before you pick up the trees from the nursery for that days planting.
3. Depending on the size of the tree you will either dig the hole about 1' – 2' larger than the root ball using a shovel (just as you did with the bareroot type planting) or if it is a larger planting, the hole will be dug using a tree spade.
4. From your experience you know that the sides of the hole will be glazed from the blades cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil somewhat. You may need to add some planting soil in the hole in order to set the root ball to the proper depth.
5. Once the hole is ready, the Bobcat operator will spring into action. Watch out for him! Crew members will help to attach two rings of the sling to the Bobcat. Gather together two of the rings on each side of the tree and then the sling can be attached to the forks on the Bobcat. The sling will cradle the tree as it's transported from the back of the truck to the hole that was dug.



6. The tree is gently lowered into the hole. One crew member should hold the tree in the proper position as the sling is removed. Give the Bobcat operator a minute to get out of the way, and then members of the crew can cut away and remove strings and any extra burlap. The remaining burlap is then folded over and tucked into the hole alongside the root system. The burlap must be below the soil surface from the top 1/3 of the root system or it will end up drawing moisture away from the tree. The burlap is normally bio-degradable (unless it's treated burlap - green in color), so it can be left on the root system. Over time it will break down in the soil.



7. Now that you have gotten the root ball of the planting all nicely tucked away in its new home you can begin backfilling the hole using the planting soil from the “soil truck”.
8. Once you have backfilled the hole, compact the soil by walking on it or you can use the back of your shovel combined with a pressing down – tamping motion.



9. Same as with the bareroot type planting, it is important to plant the new tree at the same soil level and insert the trunk in the same direction, (a mark is normally placed on the north side of the tree prior to it being dug up), as it was grown in at the nursery.
10. You should tag the planting, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule.





Tree Planting – Job Aid

Wire Basket Planting Procedures

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This type of planting method is exactly the same as the balled and burlapped method except for when you are lifting the plantings out of the truck and transporting them to the hole that has been dug for the tree.

1. You will notice the loops of the wire basket that are folded around the top of the root ball, these loops will enable the Bobcat to slip a hook, which is attached to the forks on the front of the Bobcat, and transport the wire basket plantings to the hole that has been dug for the tree.
2. Once the tree is lowered into the hole you will have to remove the top ring of the basket and cut the second ring in 3 or 4 different places. Don't leave any sharp edges that could damage the root system as its growing.
3. Then, just as you did with the balled and burlapped type planting, you will backfill the hole using the soil from the "soil truck", compact the soil, tag the planting, form a tree well, stake the tree and record the planting and arrange for it to be added to the watering schedule.





Tree Planting – Job Aid

Tree Spade Planting Procedures

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This type of planting method uses a tree spade to first dig the hole to transplant the tree into and then to dig up the tree at the nursery, transport it, and transplant it in its new planting site.



1. The steps when planting this type of tree are much the same as the balled and burlapped method. Of course you will not have any wire basket or burlap on the root system. From your experience you know that the sides of the hole will be glazed from the blades cutting into the earth so you will want to scrape the sides of it with your shovel to loosen the soil so the roots are able to penetrate through the ground better. Clean out the hole prior to transplanting to ensure the plant fits properly in the hole. Remember, slightly higher is better than too deep.



2. Now, once the tree spade has set the tree in its new home, the steps are the same for backfilling the hole and compacting the soil. It may be necessary to fill the voids or cracks around the edge of the planting hole to eliminate any air pockets that could cause the roots to dry out. This may also need to be done following irrigation as the soil may sink.
3. Same as with the bareroot and balled and burlapped type planting, it is important to plant the new tree at the same soil level and insert the trunk in the same direction as it was grown in at the nursery.
4. You should tag the planting, form a tree well, stake the tree if necessary and record the planting information and arrange for it to be added to the watering schedule.





Tree Planting – Job Aid

Things to Consider When Planting

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Things to Consider:

- Remember to take into consideration the size of the tree when it becomes full-grown.
- The tree should not obstruct the view of motorists approaching traffic signs or lights, typically a tree should not be planted within 10 meters of an intersection. (site line triangle – Traffic Bylaw)
- The tree should not obstruct the view of motorists or pedestrians approaching or leaving an intersection, walkway or alley. (Traffic Bylaw)
- Large trees should not be planted close to traffic lanes.
- Trees on boulevards that will block the view of motorists and pedestrians should be avoided.
- Only smaller types of trees can be planted under canopies, power lines and overhead signs.

Trees should NOT be planted in the following areas:

- loading, taxi, bus, police or handicap zones;
- storm channel floodways, stormwater ditches and on top of flood dikes;
- on the reading side of regulatory signs (i.e. stop and yield signs, school zone signs, no parking signs, etc.);
- in front of doorways, entrance walkways, show windows (unless spacing requirements permit it);
- where they may obstruct parking meters; or
- on major arterial roadways where the boulevard is less than 6 meters wide.





Tree Planting– Job Aid Proper Spacing When Planting

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Spacing between trees:

- ☑ 8 meters between crab apples, cherries, spruce, willows and any other ornamental tree type on residential streets.
- ☑ 10 meters between shade trees like maple, ash, elm, linden, willows, poplar and birch on residential streets.
- ☑ 6 meters between trees planted in a single row on boulevards.
- ☑ 10 meters between trees planted in a double row on boulevards. Trees must be at least 3 meters in from the curb.

Trees must be planted no less than:

- ☑ 1 1/2 meters from the city sidewalk.
- ☑ 2 meters from underground utilities (sewer, water, gas, secondary cables).
- ☑ 5 meters from major underground utilities (main gas lines, primary cables and concrete ducts).
- ☑ 1 meter from street light cables.
- ☑ 4 1/2 meters from alleys.
- ☑ 5 meters from street lights.
- ☑ 5 meters from traffic signs.
- ☑ 2 meters from fire hydrants and bus stops.
- ☑ 10 meters from overhead power lines for trees that grow to a height of 10 meters.
5 meters from overhead power lines for trees that grow to a height of 5 meters.
- ☑ 5 meters from adjacent private property – except for poplar which require 10 meters minimum because of their strong spreading root system.





Tagging the Plantings



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2003 the Community used green tags, so in 2005 we know that trees we see that have been tagged green should have the guards and / or stakes removed. Essentially, you could track the entire history of the tree by referencing the number on the tag. That's why it is so important to record the planting information. To take it one step further, that is why any information with regards to change of location, damage or disease should be recorded.



Staking the Plantings



1. Using the staking tool you will pound the metal stakes into firm ground – not through the root system of your planting. Make sure that one of the stakes is on the northwest side of the tree to protect it against our famous northwest Saskatchewan winds.

2. Once the tree stakes are in place you can loop the guide wires around the trunk of the tree about 1/2 – 2/3 the way up the tree. From your experience you know the importance of slipping the guide wires through a piece of rubber hose before you tie them around the tree trunk. This will prevent the guide wire from coming in direct contact with the tree trunk and causing any damage.





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