

# 5th & LAYTON OUTLOT

350 West Layton Avenue  
Milwaukee, WI 53207

Plant Portfolio for Staff Presentation

March 10th, 2022



**Heritage River Birch Multi**  
***Betula nigra 'Heritage'***



**Description:**

A beautiful, multi-stemmed shrubby new birch tree. An outstanding winter specimen when uniquely textured, colorful, peeling bark. Exceptional subject for night lighting. Thrives in problematic low wet soils and high-water table. Deciduous tree that will grow to 40 -60 feet tall and wide.

**Flowering:**

Flower or Bloom description: Inconspicuous

Flower Color: Yellow

Flowering Time/Season: Spring

**Growth Conditions:**

Growth Rate: Fast

Growth Habit: Pyramidal

Heat Zones:

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 7 (0 to 10 F)

Low: 3 (-40 to -30 F)

Water Requirements: Needs wet or constantly moist soil

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring.

**PRINCETON SENTRY MAIDENHAIR TREE**  
*Ginkgo biloba 'Princeton Sentry'*



**Description:**

This superb deciduous conifer shade tree is a male non-fruiting selection that grows naturally narrow, with an upright, narrowly conical habit. Easily grown in average, medium moisture soil in full sun, branches don't droop and resist breakage. Has fragrant flower. Unique fan-shaped foliage turns golden yellow in fall. It tolerates deer, clay soil, air pollution & thrives in a wide range of soils, tolerant of urban stresses. Full sun. Moderate-growing to 40 to 50 feet high and 20 to 30 in width.

**Flowering:**

Flower or Bloom description: Catkin like, pendulous  
Flower Color: Yellow  
Flowering Time/Season: Flowers are inconspicuous.

**Growth Conditions:**

Growth Rate: Moderate Growing  
Growth Habit: Spreading  
Heat Zones:

High: 9 (>120 to 150 days)  
Low: 3 (>7 to 14 days)

Cold Hardiness:

High: 8 (10 to 20 F)  
Low: 3 (-40 to -30 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring

**Chanticleer Flowering Pear**  
*Pyrus calleryana 'Chanticleer'*



**Description:**

Exquisite flowering broadleaf deciduous tree that displays a dazzling profusion of white flowers in early spring. Narrow, pyramidal form is coated with dark green summer foliage turning brilliant reddish-purple in fall. Ideal specimen tree for areas with limited space growing to 30 to 35 ft. tall and 15 ft. wide.

**Flowering:**

Flower or Bloom description: Clusters of blooms  
Flower Color: White  
Flowering Time/Season: Spring

**Growth Conditions:**

Growth Rate: Moderate  
Growth Habit: Pyramidal  
Heat Zones:  
    High: 9 (>120 to 150 days)  
    Low: 1 (< 1 days)

Cold Hardiness:  
    High: 9 (20 to 30 F)  
    Low: 5 (-20 to -10 F)

Water Requirements: Needs regular watering - weekly, or more often in extreme heat, can be reduced after establishment

Sun Exposure: Full Sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering may be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring.

**SKYMASTER ENGLISH OAK**  
*Quercus robur 'Skymaster'*



**Description:**

A stately specimen with heavy broad branches noted for its unique shape. Narrow when young, it matures to a symmetrical, pyramidal shape. A strong central leader, wide crotch angles and excellent lateral branch development are among the characteristics that make it a distinctive street tree. Deciduous. Full sun. Moderate grower to 50'-0" tall and to 25'-0" wide. Dark green in summer; brown to yellowish in fall.

**Flowering:**

Flower or Bloom description: Inconspicuous  
Flower Color: No Value  
Flowering Time/Season: Insignificant spring flowers

**Growth Conditions:**

Growth Rate: Moderate  
Growth Habit: Upright and pyramidal  
Heat Zones:  
    High: 8 (>90 to 120 days)  
    Low: 3 (>7 to 14 days)  
Cold Hardiness:  
    High: 8 (20 to 30 F)  
    Low: 4 (-30 to -20 F)  
Water Requirements: Water regularly, when top 3 in. of soil is dry  
Sun Exposure: Full to partial sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring

**IVORY SILK JAPANESE TREE LILAC**  
*Syringa reticulata 'Ivory Silk'*



**Description:**

An easy-care lilac which makes an excellent individual accent or street tree. Selected for its compact form and sturdiness. Displays large clusters of pure white blooms at an early age. Moderate-growing to 15 to 25 ft. tall, 10 to 15 ft. wide. Full sun. Deciduous.

**Flowering:**

Flower or Bloom description: May - June

Flower Color: Creamy white

Flowering Time/Season: Early June for a two week period

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Oval

Heat Zones:

High: 7 (>60 to 90 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Once established needs only occasional water.

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. Increase watering before spring bloom. Prune after flowering

**Arctic Sun Red Twig Dogwood**  
*Cornus sanguinea 'Cato'*



**Description:**

This special smaller variety has beautiful yellow stems tipped with red providing a spectacular winter show. It was selected for its naturally compact stature with full branching. Stunning planted in containers or used in cut floral arrangements Use for naturalizing. Full to partial sun. Moderate grower to 3 to 4 feet high, and wide.

**Flowering:**

Flower or Bloom description: Clusters of star-shaped flowers

Flower Color: White

Flowering Time/Season: White flowers in late spring to summer

**Growth Conditions:**

Growth Rate: Moderate Growing

Growth Habit: Round

Heat Zones:

High: 8 (>90 to 120 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Requires regular watering, weekly or more often in extreme heat

Sun Exposure: Full to partial sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Prefers moist, well-drained soil. Prune immediately after flowering. Fertilize in early spring with a controlled release fertilizer.

**Bobo Hardy Hydrangea**  
*Hydrangea paniculata 'Bobo'***Description:**

A new dwarf hydrangea that is sure to turn heads! Reaching to just three feet tall, it will be engulfed by enormous creamy white flowers in summer, providing a nonstop show until frost. Blossoms are held upright on strong stems, and continue to grow and lengthen as they bloom. In fall, flowers may turn a pinkish hue. An undeniable asset to any garden, particularly where space is limited. Plan in part shade to full sun. Moderate growth 3' tall and 3' to 4' wide.

**Flowering:**

Flower or Bloom description: Globular flower heads have  
Flower Color: White flowers whose color changes light pink.  
Flowering Time/Season: Reblooms continuously in summer

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Mounded

Heat Zones:

High: 9 (>120 to 150 days)

Low: 3 (>7 to 14 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 3 (-40 to -30 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Filtered to partial sun

**Care Instructions:**

Prefers moist, rich, loamy soil but adaptable to many soil types. Follow a regular watering schedule during the first growing season to develop a deep, extensive root system. Apply a controlled-release fertilizer in early spring. Blooms each year on new wood; prune in late winter or early spring



Plan Reference Tag: PhopTW

**Tiny Wine Ninebark**  
*Physocarpus opulifolius 'Tiny Wine'*



**Description:**

A full, dwarf variety with small, refined leaves. The dark bronze-maroon foliage is colorful all season and contrasts beautifully with soft pink and white flowers in late spring. The dainty flowers cover the stems, providing an exceptionally showy display. This durable shrub is perfect for season-long color in the landscape. Useful accent for small urban gardens or massed in a low maintenance landscape. Deciduous. Full sun. Moderate-growing to 3 to 4 feet high, equal width.

**Flowering:**

Flower or Bloom description: Button-shaped Clusters

Flower Color: Burgandy leaves / Pink flowers

Flowering Time/Season: Summer

**Growth Conditions:**

Growth Rate: Moderate Growing

Growth Habit: Fountain

Heat Zones

High: 7 (>60 to 90 days)

Low: 1 (< 1 days)

Cold Hardiness

High: 8 (10 to 20 F)

Low: 3 (-40 to -30 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry.

Sun Exposure: Full sun

**Care Instructions:**

Tolerates most soil types. Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Apply a controlled release fertilizer before new growth begins in spring..

**DOUBLE PLAY BIG BANG SPIREA**  
*Spiraea japonica 'Tracy'***Description:**

With its dazzling display of colorful foliage and flowers, this fantastic selection provides beauty in the landscape from spring through fall! Emerging spring foliage glows orange, transitions to deep yellow all summer long, returning to rich golden orange in autumn. Massive pink flowers are the largest we've ever seen on a Spiraea. Easy care shrub for borders, perennial beds, or massed to provide outstanding color. Deciduous shrub. Full sun. Medium to fast growth to 2 feet – 3 feet tall and wide.

**Flowering:**

Flower or Bloom description: Profuse pink clusters  
Flower Color: Pink flowers / Yellow /orange foliage  
Flowering Time/Season: Pinkish-purple flowers in spring.

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Spreading

Heat Zones:

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (10 to 20 F)

Low: 4 (-30 to -20 F)

Water Requirements: Needs regular watering - weekly, or more often in extreme heat

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. For a tidy, neat appearance, shear annually to shape.

**Sonic Bloom Pink Reblooming Weigela**  
**Weigela florida 'Bokrasopin'**



**Description:**

Create an explosion of color with this fantastic new re-blooming selection. Loads of hot pink flowers in spring are followed by waves of blooms until frost! Mounded growth habit with deep green, deer resistant foliage. Reblooms without deadheading, providing season-long color in foundation plantings and borders. Attracts hummingbirds. Deciduous shrub to be planted in full sun. Moderate grower 4 to 5 feet tall and wide.

**Flowering:**

Flower or Bloom description: Large vase shaped flowers

Flower Color: Hot-pink

Flowering Time/Season: Spring and late summer to hard frost

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Compact spreading

Heat Zones:

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 8 (10 to 20 F)

Low: 4 (-30 to -20 F)

Water Requirements: Needs regular watering - weekly, or more often in extreme heat

Sun Exposure: Full Sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish an extensive root system. Feed regularly during the growing season with a general purpose fertilizer. Prune annually in late winter to promote vigorous new growth.

**GOLD CONE JUNIPER**

*Juniperus communis 'Gold Cone'*



**Description:**

An upright, narrow, columnar, evergreen shrub which features golden new growth foliage. Awl-shaped new growth foliage emerges bright gold in spring with good color retention throughout the summer and early fall. Golden foliage gradually fades to bluish-green in winter. Evergreen. Full sun to part shade. Slow grower to 60 inches tall, 24 inches wide.

**Flowering:**

Flower or Bloom description: None

Flower Color: No Value

Flowering Time/Season: No noticeable flowers

**Growth Conditions:**

Growth Rate: Moderate Growing

Growth Habit: Spreading

Heat Zones:

High: 7 (>60 to 90 days)8 (>90 to 120 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 6 (-10 to 0 F)

Low: 3 (-40 to -30 F)

Water Requirements: Once established needs only occasional water.

Sun Exposure: Full sun to part shade

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring

**SEA OF GOLD JUNIPER**

*Juniperus x pfitzeriana 'MonSan'*



**Description:**

Even more outstanding golden color on lacy foliage than its Gold Coast parent on the same compact form makes this evergreen shrub an excellent choice as a colorful accent. Color is retained and deepens in winter better than other gold tipped varieties. Full sun. Moderate grower to 3 feet tall, 4 feet wide. Cutting grown

**Flowering:**

Flower or Bloom description: None

Flower Color: No Value

Flowering Time/Season: No noticeable flowers

**Growth Conditions:**

Growth Rate: Moderate Growing

Heat Zones

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness

High: 9 (20 to 30 F)

Low: 3 (-40 to -30 F)

Water Requirements: Once established needs only occasional water.

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Watering can be reduced after establishment. Feed with a general purpose fertilizer before new growth begins in spring.

**DENSE SPREADING YEW**  
*Taxus x media 'Densiformis Select'*



**Description:**

Dense, low, spreading shrub is an excellent basic foundation planting for hedge, screen or border. Dark green foliage backs scarlet berries. Versatile and durable, tolerates shearing well. Evergreen. Full sun. Slow grower to 3 to 4 feet tall and 4 to 6 feet wide.

**Flowering:**

Flower or Bloom description: None

Flower Color: No Value

Flowering Time/Season: Inconspicuous flowers, dark red fruit.

**Growth Conditions:**

Growth Rate: Moderate Growing

Growth Habit: Spreading

Heat Zones:

High: 7 (>60 to 90 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 7 (0 to 10 F)

Low: 4 (-30 to -20 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Full to partial sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. For a tidy, neat appearance, shear annually to shape.

**HOLMSTRUP ARBORVITAE**  
*Thuja occidentalis 'Holmstrup'***Description:**

Neat, formal appearance to densely branched narrow conical evergreen shrub. Effective landscape accent, windbreak or screen. Its rich green foliage covered form can create handsome framework for doorways or garden entries. Full sun. Slower grower to 5 to 7 feet tall, 2 to 3 feet wide, larger with age.

**Flowering:**

Flower or Bloom description: None  
Flower Color: None  
Flowering Time/Season: Insignificant flowers.

**Growth Conditions:**

Growth Rate: Fast growing  
Growth Habit: narrow pyramidal evergreen  
Heat Zones:  
    High: 7 (>60 to 90 days)  
    Low: 1 (< 1 days)  
Cold Hardiness:  
    High: 8 (10 to 20 F)  
    Low: 3 (-40 to -30 F)  
Water Requirements: Water regularly, when top 3 in. of soil is dry  
Sun Exposure: Full to partial sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. Feed with a general purpose fertilizer before new growth begins in spring. For a tidy,

**Bronze Veil Tufted Hair Grass**  
*Deschampsia caespitosa 'Bronzschleier'*



**Description:**

One of the best ornamental grasses, it is grown for its huge, graceful flower stalks. It looks good even in winter, with flowering spikes on stout stems that often last into the season, and dense tufts of shiny, dark green leaves. Grows well in full sun and shade. Moderate growing herbaceous perennial that grows 2'-6" to 5'-0" tall & 2'-0" wide.

**Flowering:**

Flower or Bloom description: Feathery plumes

Flower Color: Tones of green, purple, golden yellow, brown, and silver

Flowering Time/Season: Summer through fall

**Growth Conditions:**

Growth Rate: Moderate Growing

Growth Habit: Clumping

Heat Zones:

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Full sun to filtered sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring.



Plan reference tag: PaviDB

**DALLAS BLUES SWITCH GRASS**  
*Panicum virgatum 'Dallas Blues'*



**Description:**

Wide, erect blades are powder blue during the season provide an excellent backdrop for the stunning reddish-purple plumes that rise above the foliage are beautiful as cut flowers. Quite handsome when used in groups. Herbaceous. Full to partial sun. Clumps to 5 ft. tall, 5 ft. wide

**Growth Conditions:**

Growth Rate: Fast Growing

Growth Habit: Clumping

Heat Zones

High: 9 (>120 to 150 days)

Low: 1 (>1 days)

Cold Hardiness

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Once established needs only occasional water.

Sun Exposure: Full sun

**Flowering:**

Flower or Bloom description: Airy panicles

Flower Color: Reddish-purple

Flowering Time/Season: Panicles in late summer into fall.

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring.

**HOT ROD SWITCH GRASS**  
*Panicum virgatum 'Hot Rod'*



**Description:**

A compact, clumping grass with excellent vertical form. Blue-green foliage during the growing season turns a deep burgundy in summer. Airy purple flower panicles produce showy seed heads that persist for winter interest. Drought and salt tolerant plants are deer resistant and provide protection for wintering songbirds. Herbaceous, Compact, upright clumps 3-4 ft. tall and 2 ft wide.

**Flowering:**

Flower or Bloom description: Wispy, feathery plumes

Flower Color: Mauve

Flowering Time/Season: Summer into Fall

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Upright

Heat Zones:

High: 9 (>120 to 150 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Needs regular watering - weekly, or more often in extreme heat but can be reduced once established

Sun Exposure: Part Sun to Full Sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring. Pruning time: early spring

Plan reference tag: PaviN

**NORTHWIND SWITCH GRASS**  
*Panicum virgatum 'Northwind'*



**Description:**

A compact, clumping grass with excellent vertical form. Olive to blue-green foliage during the growing season turns golden-yellow in autumn. Airy flower panicles produce showy seed heads that persist for winter interest. Sturdy stems remain upright even under a snow load, providing protection for wintering songbirds. The root system provides erosion control. Herbaceous. Full to partial sun. Clumps to 4'-6' ft. tall, 2'-3' ft. wide

**Growth Conditions:**

Growth Rate: Fast Growing

Growth Habit: Clumping

Heat Zones

High: 9 (>120 to 150 days)

Low: 1 (>1 days)

Cold Hardiness

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Once established needs only occasional water.

Sun Exposure: Full sun

**Flowering:**

Flower or Bloom description: Airy panicles

Flower Color: Gray-green

Flowering Time/Season: Panicles in late summer into fall.

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring.

Plan Reference Tag: HeCA

**CHICAGO APACHE DWARF DAYLILY**  
*Hemerocallis x 'Chicago Apache'*



**Description:**

Bright red flowers have a vivid yellow throat and slightly ruffled edges. Blooms midseason from June through August. Easy care plant has sunfast color and drought resistance. Herbaceous perennial with Moderate growth to about 28 inches tall and 20 inches wide.

**Flowering:**

Flower or Bloom description: Vase

Flower Color: Bright wine red with yellow throat blooms

Flowering Time/Season: Mid-season repeat bloomer

**Growth Conditions:**

Growth Rate: Fast

Growth Habit: Clumping

Heat Zones:

High: 11 (>180 to 210 days)

Low: 3 (>8 to 14 days)

Cold Hardiness:

High: 11 (>120 to 150 days)

Low: 4 (>120 to 150 days)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Full sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring.

Plan Reference Tag: HePF

**PEACH FLAMBE CORAL BELLS**  
*Heuchera x 'Peach Flambe'***Description:**

Expect multi-season interest with glowing bright peach-colored leaves infused with flaming red from spring to fall, turning to plum-purple as the weather cools. A superb companion with seasonal garden color. Provides bold texture and color contrast in mixed containers or borders in bright or dappled shade. Evergreen in mild winter climates and is a moderate grower 8" tall, 14" wide; with flower spikes to 16" tall.

**Flowering:**

Flower or Bloom description: Clusters of vase like flowers

Flower Color: White

Flowering Time/Season: White flowers throughout summer.

**Growth Conditions:**

Growth Rate: Moderate

Growth Habit: Mounding

Heat Zones:

High: 8 (>90 to 120 days)

Low: 1 (< 1 days)

Cold Hardiness:

High: 9 (20 to 30 F)

Low: 4 (-30 to -20 F)

Water Requirements: Water regularly, when top 3 in. of soil is dry

Sun Exposure: Full to partial sun

**Care Instructions:**

Follow a regular watering schedule during the first growing season to establish a deep, extensive root system. For a neat appearance, remove old foliage before new leaves emerge. Divide clumps every 2 to 3 years in early spring.

# SWALE SEED MIX

For installation services, please call (574)586-2412

A swale is a drainage ditch or natural depression along a roadside, sidewalk or driveway which may or may not lead to a retention pond. The native plants used in our "Swale Seed Mix" help filter pollutants from yard and road runoff. Homeowners can blend landscaping into their yard with the natives in the swale. This mix can also be applied to areas in a yard which temporarily retains water after a rain. Used in this way, homeowners can create rain gardens with beautiful native wildflowers, grasses and sedges. This seed mix will include at least 7 of 12 native permanent grass and sedge species, and 10 of 13 native forb species. To install this seed mix see the "Installation Instructions for Seed Mixes" section.



Botanical Name	Common Name	Oz./Acre
<b>Permanent Grasses/Sedges</b>		
<i>Andropogon gerardii</i>	Big Bluestem	12.00
<i>Carex comosa</i>	Bristly Sedge	2.00
<i>Carex cristatella</i>	Crested Oval-Sedge	2.00
<i>Carex lurida</i>	Bottlebrush Sedge	2.50
<i>Carex sparganioides v. cephaloidea</i>	Rough Clustered Sedge	3.00
<i>Carex vulpinoidea</i>	Brown Fox Sedge	3.00
<i>Elymus virginicus</i>	Virginia Wild Rye	8.00
<i>Glyceria striata</i>	Fowl Manna Grass	1.00
<i>Panicum virgatum</i>	Switch Grass	2.00
<i>Scirpus atrovirens</i>	Dark Green Rush	2.00
<i>Scirpus cyperinus</i>	Wool Grass	0.50
<i>Spartina pectinata</i>	Prairie Cord Grass	2.50
	<b>Total</b>	<b>40.50</b>
<b>Temporary Cover</b>		
<i>Avena sativa</i>	Common Oat	360.00
<i>Lolium multiflorum</i>	Annual Rye	28.00
	<b>Total</b>	<b>388.00</b>
<b>Forbs</b>		
<i>Alisma</i> spp.	Water Plantain (Various Mix)	1.00
<i>Asclepias incarnata</i>	Swamp Milkweed	2.00
<i>Aster novae-angliae</i>	New England Aster	0.50
<i>Coreopsis tripteris</i>	Tall Coreopsis	2.00
<i>Eupatorium maculatum</i>	Spotted Joe-Pye Weed	0.25
<i>Iris virginica</i>	Blue Flag Iris	3.00
<i>Liatris spicata</i>	Marsh Blazing Star	2.00
<i>Lobelia cardinalis</i>	Cardinal Flower	0.25
<i>Lobelia siphilitica</i>	Great Blue Lobelia	0.50
<i>Sagittaria latifolia</i>	Broad-Leaved Arrowhead	0.75
<i>Silphium terebinthinaceum</i>	Prairie Dock	1.00
<i>Verbena hastata</i>	Blue Vervain	1.00
<i>Zizia aurea</i>	Golden Alexanders	0.75
	<b>Total</b>	<b>15.00</b>

Mix Statistics				
Native Component	PLS lbs./Acre	PLS Seeds/Acre	PLS Seeds/Sq. Ft.	% of Native Mix
<b>Forbs</b>	0.94	732,679	16.82	31.68%
<b>Grasses</b>	2.53	1,579,921	36.27	68.32%
<b>Total Natives</b>	3.47	2,312,600	53.09	100%
<b>Non-Native Forbs</b>		-		
<b>Cover</b>	24.25	3,322,321	76.27	
<b>Totals</b>	27.72	5,634,922		

Sold In 1/4 Acre Increments		
1 or More Acres	1/2 Acre	1/4 Acre
\$525.00	\$301.00	\$171.00

## Mulch

Mulching is one of the most important ways to maintain healthy landscape plants. A mulch is any material applied to the soil surface for protection or improvement of the area covered. Mulching is really nature's idea. Nature produces large quantities of mulch all the time with fallen leaves, needles, twigs, pieces of bark, spent flower blossoms, fallen fruit and other organic material.

### **Benefits of Mulching**

When applied correctly, mulch has the following beneficial effects on plants and soil:

- Mulches prevent loss of water from the soil by evaporation.
- Mulches reduce the growth of weeds, when the mulch material itself is weed-free and applied deeply enough to prevent weed germination or to smother existing weeds.
- Mulches keep the soil cooler in the summer and warmer in the winter, thus maintaining a more even soil temperature.
- Mulches prevent soil splashing, which not only stops erosion but keeps soil-borne diseases from splashing up onto the plants.
- Organic mulches can improve the soil structure. As the mulch decays, the material becomes topsoil. Decaying mulch also adds nutrients to the soil.
- Mulches prevent crusting of the soil surface, thus improving the absorption and movement of water into the soil.
- Mulches protect the trunks of trees and shrubs from damage by lawn equipment.
- Mulches help prevent soil compaction.
- Mulches can add to the beauty of the landscape by providing a cover of uniform color and interesting texture to the surface.
- Mulched plants have more roots than plants that are not mulched because mulched plants will produce additional roots in the mulch that surrounds them.

### **Types of Mulches**

There are basically two types of mulches: organic and inorganic. Both types may have their place in the garden.

An organic mulch is a mulch made of natural substances such as bark, wood chips, leaves, pine needles, or grass clippings. Organic mulches attract insects, slugs, cutworms and the birds that eat them. They decompose over time and need to be replaced after several years.

Inorganic mulches, such as gravel, pebbles, black plastic and landscape fabrics, do not attract pests, and they do not decompose.

## Mulch Materials

**Organic Mulch Materials:** Your yard “trash” can be recycled as mulch with the advantage of retaining the nutrients found in these organic materials, in addition to saving money otherwise spent in transporting and disposing of the yard trash.

**Grass Clippings:** The best use for grass clippings is to leave them on the lawn. They decompose rapidly, adding nutrients back into the soil. If you choose to use grass clippings for mulch, it is best to build up the mulch layer gradually using dry grass, not fresh clippings, to prevent the formation of a solid mat that can prevent water moving through it. A two-inch layer of grass clippings provides weed control if it is not full of weed seeds. Be careful not to use clippings from lawns that have been treated with herbicides.

**Hay & Straw:** Never use hay for mulch since it contains too many weed seeds. Straw decomposes rapidly, so you will have to replenish it to keep the weeds down. Straw is not very ornamental and is best for a vegetable garden or over newly sown lawns. Straw will improve the soil as it decays.

**Leaf Mold:** Leaf mold has a tendency to form a crust, preventing water from penetrating into the soil. It is better to use leaf mold as a soil amendment than as a mulch.

**Leaves:** A 2- to 3-inch layer of leaves provides good weed control. It is best to shred the leaves coarsely, using a shredder or your lawn mower. Whole leaves have a tendency to blow away, while finely shredded leaves do not allow water to penetrate. Oak and beech leaves help to acidify the soil for acid-loving plants. Leaves are usually easy to get, attractive as a mulch, and they will improve the soil once they decompose. After the leaves decompose, dig them into the soil and add a new layer of mulch on top.

**Pine Bark:** A 2- to 3-inch layer of pine bark is good for weed control. Pine bark makes an attractive, usually dark-colored mulch. It can be purchased in various particle sizes, from shredded to large-sized particles, called nuggets. Large pine bark nuggets float in water and may not stay in place during a heavy rain. They may also attract termites and other insects.

**Pine Needles:** A 2-inch layer of pine needles makes an excellent mulch for acid-loving trees and shrubs. Pine needles tend to interlock and stay in place better than most mulches, especially on a slope. This mulch is very attractive and allows air, water and nutrients to penetrate easily to the soil surface.

**Shredded Hardwood Mulch:** This mulch is good at suppressing weeds. It does not wash away easily. It decomposes relatively slowly, and it is very attractive.

**Wood Chips:** This material contains bark and pieces of wood of various sizes and makes an attractive mulch. A 2- to 3-inch layer of wood chips provides good weed control. Small wood chips decompose very rapidly using nitrogen from the soil, which needs to be replaced by nitrogen fertilizer. Wood chips may attract termites and other insects.

**Pecan Shells:** Pecan shells make a long-lasting, attractive, dark brown mulch that is effective in retaining moisture in the soil. Availability is limited to areas where pecans are processed.



**Ground Cover:** Many perennial ground cover plants, such as ivy, periwinkle, pachysandra, mondo grass and liriope, will cover the soil and act as a mulch. For more information on groundcovers, refer to

### **Inorganic Mulch Materials:**

**Gravel, Pebbles & Crushed Stone:** These materials are permanent and are best used for permanent plantings such as foundation plants. A 1- inch layer of small rocks will provide good weed control. Do not use them around acid-loving plants since the rocks may add alkaline elements and minerals to the soil. These materials reflect solar radiation and can create a very hot landscape environment during the summer months.

**Black Plastic:** Black polyethylene film is very effective in preventing weed growth. It also holds water in the soil. Therefore, plastic is not recommended for poorly-drained areas as it may cause the soil to remain too wet, which could result in root disease problems. You may have to cut holes in the plastic if water does not go through it. There is black plastic available that has small holes in it to help with drainage. If exposed to sunlight, black plastic is broken down fast, losing its effectiveness as a mulch. However, if you bury black plastic in the soil, it will last for many years. Covering the black plastic with a layer of wood chips or pine needles will reduce heat absorption and mask its artificial appearance.

**Clear Plastic:** Clear plastic will not suppress weed growth because light penetrates the film and raises the soil temperature, which may result in an increased growth of weeds in early spring.

**Landscape Cloth or Woven Ground Cloth:** Materials woven of fabric, plastic or paper are available in various lengths and widths. The materials are treated to resist decomposition. Unlike plastic films, woven materials allow water and air to move through them. They are very effective in controlling most weeds, although some grasses may grow up through the holes in the fabric. Landscape cloth needs to be fastened down so it will not be pushed up by perennial weeds. Better moisture, temperature and weed control will be obtained by adding several inches of another mulching material on top of the landscape cloth.

**Aluminum-coated plastic & foil:** One layer of either one of these materials provides excellent weed control. These materials decompose very slowly, but they are very expensive and quite unattractive mulches.

**Ground Rubber Tires & Artificial Pine Needles:** Mulches made of ground rubber tires and artificial (plastic) pine needles do not decompose, and unless scattered, may never need to be replaced. The use of these materials is relatively new, and both their effectiveness as mulch and their color retention is still being evaluated.

### **Where to Use Mulch**

Mulching is a very important practice for establishing new plantings, because it helps to conserve moisture in the root ball of the new plant until the roots have grown out into the surrounding soil. The growth rate and health of trees and shrubs increases when there is no competition for water and nutrients from weeds. Mulch also helps to prevent tree trunk injury by mowers and trimmers. Newly planted trees require a circle of mulch 3 to 4 feet in diameter. Maintain this for five years. Mulch entire beds of shrubs, trees, annuals, herbaceous perennials and ground covers.

Mulch can also be used to cover trails, driveways, and play and natural areas.

Light-weight mulch such as dried grass clippings and pine straw can be used temporarily to cover low-growing tender plants to protect them from frost injury.

### **When & How Often to Mulch**

The best time to mulch new plantings is right after you plant them. Around established plants mulch is best applied in early spring. This is when plants are beginning to grow and before weed seeds start to germinate.

How often mulch needs to be replenished depends on the mulching material. Grass clippings and leaves decompose very fast and need to be replenished frequently. Inorganic mulches such as gravel and pebbles rarely need replenishing. As the plants grow and fill in the bed areas, less and less mulch is needed.

### **How to Apply Mulch**

Before applying any type of mulch to an area, it is best to weed the area. Spread a layer of mulching materials over the entire plant bed. Keep mulch 2 to 3 inches away from the stems of woody plants. This will prevent decay caused by wet mulch and rodent damage during the winter. Keep mulch 6 to 12 inches away from the walls of buildings.

Subterranean termites nest in the soil and feed on materials that contain cellulose. Termite treatments are applied to the soil around buildings, so keeping mulch away from walls will prevent termites from using it as a bridge to cross treated soil.

Newly planted trees require a circle of mulch 3 to 4 feet in diameter. Maintain this for at least three years. Do not pile mulch against the trunk. For established trees in lawns create a circle of mulch about 2 feet in diameter for each inch of trunk diameter. Increase the size of the mulched area as the tree grows. Try to apply the mulch at least 6 to 12 inches beyond the drip-line of the tree. Because the root system can extend two to three times the crown spread of the tree, mulch as large an area as possible.

### **How Deep to Apply Mulch**

The amount of mulch to apply depends on the texture and density of the mulch material. Many wood and bark mulches are composed of fine particles and should not be more than 2 to 3 inches deep. Excessive amounts of these fine-textured mulches can suffocate plant roots, resulting in yellowing of the leaves and poor growth.

Coarse-textured mulches such as pine bark nuggets allow good air movement through them and can be as deep as 4 inches.

Mulches composed of grass clippings or shredded leaves should never be deeper than 2 inches, because these materials tend to mat together, restricting the water and air supply to plant roots.

### **How to Calculate the Amount of Mulch Needed**

To determine how many cubic feet of mulch is needed, you need to calculate the surface area and the desired depth of coverage. There are 27 cubic feet in a cubic yard. One cubic yard will cover a 324-square-foot area with an inch of mulch. Figure out the square footage of your bed, that is the width times the length for square or rectangular shaped beds. The square footage of a circular bed is the distance from the middle of the circle to the outside, multiplied by itself and then multiplied by 3.14 (which is pi). Multiply your square footage by the depth desired (in inches) and divide by 324 square feet. This will tell you how many cubic yards you will need.

## Problems

**Mulch Toxicity:** Though mulch benefits plants, “sour” mulch can quickly damage plant tissue and lower the soil pH causing injury or death. Bedding and low-growing woody plants are most easily damaged. Symptoms include yellowing of the leaf margins, scorching or dropping of leaves and occasionally entire plant death. Although it may be several days before symptoms appear, spreading sour mulch can damage plants immediately.

Sour or “acid” mulch is caused by poor handling or storing of mulch resulting in anaerobic (without air) conditions. Mulch piles need to “breathe” to prevent anaerobic conditions from occurring. In the absence of air, microbes in the mulch (mostly bacteria) produce toxic substances such as methanol, acetic acid, ammonia gas, and hydrogen sulfide gas.

Sour mulch smells like vinegar, ammonia, sulfur or silage. Good mulch smells like freshly cut wood or has the earthy smell of a good garden soil. Another way to determine if mulch is sour is to test its pH. Toxic mulch will have a pH of 1.8 to 2.5.

To prevent mulch from turning sour or to cure sour mulch, you need to turn your pile once or twice a month, more frequently if the pile is very wet. Do not let the pile get larger than 4 feet thick in any dimension if you are not turning the pile regularly. A good aeration will eliminate the toxic compounds in 24 hours, but to be safe allow three days.

**Slime Molds:** Slime molds are fungus-like organisms that can be a nuisance in mulch. They typically appear suddenly during warm, damp weather. The resulting masses may be several inches to a foot or more in diameter and vary in color, including bright yellow or orange. They are unsightly but harmless, feeding on decaying organic matter such as that found in new hardwood mulch. No pesticides are recommended. Simply scoop up with a shovel and remove.

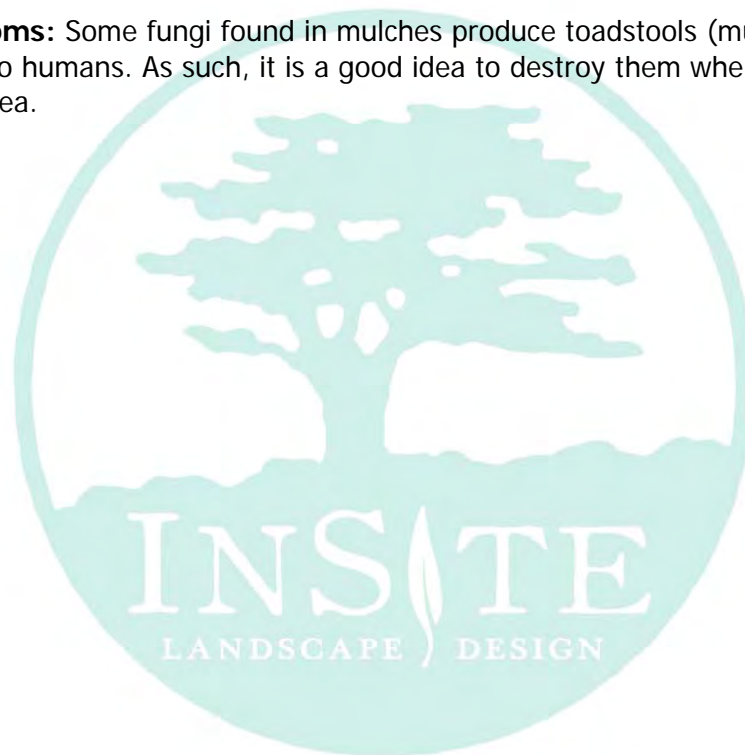
**Matted mulch:** When thick layers of dry mulch are applied or existing mulch dries, some nuisance fungi can grow, forming a mat of mycelium (a mass of fine threadlike structures that make up the body of the fungus). The mycelial mat is hydrophobic (repels water). As a result, the mulch is not easily penetrated by water, which can prevent plants from receiving adequate water. Newly installed mulch should be watered to prevent this problem. If existing mulch is matted, break apart the matted layers with a rake or claw cultivator.

**The Artillery Fungus:** Occasionally, micro-organisms in mulches can become a nuisance. The shotgun or artillery fungus (*Sphaerobolus*) may cause serious problems. While it decays the mulch, it also produces fruiting structures that resemble tiny cream or orange-brown cups that hold a spore mass resembling a tiny black egg (1/10 inch in diameter). This fungus shoots these spore masses high

into the air. They stick to any surface and resemble small tar spots on leaves of plants, on cars or on the siding of homes. They are very difficult to remove. To avoid damage to cars and houses do not use mulches that contain cellulose (wood). Use pure bark mulches, especially pine, or if the mulch is already in place, cover the hardwood mulch with pine needles.

**Stinkhorn Fungi:** Stinkhorn fungi, such as *Mutinus caninus* and *M. elegans*, can colonize hardwood bark mulch. The fruiting bodies or mushrooms often come up in the fall and exude a very unpleasant odor. Scoop up and dispose of the mushrooms as soon as they appear. Consider replacement of hardwood bark mulch, which contains a lot of wood, with another choice, such as pine needles, pine bark, or a composted mulch.

**Toadstools & Mushrooms:** Some fungi found in mulches produce toadstools (mushrooms), and some of these are toxic to humans. As such, it is a good idea to destroy them when small children have access to the mulched area.



## **Watering Newly Planted Trees and Shrubs**

Plant survival is directly related to the care plants receive after they leave the Nursery. One of the most basic concepts is adequate moisture. Without it plants cannot survive. Water requirements for newly installed plants are fairly simple: the roots should never become completely dry or waterlogged. Overwatering, very common with newly transplanted trees, forces oxygen out of the soil around the roots and can lead to death of a tree. A good indication of too much water is yellowing of the foliage that develops first on the inside leaves and progresses to outer leaves.

### **The Soil**

The soil you have helps determine your watering intervals. If you are lucky enough to have sandy or loamy soil you have a big advantage towards a successful tree. Clay soil is the worst it acts like a bowl and just holds water, which makes it much more difficult on determining the amount of water and watering interval. But it is still very important to determine moisture levels of the soil in the root zone. Soil sampling: Dig down 2–4" just outside the root mass of the plant and water only if the soil feels dry to the touch. Feeling the soil for moisture content is the BEST method for gauging dryness. Only sampling can tell you when the soil is adequately moist, too dry, or too wet. Another way to help you determine if your plant needs water is stick a pointed dowel rod in the ground if it comes out clean you need to water and if you can't stick it in the ground you really need to water.

### **The Purpose of Watering a Newly planted tree To keep it alive and establishes roots.**

This should be done by giving it enough water to meet its needs and nothing more. By keeping it a little on the dry side it encourages the roots of the tree to seek out moisture in the surrounding area and establish its roots. This is why the intervals of watering will become farther between as time goes by. Also keep in mind that excess moisture reduces oxygen in the soil and can suppress root development. In order for roots to produce new cells and grow, respiration must occur and respiration requires oxygen and releases carbon dioxide. If water is in excess, both oxygen diffusion into the soil and carbon dioxide release out of the soil is impaired.

### **The Initial Watering**

Once a newly planted tree is installed it needs to be properly watered, this initial watering rehydrates the tree roots and supplies the surrounding soil with moisture. This is the most important watering that can be done for a newly planted tree. One way water a newly planted tree is to use a soil needle or root feeder attachment to a garden hose. This allows some water movement directly to the root zone. Insert the soil needle in a zigzag pattern

around the root ball of the transplanted tree. This ensures that all new feeder roots outside the original root ball receive adequate water.

## Your Watering Schedule

Typically most sprinkler systems will not give your new tree the proper water it needs for good root growth. If you don't have time to water install a water tree bag or purchase a deep root water feeder. "Well" all newly installed plants by creating a circular berm of soil (a 3" or 4" high saucer edge) around each plant. This allows both for easy measurement and placement of water at the root zone.

Keeping track of water volume: Apply measured amounts of water depending on the size of the root ball. The following chart is a guideline for the amounts of water needed by newly planted trees and shrubs based upon plant size. Plant species have varying water requirements. Before watering according to the chart, check actual soil moisture and the moisture requirements of your plants.

<u>Plant Size</u>	<u>Amount of Gallons per Application</u>
Small Shrubs (<3 feet)	4 - 5 gallons
Large Shrubs (>3 feet)	7 - 10 gallons
Small Trees (<2" Caliper)	7 - 10 gallons
Large Trees (>2" Caliper)	10 - 20 gallons

## Spring and Fall Planted Trees

- Week One: Water every other day.
- Week Two, Three and Four: Water 3 times per week
- After the fourth week water 2 times per week
- After the 12th week water 1 time per week for a year.

Water newly transplanted trees thoroughly to late September, then gradually cut back on water to allow for "hardening off" before cold weather sets in. After the leaves have dropped off, continue watering if natural moisture is inadequate.

## Summer Planted Trees

- Week One: Water everyday
- Week Two and Three: Water every other day
- Week Four: Water the trees 3 times this week
- After the fourth week water 2 times per week till October. After October water once per week for a year.

Even with the chart as a guideline evaluate frequency newly installed shrubs and trees should be checked for soil saturation. Your plants need to be watered throughout their first full growing cycle in order to establish roots into new soil and put on top growth. A full growing cycle includes a fall and spring season.

## Additional Rules

- If there is one inch of slow rain in a week you might be able to skip watering that week.
- If there is thunderstorm that gives us a inch of rain still water most of the water from a storm runs off.
- Check your trees weekly with the dowel rod method and adjust water accordingly.
- Mulch: Maintaining a 2–4" layer of organic mulch greatly reduces water lost to evaporation. Mulch should be tapered to and not touching the plant base.
- Ground Covers and Perennials: In order for these tender plants to become established and spread, they must be watered every other day for the first month, and then once a week thereafter for the next two months. If planted in spring or summer, watering may be needed on a daily basis. A rotary sprinkler works best for large areas. Overhead watering should be used only in the morning or late afternoon. Wet foliage in the middle of the day or late evening can promote fungal diseases.
- Sod: After installing sod, soak the root area daily for the next week. After the first week, water every two to three days. If sod shows signs of drying or turning brown, it should be soaked immediately. If the edges of the sod show signs of drying or turning brown along driveways or walks, a hand soaking may be required along those edges. Over watering will inhibit rooting. Sod should root into the soil in two to three weeks.
- Consider spraying the foliage of a newly planted tree or shrub with an anti-desiccant such as Wilt Proof or Transfilm to prevent transplant shock by excess moisture from evaporating through the leaves or needles of conifers.

CAUTION! These are only general recommendations. Each site is different (i. e., soil type, sun and wind exposure, topography) and different plants have different water needs. You must adjust your watering routine to compensate for those factors as well as the weather. BE CAREFUL NOT TO OVER WATER.

## **Protecting Existing Trees During Construction**

Working around existing trees or under their canopies can be harmful to the trees. If you are planning to do work under the tree canopy or dripline of the tree it will be beneficial to read this article first and decide if the tree you will be working under is worth saving and how to protect it from stress.

Trees have an extensive root system that is required to maintain the health of the tree. The majority of roots are located within the top 12 inches of soil and extend past the dripline of the tree. However, the main area of concern is within the dripline of the tree's canopy. The dripline can be determined by dropping an imaginary line from the outermost leaves to the ground, as seen in figure 1. This area makes a circle around the tree and is considered the protected root zone. Any work in this area should be done with extreme care.

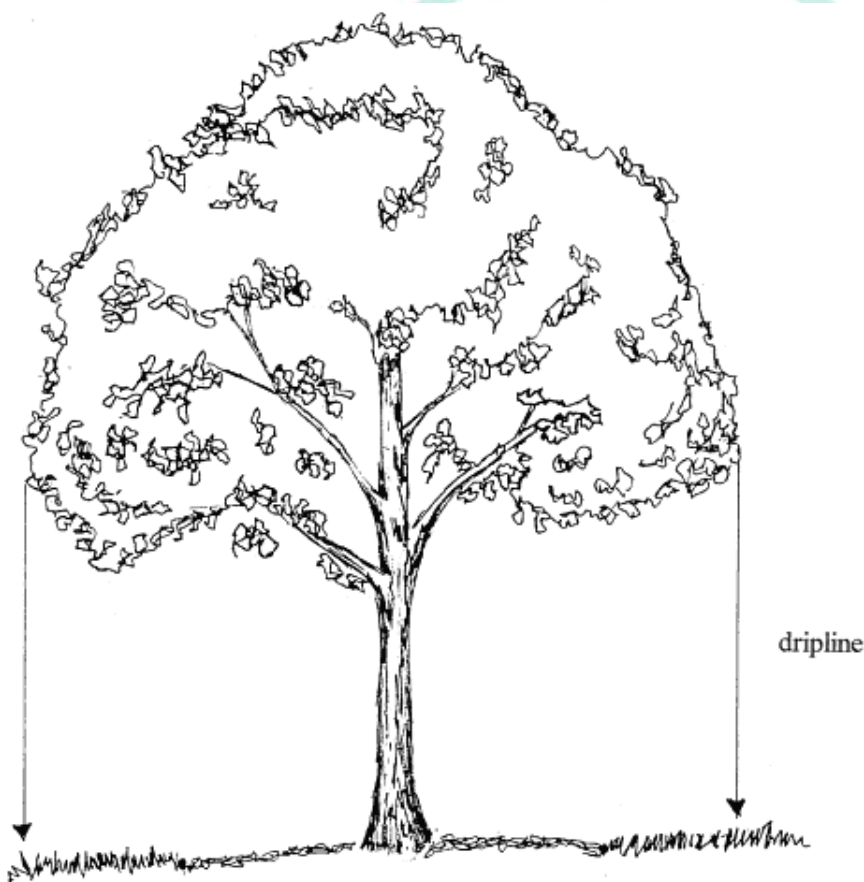


Figure 1.

The easiest way to avoid damage is to reconsider the work to be done. Remember there is usually more than one way to do a job. If you plan to build a patio with pavers that will require cutting or lowering the grade underneath a tree, consider instead building a wood deck. Wood decks are built above the soil line and the only disturbance to the root system will be digging the foundation post



holes. This option decreases root disturbance and soil compaction and will more than likely keep the tree healthy and alive.

Remember to contact your utility companies to find out where it is safe to dig before digging.

### **Determining Whether a Tree Can Be Saved**

- **Age of Tree.** Younger trees will survive changes better than older, more mature trees. If the tree is overly mature and in poor condition, it might be best to remove it and replace it with a new tree.
- **Sensitivity to Root Disturbance.** Trees vary in sensitivity when their roots are cut or the soil around their roots disturbed.
- **Sensitivity to Soil Compaction.** Trees also vary in sensitivity to the soil around their roots being compacted. For example, using heavy equipment or raising the soil grade often causes soil compaction. Basically, soil compaction decreases the amount of oxygen in the soil that trees need to survive.
- **Health of Tree.** If trees are already stressed and unhealthy in appearance the likelihood of surviving a major change in their current environment (loss of roots or grade change) can be minimal. On the other hand, a healthy, vigorous tree should live even after losing half of its root system. However, it is often difficult for a person to determine whether a tree is healthy. Following are some guidelines to help you decide:
  - Young trees are generally healthier than older trees.
  - Diseased trees increase the chance of loss. A good way to determine if a tree is diseased is to check whether:
    - the tree has excessive dieback of the canopy or branches,
    - the tree turns to fall colors early,
    - the tree loses leaves early in the season.
  - Ratio of canopy (leafed out part of tree, deciduous trees only) vs. trunk. A healthy tree has 60% canopy to 40% trunk (see figure 2a). An unhealthy tree has 40% or less canopy to 60% or more trunk (see figure 2b).
  - **Severity of Change Necessary.** If the amount of grade change or root loss is too severe, remove the tree and replace it after changes have been made.

### **Making Vertical Cuts or Lowering Current Grade**

Some trees are more sensitive to root disturbance than others. Try to avoid disturbing more roots than necessary no matter how tolerant the tree is of root disturbance. The less the soil is disturbed around and underneath a tree, the healthier and more vigorous the tree will be. Keep in mind that if your tree is tolerant of root disturbance, but is unhealthy, it might be best to consider the tree as being intermediate or sensitive before cutting away roots. On the other hand, if your tree is young and healthy yet considered sensitive, it might be possible to make the maximum cut.

#### **Making Vertical Cuts**

These usually involve removing the entire root system, 12 inches or deeper.

- If the tree to be worked under is tolerant of root disturbance avoid removing more than 25 percent of the roots under the dripline.
- If the tree is intermediate avoid damaging roots inside the dripline.
- If the tree is sensitive to root disturbance extend the protected root zone beyond the dripline.

### Lowering the Current Grade (Horizontal Cuts)

- Do not remove soil within 3 feet of the trunk.
- Take no more than 2 inches off the top three feet away from base of tree. Reducing the current grade 2 inches will already remove a good portion of the viable roots, so do not go deeper or chances of losing the tree increase. However, if you still need to remove more:
  - Build a Retaining Wall. To reduce the amount of grade change within the protected root zone, create steps of grade changes (figure 3). Starting at a point past the dripline, keep in mind the sensitivity of the tree to root disturbance and cut away the current soil line making a vertical cut. Build a retaining wall, back fill with soil, and mulch around the tree. If the tree is sensitive to root disturbance, remove tree and plant a new one once the grade change has been made.

### Digging Trenches

Trenches should only be dug on one side of the tree. To find the minimum distance from the tree trunk that the trench can be dug, determine diameter of tree at breast height (dbh) by measuring the diameter or width of the tree at 4.5 feet off the ground. Multiply the dbh by 0.5 feet to get minimum distance from tree to start trenching.

$\text{dbh} \times 0.5 \text{ feet} = \text{minimum distance from tree to start trenching (in feet)}$

Keep in mind this is the minimum distance, however, it is always best for the health of the tree to maximize this distance. So if possible go a few feet beyond this amount or, preferably, go outside the dripline.

**Augering** When augering for fence posts, deck footings, etc., multiply dbh (see above) by 1 foot

$\text{dbh} \times 1 \text{ foot} = \text{minimum distance from tree to auger (in feet)}$

Again this is a minimum distance. If possible, extend this outward a few feet or outside the dripline.

### General Rules for Cutting Roots

- Water tree a few days before work will be done.
- Work only on dry soil. If soil is wet, any weight will compact the soil which will cause more stress on the tree.
- Make sure cuts are done with hand tools that will make clean, quick cuts (i.e. chainsaw and axe are best). Do not use large equipment like backhoes and bulldozers.
- Do not disturb roots more than necessary.
- Make sure cut roots are covered with soil and wood chips as soon as possible. If roots are going to be exposed for more than an hour, cover roots with a damp cloth. Be sure to keep cloth moist until soil and mulch can be used for permanent cover.
- Water the tree thoroughly when job is done. Wet first 12 inches of soil within the tree dripline.
- Put a permanent three foot (minimum) diameter ring of mulch around base of tree. Mulch 3-5 inches deep and keep the mulch away from trunk. Wood chips, shredded bark, or lawn trimmings can be used for mulch. Most types of mulch break down in time, so it is necessary to replenish the mulch from year to year.
- Twenty percent of the tree's roots can be cut before any signs of stress will appear, however, keep in mind that tree roots do extend outside of the protected root zone.

### Filling or Increasing Current Grade

- Before adding soil or increasing the grade within the protected root zone, check how sensitive or tolerant the tree is to soil compaction. Keep in mind that just because your tree is considered tolerant of soil compaction does not mean it will survive. If the tree is unhealthy and mature, the tree might tolerate less fill than if it were newly planted and healthy. Take into consideration all aspects mentioned above in determining whether tree can be saved when deciding how much soil can be added.
- If the tree to be worked under is **tolerant** of soil compaction, the maximum amount of soil added to the protected root zone is 24 inches. No more than 24 inches should be added within the protected root zone.
- If the tree is **intermediate**, avoid adding more than 6 to 12 inches of soil to the protected root zone.
- If the tree is **sensitive** to root compaction, 0 to 6 inches of soil may be added.
- When adding soil to increase the grade within the protected root zone, never allow the excess soil to touch the trunk or base of the tree. This will cause rot, which can kill the tree no matter how healthy. To keep soil away from the base of the tree, build a retention wall around the trunk (see figure 4). This wall can be made of key stone or treated wood. Build the wall 3 feet away from the trunk. When adding soil, it is advisable to add the lower half of soil as class 5 fill. This is often used in making a foundation for patios and sidewalks. The upper half should be a porous soil mix of one part of each of the following: loam, coarse sand and shredded bark.
- If fills deeper than suggested above are necessary, build a retaining wall on or outside the dripline. Backfilling should be done as above, with half the depth class 5 fill and half porous mix. Aeration is necessary when adding large amounts of fill (see below).

### Adding soil to just one side of the tree

If it is necessary to fill on only one side of the tree, the best method is to use the equation for trenching mentioned above. However, if the situation requires filling closer to the tree than recommended, do not fill closer than 3 feet from the trunk of the tree.

### Aeration.

Aerate within the protected root zone before and after grade changes. Starting 3 feet from the base of the tree, drill 2-inch diameter holes into the soil about 1 to 1-1/2 feet deep. Drill the holes in a circle 3 feet away from the trunk, spacing them two feet apart, then go out 5 feet and drill again in a circle. Continue every 2 feet within the protected root zone (see figure 5). Use the porous soil referred to previously to fill the holes.

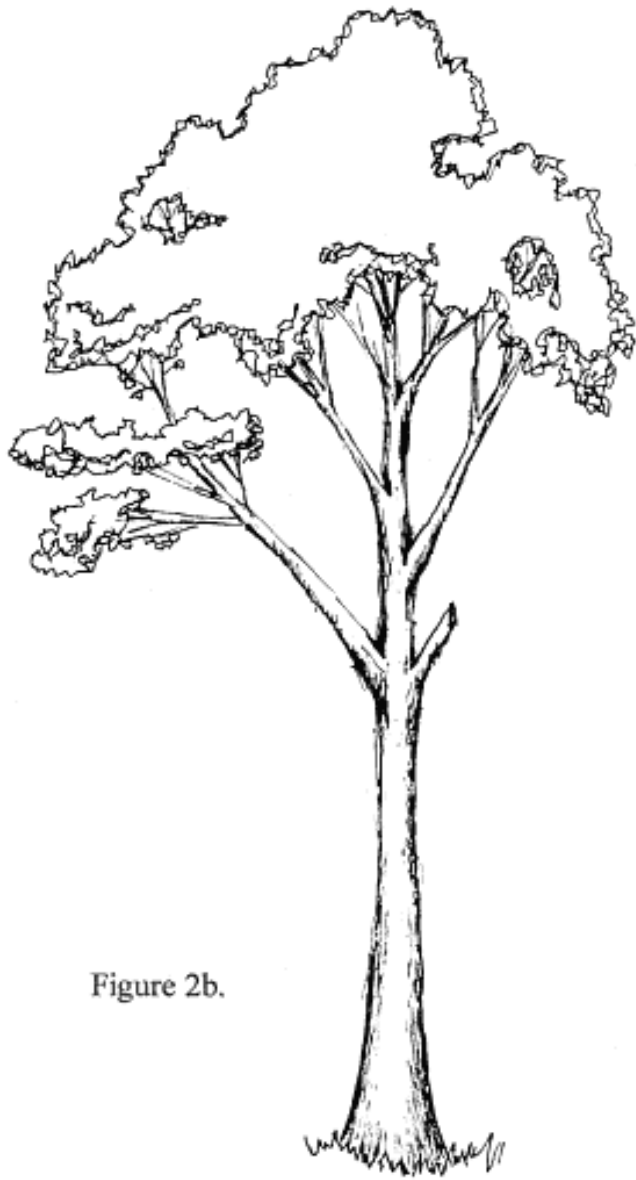


Figure 2b.

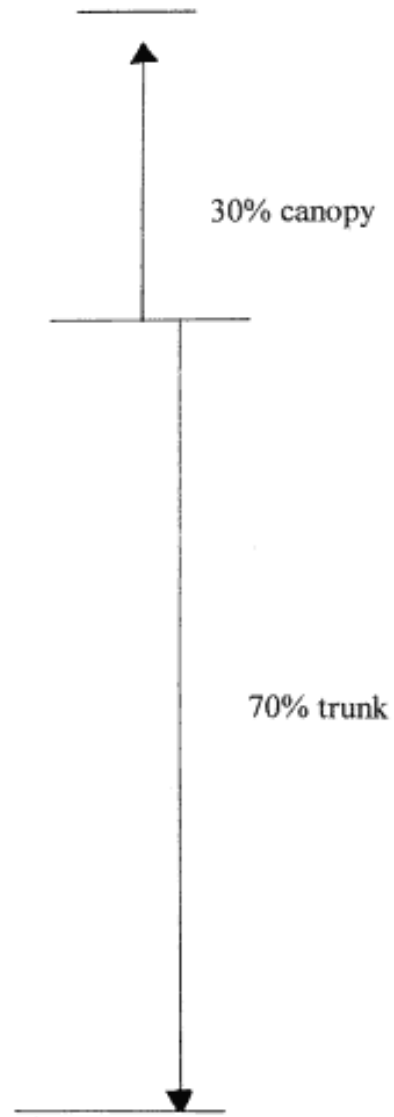
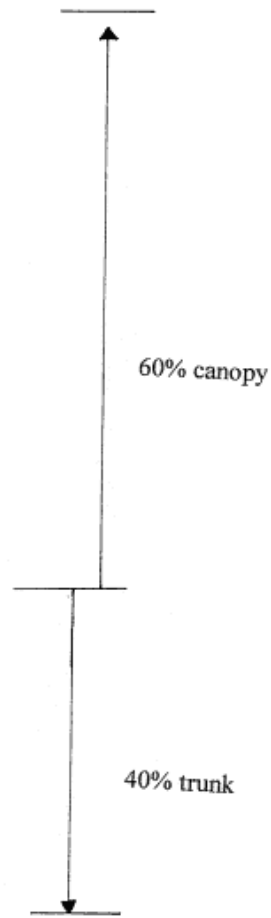
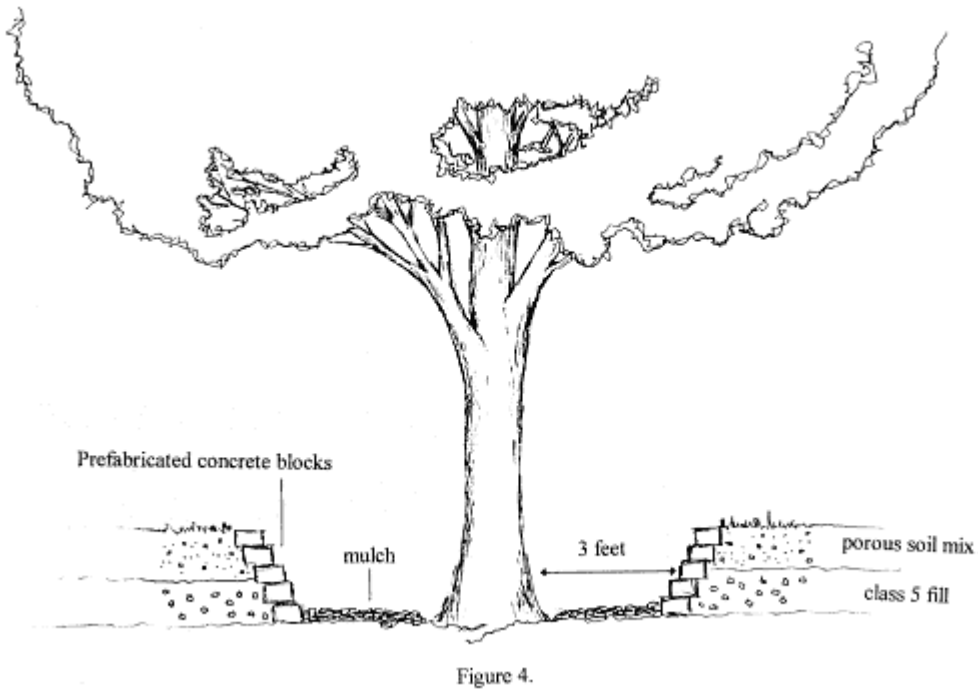
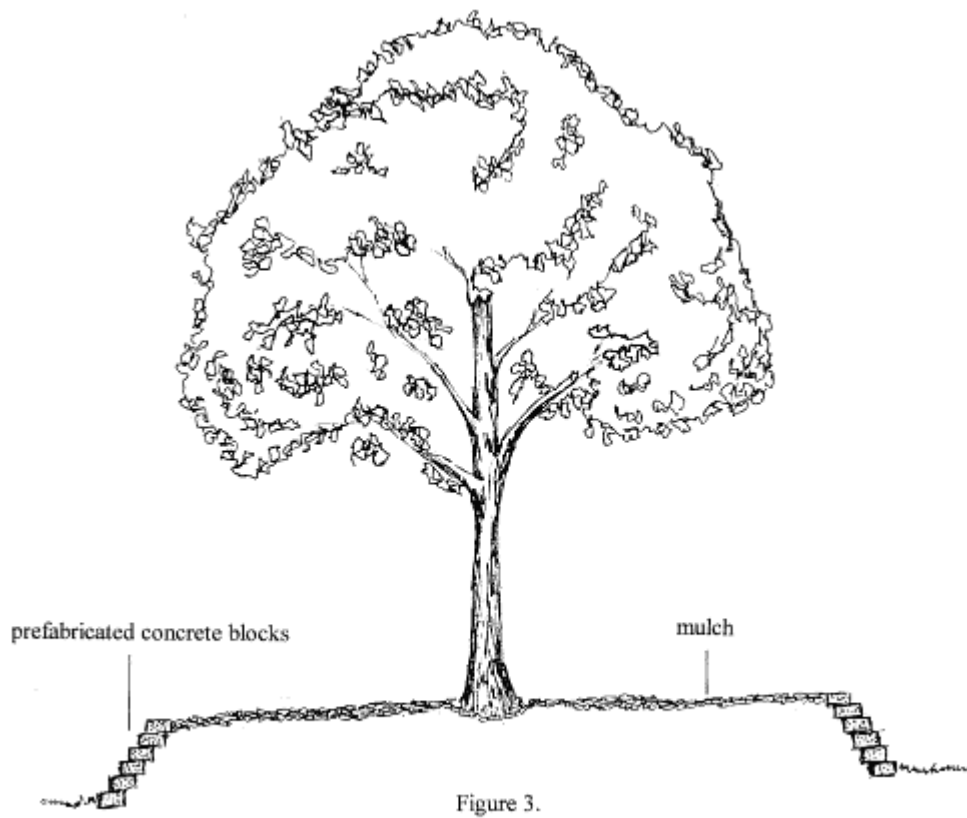




Figure 2a.





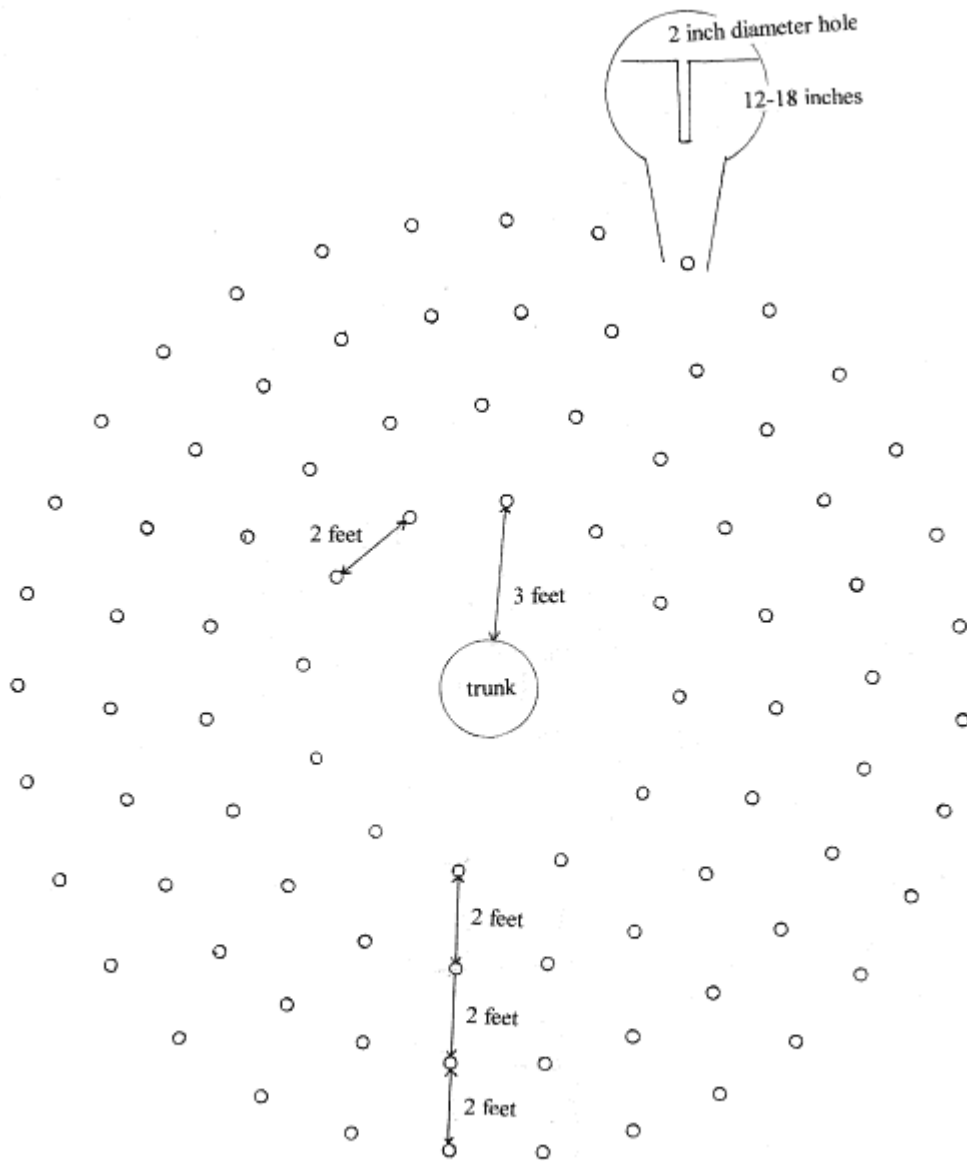


Figure 5.

### **Planting Under Canopy**

- Do not add more than 6" total of soil and/or mulch.
- Keep mulch away from base of tree; any wood chips or soil that come in contact with the trunk of the tree will promote rot of the tree trunk.
- Never till soil under canopy; do not overwork the soil under the tree.
- Work soil with hands and hand tools only, no large equipment.
- Ground covers and/or mulch around the tree protect its roots and the soil from compaction and maintain soil moisture.
- Do not plant within 3 feet of the tree trunk.

- Do not plant anything within dripline that will compete with the tree for moisture and nutrients, such as another tree or large shrubs. Ground covers, perennials and small shrubs can be beneficial to the tree, acting as a barrier to soil compaction and improve moisture content by shielding the soil from direct sun exposure. Avoid planting anything that will be more than one-third the mature height of the tree (see figure 6).

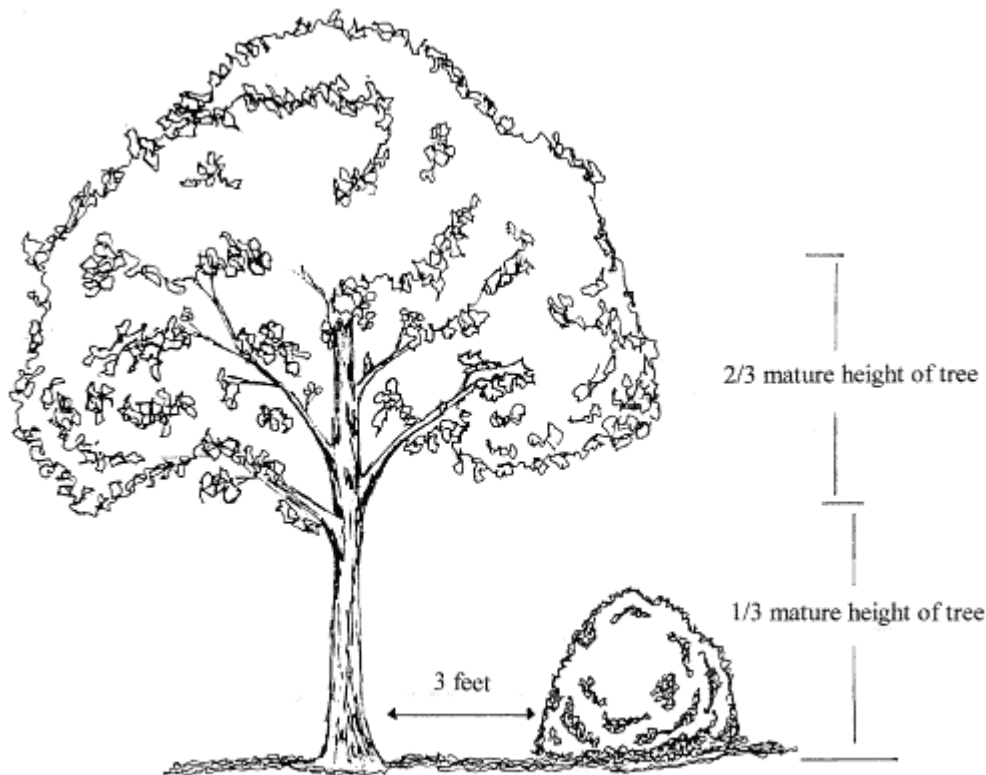


Figure 6.

- Avoid cutting roots from one inch diameter and up. If roots are encountered, move plant hole over a few inches, or until you can dig without encountering large roots.

### **Tips for Tree Care Before and After Damaging Work**

- The best time to start making a tree more resistant to work around its roots is a year before the work begins. Trees store water and nutrients for times of need. These times can be in the spring, during droughts, after a hailstorm, etc. So extra stores of water and nutrients will create a healthier, stronger tree and will increase survival following the stress of damaging work.
- Trees should be watered a few days before work is to begin and again as soon as possible after the work is done. Thereafter, watering should be done thoroughly and infrequently. Make sure the ground is moist a foot deep within the dripline of the tree. Avoid getting the leaves of the tree wet while watering and try to water in the morning, rather than in the evening.
- Fertilizing should be done about a year before the work is to begin. This will help the tree store up needed nutrients for the next few years. Whether or not to fertilize after the work is done, depends upon the damage done to the tree. If roots were cut, do not fertilize the tree for a year. If the soil was compacted or fill was added, fertilizing the tree after the work is done may be beneficial. Use a



slow release fertilizer, preferably organic, with only a couple pounds of nitrogen per 1000 square feet.

- If root loss has occurred, do not thin out the canopy of the tree. If this is done after root loss, you are decreasing the amount of root growth that can occur, since the chemical that stimulates the roots to grow is located in the tree's buds. Plus, even if you thin out the canopy, the tree might still have dieback. Wait only one to two years before pruning, then only cut out the dieback that has occurred.

- If the grade is to be increased, aerate the soil within the dripline before and after the work is done. By aerating the soil you will not only increase the chance of survival, but also help to create healthier, more vigorous growth in the future. For best results aerate the soil once every two years.





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