## 1. MANUAL FOR MAINTENANCE OF GROUNDS

.1 The following document is appended to this Section:

.1 Manual for the Maintenance of Grounds, 2005-02-14.

**END OF SECTION**

# Manual for Maintenance of Grounds

Alberta Infrastructure
2005-02-14

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## *PREFACE*

The maintenance of the grounds of small or large sites is reflected in the appearance of the health of the turf and the plant material. This manual gives a brief resume of maintenance procedures.

Many questions have been asked prior to, during, and after the construction of landscape projects throughout the province. We hope these questions have been answered to your satisfaction in this manual. Information has also been included which will contribute to the standardization of accepted maintenance practices.

Copies of this grounds maintenance manual are available from:

Alberta Infrastructure, Technical Services Branch or Property Management, 3rd Floor, 6950 – 113 Street, Edmonton, Alberta T6H 5V7.

Copies of reference material noted in this manual can be purchased from:

Alberta Agriculture, Food and Rural Development, Publications Office, Main Floor, 7000 - 113 Street, Edmonton, Alberta T6H 5T6 or from your local District Agriculturist.

Your co-operation is requested in using this manual to achieve improved maintenance procedures that will be reflected in the appearance of our sites.

2005-02-14

*Mechanical Turfgrass Maintenance*

## EDGING

The planting beds and desired cultivated areas around trees should be edged at least once a month as neatly as originally designed. The edges should be clean, sharp, well defined, and free of weeds and grass. Edge plant beds to depth of 100 mm. Along sidewalks or other hard surfaces edge at least once monthly during the heavy growing season.

If the planting beds have straight-line grass edges, mowing strips may replace the edges to facilitate maintenance.

## AERATION

Aeration is recommended where soil has been compacted, particularly lawn areas heavily used by pedestrians and heavy machinery and lawns on clay soil.

The purpose of aeration is to loosen and add air to the soil under the turf without disturbing the turf. Aeration makes the soil porous, allows air, moisture and fertilizer to reach the root zones, and thus encourages rapid growth. Aeration is best accomplished by coring the lawn when the soil has adequate moisture. Two types of core aerators are vertical motion units with hollow tines and circular motion units with open spoons or hollow tines. Circular motion units use tines or spoons mounted on a hollow drum. It is more efficient in covering the lawn but it will not penetrate as deeply as the vertical motion unit. Core aeration is required once a year on heavily used lawn areas and every three to four years on all other areas. Minimum required depth of cores is 50 mm with a spacing of 90 mm. The best time to aerate is in early spring or late summer. Before aerating, mow the grass to 50 mm when the soil is sufficiently dry. Soil cores brought to the surface can be removed by raking if composed of a heavy clay soil or allowed to dry and break down. Raking after aerating will also pick up any debris or thatch. After raking, topdress with fertile topsoil evenly through the grass, where required.

If minimal surface disruption is required, aeration can be accomplished by spiking or closed tine aeration. Spiking is not as effective as it increases soil compaction.

## ROLLING EXISTING TURF

Where high spots are the result of frost heave in the lawn, roll the lawn lightly. However, caution should be exercised so that the soil is not heavily compacted.

## THATCH

Thatch generally consists of dead grass stems, crowns, roots, and other organic debris that builds up on the soil surface. Short grass clippings rarely contribute to increased thatch development because they are leaf tissue and breakdown rapidly due to high water content.

Thick layers of thatch will prevent water and fertilizer penetration into the soil resulting in a lawn that is sensitive to hot or dry conditions. It also harbors harmful insects and disease organisms.

The frequency of dethatching depends on the thatch build-up, but consideration should be given to every second or third year. Dethatching can be carried out by a vertical cutting mower or power rake, or by a dethatching hand rake in small areas. Rake and remove all material dethatched from the lawn. Thatch removal is generally accomplished in early spring after the ground has become dry enough. Core aeration also helps to reduce thatch development.

Avoid excessive use of heavy nitrogen fertilizers and over watering that result in lawns growing too fast and contributing to thatch development.

## MOWING

Improper mowing height and frequency will effect the health and quality of turf. Proper mowing requires a sharp mower blade with a height set at 60 mm. Dull mower blades will tear and shred the grass blades rather than cut them and will result in a brownish appearance when the ends dry out. The recommended cutting height supplies sufficient leaf surface for the grass plant to build the plant foods needed for vigorous root development. Lower mowing will starve the roots, and the turf will thin out, giving poor cover and allowing area for weeds to grow. Short turfgrass has shallow weak roots and will bake in temperatures greater than 20 ° C.

If lawns are mowed on a regular basis, short grass clippings that fall to the lawn can remain. Grass clippings that remain will recycle nutrients back into the soil while decomposing. When grass is allowed to grow over 80 mm in height, collect the clippings from the lawn surface or provide a double cut to mulch the clippings in place. Significant accumulations of grass clippings can harbor harmful insects and diseases that damage the turf. Long clippings also become unsightly as they dry and will shade or smother grass beneath resulting in unhealthy turf areas.

During the heavy growing season, June 1 to September 1, all turf areas should be mowed not less than once per week. More frequent mowing will be required if general turf growth exceeds 50% of the specified mower height between cuts. Never cut more than 30% of grass blade at any one

mowing. During hot and dry conditions, increase the mower height and mow less frequently to improve the lawn's ability to tolerate stress.

Mowing the lawns when dry will prevent grass clippings from clumping together on the lawn surface. If the lawn must be cut when wet, clippings may be temporarily left on the turf but they must be spread out evenly to allow them to readily decompose or removed as soon as possible.

Keep stringline grass trimmers away from trees to prevent severe damages to the trunk.

Lastly, wear appropriate safety clothing and protection when operating any equipment.

## WATERING

Water all turf areas, as required, to maintain a uniform healthy growth pattern. Apply a good watering, that penetrates the soil no less than 100 mm deep at each watering, to encourage deep root growth.

The frequency of watering depends on the natural precipitation in the region, the soil type, the temperature and wind. Watering in the morning or evening is preferable to watering when the sun is hot, as less water loss occurs at lower temperatures. Avoid over-watering and puddling.

During periods of strong winds and high temperatures, more frequent watering will be required. A heavy watering of 25 mm of water is more beneficial than frequent lighter applications. Apply water about once per week. Never allow the grass to dry out from inadequate watering that it turns yellow.

## REPAIRING

In low maintenance areas where seeded grass is in poor condition or very weedy, cultivate or disc to prepare a smooth, loose seedbed. Remove stones, debris and weeds. Level the area, if necessary, by spreading fertile topsoil. Apply fertilizer (12-51-0) and rake into topsoil. Seed areas at 3 kg/100m2 using a mechanical calibrated seeder, and a seed mix equivalent to grass growing on site. In small areas, hand rake the seed into the soil.

In high maintenance areas where sod is dead, remove the dead sod with a sod cutter. This produces a straight edge and the correct depth for the new sod being laid. Loosen the soil, adding topsoil if required to make a level bed. Apply fertilizer (12-51-0) at 3 kg/100m2 before placing new sod. Place sod with sections closely butted, joints staggered, and no overlapping pieces or gaps. Lay sod with a smooth even finish that is flush with adjoining grass or hard surface. The new sod should be lightly rolled. Water regularly so that the sod does not dry out.

Top-dressing may be required in some instances. For those bare patches that require minor reseeding and weed growth is minimal, top-dressing and reseeding are recommended. Mow these grass areas to 30 mm. Rake and remove all debris. Spread clean, dry fertile topsoil over the patches to a depth of 6 to 12 mm, with low spots being filled in. Rake and scarify the topsoil before applying seed. The area is then seeded at 3 kg/100 m2, using a seed mixture equivalent to the grass growing on the site. Lightly rake the seeded area and roll soil. Apply water.

*Chemical Turfgrass Maintenance*

## FERTILIZATION

Before applying any fertilizer, obtain a 500 g soil sample in the early spring or the autumn to check the nutrient status of the soil. One soil test result can form the basis of fertilizer programs for several years to come. Randomly take the sample from several areas within the upper 150 mm of the soil and mix together. A soil test sampler, available from the District Agriculturalist, is recommended. Send the soil sample to a certified testing laboratory for analysis. Consult with your District Agriculturist or use your local phone directory to find the nearest laboratory. The laboratory will test the soil for existing nutrients, pH or acidity level, and organic matter. The soil test result will indicate the kind and amount of fertilizer that is required for the area.

Fertilize lawns three times per year: in early spring, summer and late summer. Slow release organic fertilizers can be used as an alternative. These slow release fertilizers last longer because the fertilizer is released to the soil for plant use at a slower rate. Consequently, two applications of slow release fertilizer in the spring and summer can prove adequate for many sites. Do not use fertilizers that contain herbicides as serious damage may occur to non-target plants that grow within or adjacent to the lawn.

Apply fertilizer after the grass is sufficiently dry to prevent fertilizer damage to the lawn. Fertilizer granules applied on wet grass will stick to the leaf surfaces and burn the grass blades. Applying fertilizer before mid-May can result in new lush growth that is susceptible to damage from late spring frosts in Alberta. In late summer, fertilizing later than mid-August can also result in lush fall growth when grass should be slowing down in preparation for winter.

An even application is essential with the use of a broadcasting type spreader or a mechanical spreader. Apply in two directions at right angles to each other. Do not hand broadcast as this can give very uneven results. After fertilizing, water immediately to prevent the grass from burning and to move the fertilizer to the root zone. Apply 25 mm of water by either an irrigation system, or hose and sprinkler equipment. Do not allow water to puddle on lawns, as this can leach out the fertilizer. An alternative to broadcasting fertilizer on site is the use of liquid fertilizers where nutrients are sprayed on and absorbed by the grass blade for quick greening of the lawn. Several common lawn fertilizers and general application rates are listed in Table 1.

**Table 1**
**Common Fertilizers**
**Plant Food Analysis and**
**Recommended Rates of Application**

| Fertilizer | Nitrogen | Phosphate | Potash | kg/100 $m^2$ |
|---|---|---|---|---|
| | (N) | ($P_2O_5$) | ($K_2O$) | |
| | (%) | (%) | (%) | |
| Inorganic Types | | | | |
| Ammonium phosphate (only new plantings) | 12 | 51 | 0 | 4.5 |
| Ammonium phosphate sulphate | 16 | 20 | 0 | 3.0 |
| Ammonium nitrate | 34 | 0 | 0 | 1.5 |
| Ammonium nitrate Phosphate | 27 | 14 | 0 | 2.0 |
| Ammonium sulphate | 21 | 0 | 0 | 2.5 |
| Complete (Shrubs) | 6 | 10 | 4 | 8.0 |
| Complete | 10 | 30 | 10 | 5.0 |

## WEEDS, PESTS AND DISEASE CONTROL

The law requires a pesticide applicator's license, for any person applying chemicals on a government site. All chemicals must be applied in accordance with government regulations and the manufacturer's recommendations. Consult with your local district agriculturist, if there are questions regarding identification of weeds, insects and diseases and the use of chemical controls. For further information refer to: ***Backyard Pest Management, - Agdex 605-2.***

***Weeds:***

In healthy and highly maintained lawns most weeds are a minor problem because weeds do not compete well with a healthy turf. For dandelions or most broad-leaved weeds, a weed-bar can be used on smaller lawns. A common perennial weed such as dandelion is best treated before flowering in spring or in late summer. When chemicals are used, use a low pressure or no pressure applicator on a warm calm day. Do not apply water within six hours of herbicide application. Avoid spray drift to adjacent areas where non-target plants can be harmed.

***Pests:***

The prime consideration in the control of pests is ensuring positive identification. For minor insect problems, remove the insects manually or hose them off leaves. If heavier infestations occur, select appropriate pesticides to eradicate harmful pests at an early stage. Spray 7 to 10 days later to ensure complete eradication.

***Diseases:***

Two common lawn diseases are snow mold and fairy rings.

**Snow Mold** – fungi that are active during the winter and early spring cause this disease. Wet or shaded areas where snow melts slowly and areas which had become compacted during the winter from snow cover are often problem areas. The fungus produces a mass of white or pink cottony web-like fungal growth patches on the lawn surface. The disease is evident in early spring as the snow melts.

Control measures include:

a) Mowing the lawn short prior to snowfall and removing all fallen tree leaves.
b) Fungicide application in early fall.
c) Avoiding late summer fertilizer applications as the resulting grass tissue is too soft and succulent and more susceptible to fungus attack.

d) Spreading compacted snow piles in spring to speed melting and discourage snow mold growth.
e) Removing the surface webbing by raking or sweeping the lawn in the spring, so that the grass surface will dry out.

**Fairy Rings** – this disease is caused many different species of soil inhabiting fungi but the mushroom fungus is the most common. Rings or circles of dark green grass appear followed by small tan-coloured mushrooms on the outer ring edge after heavy rainfalls or watering. Infested areas grow or enlarge progressively from the center outward developing into complete circles or arcs. Later the inner turf can turn brown and die from a lack of water. Damage occurs when a white coloured soil inhabiting fungus forms a dense underground mat beneath the fairy ring that inhibits water from reaching the grass roots. Fairy rings are difficult to control and at present no chemical control is available. Control measures include:

a) Ensure that the lawn is well fertilized and watered.
b) Make holes 150 mm deep throughout the infested area with hand aerator or garden fork. Soak the area by watering heavily every one or two days. Apply a wetting agent, such as pure liquid soap mixed with water, over the area to help the water soak into the infested soil.
c) Excavate smaller infested areas by removing all the turf in the area of the ring along with 30 cm to 45 cm of surrounding soil inside and outside of the ring. Dig soil deep enough to remove all the white soil inhabiting fungus. Avoid spilling infected soil onto healthy lawn areas. Install new soil and sod or seed.

*Ornamentals Maintenance*

## FERTILIZATION

Trees, shrubs and perennial plants require fertilizer in the spring. The trees and plant beds should receive fertilizer (10-6-4) that should be immediately watered after application.
Fertilizer spikes (16-10-9) are also available for trees. The spikes should be pounded into the soil in the area of the drip-line of the tree, using four spikes for every 100 mm of trunk caliper.

### Plant Beds and Planter Care

Plant beds and planters should be cleaned continuously to eliminate all debris and dead plant material. Dead and broken branches of plants should be pruned and repaired as soon as possible. All dead or diseased plants should be removed and replaced.
Keep plant beds cultivated to eliminate weeds and allow better water penetration. Cultivation should be carried out lightly to ensure minimum root disturbance.

## WINTERIZING TREES AND SHRUBS

Desiccation, climatic injury, low temperature (frost) damage and rodent damage are the four main types of winter injury encountered by woody plants in Alberta.

***Desiccation***

Dormant plants dry out during the winter months when they lose water through the buds and especially evergreen needles faster than can be replaced through the roots. When the ground is excessively frozen beyond the root system the supply of water is cut off. Similarly, when the ground is very dry in the fall the supply of moisture will be insufficient to supply the roots. The rate of winter loss increases with rising temperatures, strong drying winds and sunny weather. Smaller plants with shallow roots are subject to injury during the freezing and thawing of soils that exposes the roots to drying winds. In Alberta, discoloured or burned evergreen needles are very common due to desiccation.

***Climatic injury***

Heavy loads of snow and ice cause serious damage by bending or breaking branches and splitting trunks. Multi-stemmed or clump trees, upright evergreens and multiple leaders are subject to the most damage. Ice coatings may increase the mass of a branch up to forty times.

***Low Temperature Damage***

The ability of trees and shrubs to withstand cold temperatures is dependent upon the winter hardiness of the plants. Excessive and rapid fluctuations in temperatures cause most of the injuries. Soft new fall growth, resulting from late summer nitrogen fertilization or pruning, will not harden off sufficiently to survive freezing temperatures. Root injury may occur in poorly drained soil and low spots where frost will develop. Young, smooth-barked trees are susceptible to sunscald on the south or west exposures of the trunk or limbs. Severe changes in temperature, between day and night, may freeze moisture in the tree trunk and result in frost cracking especially on south and west exposures. Premature opening of buds in spring, due to sunny mild weather, can result in the death of the plant bud or new growth when freezing night temperatures occur.

***Rodent and Animal Damage***

Tender bark and twigs of plants are choice areas for rodents and animals to feed on during the winter. They will girdle trees and shrubs and eat some plants to ground level that can result in their death.

**Control**

Since weather cannot be controlled, precautions should be taken to reduce the possibility of damage.

a) Use plant material recommended for the specific horticultural zones as outlined in the: ***Alberta Yards & Gardens, What to Grow - Agdex 200/32-1.***
b) Plant ornamental trees and shrubs in locations where the soil is reasonably well drained.
c) Deep-water trees and shrubs thoroughly, especially conifers, before freeze-up to ensure they have sufficient moisture in the root zone. This becomes critically important if a dry summer or autumn has occurred. Plants under building overhangs require special attention and continuous watering until freeze-up occurs. Continue watering around buildings during the winter when warm unseasonable temperatures are experienced.
d) Avoid fertilizing trees and shrubs in the late summer or early autumn that stimulate late fall growth. If an autumn application is desired, wait until trees or shrubs are dormant.
e) Place organic mulches such as leaf mold, coarse peat moss, chopped straw, compost or wood/bark chips around the base of trees and shrubs. The mulches will increase moisture retention and decrease the depth of frost penetration. Mulches also help to prevent alternate freezing and thawing of the soil. Pull the mulches away from the trunks of trees in the autumn to allow the trunks to harden off properly.

f) Tie branches of multi-stemmed evergreens, such as junipers, together with strong, pliable cord or strips of cloth to prevent breakage from ice and snow.

g) Wrap the trunks of young, thin-barked trees with burlap, sisal-draft paper, or other tree wrapping material to prevent frost cracks and sunscald. Broad boards attached to the trunks of some trees can provide satisfactory sunscald protection by shading the trunk.

h) Erect canvas, plastic, burlap or slat screens on the south and west sides of exposed evergreens to prevent desiccation. The screens should be at least 600 mm from the plants with open tops. Use plants that do not require this type of protection in severely exposed areas.

i) Prop ice-laden branches with suitable material. Avoid knocking ice off branches if breakage may occur. Gently sweep heavy snow away if it is not frozen to the foliage or branches.

j) Prune away dead and broken branches or twigs, multiple leaders and weak branch attachments in early spring. Apply complete fertilizer in spring to help stimulate new growth.

k) Protect plants from rodent and animal damage by eliminating harborages, encouraging natural predators and applying repellent treatments and guards to protect the plant. Erect large metal barriers or fencing, such as 37 mm galvanized wire mesh, around trees that are prone to animal damage. Place traps and baits to control rodents but care should be taken to avoid injury and ensure the safety of non-target animals and humans. Apply repellent treatments containing a thiram (fungicide) mixture by painting or spraying trunks and limbs to a height of 600 mm above the expected snow level. Repellents produce an objectionable taste or odour to discourage the rodent from feeding. Install light coloured spiral plastic or galvanized wire mesh tree guards around the trunk. Bury the guard 50 mm deep into the soil.

## DISEASES AND PESTS OF PLANTS

Ensure proper identification of infestations before taking corrective measures. If insect infestations are minor use physical methods to eliminate the cause of insect infestations. These methods include handpicking, if few in number, or hosing them off leaves and branches with water. When heavy infestations of insects occur and the plant is threatened select the appropriate insecticide. Apply insecticides in accordance with the manufacturer's recommendations and government regulations. Most of the insects that attack plants feed by chewing or sucking. Diseases, though, are usually fungal and occur because of unhealthy soil conditions or other factors. Pruning of disease infected plants and keeping the plant healthy through proper maintenance can prevent or cure diseased plants.

For further information refer to: ***Backyard Pest Management, - Agdex 605-2.***

***Fireblight***

The Government of Alberta has declared that Fireblight is a pest under the Agricultural Pests Act (1986). Fireblight is a destructive bacterial disease of crabapples, mountain ash, cotoneaster and several other related ornamental trees and shrubs. Typical symptoms are: blossoms turning black, leaves turning black yet remaining on the tree; cankers in the stem or trunk which are discolored, sunken, cracked at the edges, and which may produce droplets of ooze in the spring. If a tree is already diseased, eradication of the diseased parts or, if necessary, the entire tree is essential (The Agricultural Pests Act (1986) of Alberta states: "A plant with fireblight or suspected of having fireblight shall be pruned to remove diseased parts to the satisfaction of an officer.") Preventative measures can also be employed.

***Eradication:***

Trees that are not severely infected can be kept alive if prompt action is taken.

a) During the dormant season, remove and destroy all cankered limbs. Prune out all diseased branches.
b) During the growing season cut off and destroy any infected twigs, at least 300 mm into healthy tissue. Avoid excessive pruning during this time.

Prune healthy looking trees and branches first. Cuts should be made at least 300 mm back of the diseased area. Disinfect knives, pruning shears and cut surfaces after each cut with a germicide solution such as lysol (50 ml / litre of water) or household bleach (100 ml / litre of water).

***Prevention:***

- Remove known sources of fireblight from the site by removing severely infected trees and the infected branches of others, and by encouraging neighbors to do likewise.
- Remove water sprouts and suckers as this lush new growth can easily become infected.
- Avoid excessive use of high nitrogen fertilizers that result in soft susceptible growth.
- Treat very severe infections, where pruning is not helpful, with a solution of hydrochloric acid (6 ml / 100 ml water), followed by 226 g zinc chloride and 340 ml methyl hydrate. Paint all infected areas to 40 cm below the canker.
- In summer, treat blossoming and healthier trees by spraying with fixed copper (Copper Oxychloride 50 WP, Copper Spray WP Fungicide). Spray at 4-5 day intervals depending on existing moist conditions. Protective sprays are of no use on already infected trees.

***Dutch Elm Disease (DED)***

The Government of Alberta has declared that Dutch Elm Disease and its beetle vectors are pests under the Agricultural Pests Act (1986). The American Elm and, to a much lesser extent, the Siberian Elm are susceptible to Dutch Elm Disease. The native and European elm bark beetle spreads the disease.

***Prevention***

Dutch Elm Disease can be prevented from spreading (into Alberta) by controlling bark beetles which breed in the bark of dead and dying elm wood. A main priority is to prune all elm trees in order to invigorate and maintain them in the best possible condition and ability to resist disease. Prune to remove all dead, diseased, dying, crossing, rubbing or unnecessary wood and to shape and balance the tree's appearance. Pruning of Elm trees can only be done between October 1 and March 31 when beetles are not in their active stage. Dispose of all elm wood by burning, burying or chipping. Chips must be no greater than 30 mm. Provincial regulations prohibit the storage, transport and sale of elm firewood. Other insecticide treatments include basal spray applications to control the elm bark beetle and tree injections to cure and preserve infected trees and to protect healthy trees.

*Mechanical Ornamentals Maintenance*

## WATERING

The availability of water is of critical importance to tree and shrub growth. Plants will die from prolonged drought. One of the first rules for watering plant material, particularly trees, is to follow the normal pattern of rainfall, making up any deficiencies of the moment. Spring and early summer rainfall usually average 25 to 40 mm per week. Later in the season rainfall could be less than 25 mm. If rainfall is below average week after week, additional water is required to make up the difference.

A single heavy water application that moistens the soil to a minimum depth of 300 mm is preferable to several frequent shallow applications. As the water is allowed to move downward through the soil it pulls air in after it by capillary action. These single and infrequent heavy waterings encourage deep rooting. Shallow rooting that grows upward will result from frequent light waterings. When watering avoid constant soggy or flooded conditions that deprive the tree roots of oxygen. Roots in waterlogged soils can be killed or become susceptible to soil-borne fungus infestations.

Watering Considerations:

a) Newly planted trees should be watered about once per week when rainfall is less than 25 mm per week. Flood the plant's soil saucer once or twice, and then do not re-water until the soil is barely damp at the surface.
b) Trees which have been planted for less than five years require deep watering of the root systems when rainfall is not sufficient for two or three weeks. Every older tree should be deep watered at least once every three to four weeks during a drought.

## CULTIVATION AROUND TREES

Cultivate the soil around the base of tree trunks to control and eliminate weeds and grass. Maintain a cultivated soil circle while the plant is young so that maintenance equipment will not damage the tender bark. As the tree matures and the bark also matures, the turf can be allowed to grow towards the trunk, and the cultivation will be eliminated.

If cultivated soil circles are removed for younger trees, the installation of plastic tree guards around the base of each tree can prevent serious damage to trunks from mechanical equipment.

## STAKING

Newly transplanted trees and grafted standard plants should have either support stakes or guy-lines attached. These supports are required to steady the new plants during winds and prevent breaking of the newly developing feeder roots.

Keep stakes or guy-lines taut and in place for a minimum of two years. Periodically inspect and adjust tree supports to prevent girdling of the tree trunks as the plant grows and increases in size. Allowing guy wires to girdle a tree trunk can result in severe damage or death.

## PRUNING

All pruning should be done according to proper practices and standards that are described in ***Pruning in Alberta, Agdex 270/24-1***. Proper pruning encourages a healthy natural growth pattern and structure for each specific plant. When removing branches, always make pruning cuts just outside branch collars. Cut back to a lateral bud, when heading back. Never leave stubs when pruning. Perform corrective pruning by removing all weak crotches, crossing or rubbing branches, sucker growth, and watersprouts. Avoid topping trees that only result in a deformed and unsightly looking tree with unhealthy weakened growth.

On top grafted plants, such as weeping caragana and fernleaf caragana, all twig or leaf growth below the graft should be removed.

Coniferous trees will require minimal pruning. Remove all double leaders when they appear.

## TREE AND SHRUB REPLACEMENT

Replacement of dead plant materials is often overlooked in maintenance programs. Plants may die from diseases, insects, drought, being root-bound, winterkill, root suffocation or vandalism. As plants become old, mature and unhealthy looking consideration must be given to removing these plants and installing new shrubs, perennials and trees. Replace dead plants where space allows with new plants that are suitable and hardy for the location.

The maintenance program should consider the landscape design chosen for the building and its surroundings. Design considerations could include the colour, texture, form, size and aesthetics of the plants chosen. Select shrubs to provide foundation planting, screening and interest. Choose trees to complement the building and to provide shade, screening and colour.

***End***