

APPENDIX A

CRITERIA FOR SIGNIFICANT AND LANDMARK TREES

SIGNIFICANT TREES

<u>Species</u>	<u>Common Name</u>	<u>Minimum Diameter</u>
<i>Quercus virginiana</i>	Live Oak	8"
<i>Quercus alba</i>	White Oak	8"
<i>Quercus stellata</i>	Post Oak	8"
<i>Quercus nigra</i>	Water Oak	8"
<i>Quercus falcata</i>	Southern Red Oak	8"
<i>Quercus laurifolia</i>	Laurel Oak	8"
<i>Quercus phellos</i>	Willow Oak	8"
<i>Acer rubrum</i>	Red Maple	8"
<i>Liquidambar styraciflua</i>	Sweetgum	8"
<i>Liriodendron tulipifera</i>	Yellow-poplar	8"
<i>Taxodium distichum</i>	Baldcypress	8"
<i>Cercis canadensis</i>	Eastern Redbud	4"
<i>Ilex opaca</i>	American Holly	4"
<i>Cornus florida</i>	Flowering Dogwood	4"
<i>Fagus grandifolia</i>	American Beech	8"
<i>Magnolia grandiflora</i>	Southern Magnolia	8"
<i>Carya tomentosa</i>	Mockernut Hickory	8"
<i>Carya glabra</i>	Pignut Hickory	8"
<i>Carya ovata</i>	Shagbark Hickory	8"
<i>Ulmus american</i>	Elm	8"
<i>Nyssa aquatica</i>	Tupelo	8"
<i>Nyssa biflora</i>	Black Gum	6"
<i>Diospyros virginiana</i>	Persimmon	8"
<i>Magnolia virginiana</i>	Sweet Bay	6"
<i>Gordonia liasanthus</i>	Gordonia	6"

LANDMARK TREES

<u>Species</u>	<u>Common Name</u>	<u>DBH (inches)</u>
<i>Quercus virginiana</i>	Live Oak	30
<i>Juniperus virginiana</i>	Eastern Red Cedar	30
<i>Magnolia grandiflora</i>	Southern Magnolia	30
<i>Quercus laurifolia</i>	Laurel Oak	36
<i>Acer rubrum</i>	Red Maple	36
<i>Taxodium distichum</i>	Bald Cypress	30
<i>Ilex opaca</i>	American Holly	20
<i>Cornus florida</i>	Flowering Dogwood	15
<i>Carya</i>	Hickory (except Pecan)	36

APPENDIX A

PROCEDURES FOR CALCULATING MINIMUM TREE REQUIREMENTS

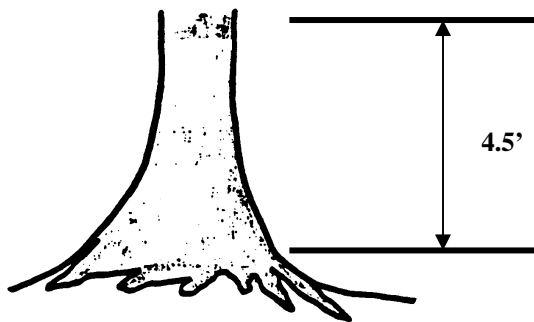
FOLLOW THE STEPS BELOW OR USE THE CONVERSION CHART.

Step 1. Calculate the required tree basal area for the site by multiplying the site acreage (minus water features) by 15.

Example: A 3.2 acre site with a .5 acre lake has a required tree basal area of $(3.2 - .5) \times 15 = 40.5$

Step 2. Calculate the square footage of the basal area of the trees that are to be retained on the site. The method of measuring trees and determining basal area is illustrated below:

FIGURE 2. CALCULATING BASAL AREA



- Measure circumference at breast height in inches
- Divide by 6.28 to get radius
- Square the radius and multiply by .0218 to get basal area in square feet

Example: a total of 20 trees will remain on the site after development including:

<u>DBH</u>	<u>BASAL AREA</u>	<u># TREES</u>	<u>TOTAL BASAL AREA</u>
36" (Live Oaks)	7.1	2	14.2
12" (Pines)	0.8	13	10.2
8" (Pines)	0.3	3	0.9
15" (Pines)	1.2	<u>2</u>	<u>2.4</u>
		20	27.7

THE GRAND TOTAL OF TREE BASAL AREA RETAINED ON THE SITE IS 27.7 SQUARE FEET.

Step 3. Determine the number of replacement trees that must be planted to meet the minimum requirements by using the standard of two trees per each square foot of basal area under the minimum requirement.

Example: $40.5 - 27.7 = 12.8$ (Round up to 13). $13 \times 2 = 26$ Replacement Trees

Based on the example given, the 3.2 acre site will be required to plant at least 26 replacement trees (2" DBH) to meet the minimum requirements of the regulations.

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TREE CALCULATIONS FOR BASAL REQUIREMENTS

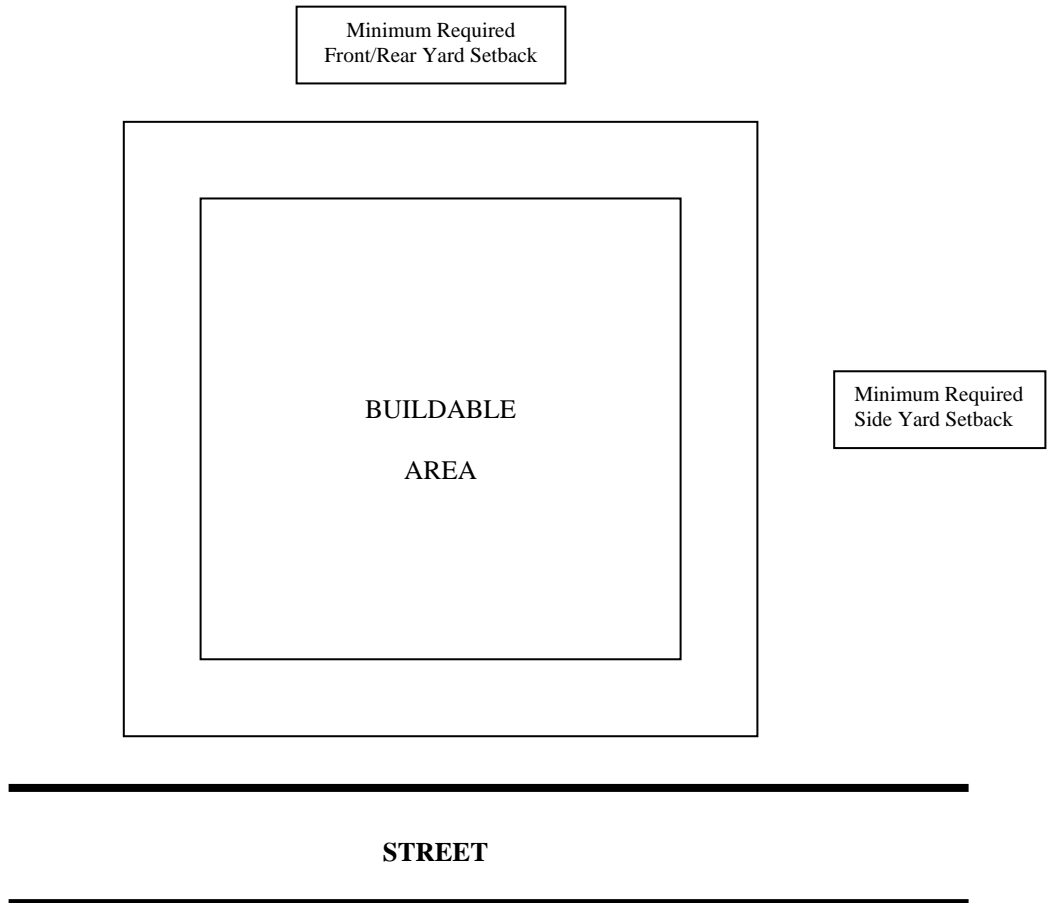
BY CIRCUMFERENCE

BY DIAMETER

TREE CIRCUMFERENCE	TREE RADIUS	BASAL AREA SQ. FT.	TREE DIAMETER	TREE RADIUS	BASAL AREA SQ. FT.
1	0.159	0.001	1	0.500	0.005
2	0.318	0.002	2	1.000	0.022
3	0.478	0.005	3	1.500	0.049
4	0.637	0.009	4	2.000	0.087
5	0.796	0.014	5	2.500	0.136
6	0.955	0.020	6	3.000	0.196
7	1.115	0.027	7	3.500	0.267
8	1.274	0.035	8	4.000	0.349
9	1.433	0.045	9	4.500	0.441
10	1.592	0.055	10	5.000	0.545
11	1.752	0.067	11	5.500	0.659
12	1.911	0.080	12	6.000	0.785
13	2.070	0.093	13	6.500	0.921
14	2.229	0.108	14	7.000	1.068
15	2.389	0.124	15	7.500	1.226
16	2.548	0.142	16	8.000	1.395
17	2.707	0.160	17	8.500	1.575
18	2.866	0.179	18	9.000	1.766
19	3.025	0.200	19	9.500	1.967
20	3.185	0.221	20	10.000	2.180
21	3.344	0.244	21	10.500	2.403
22	3.503	0.268	22	11.000	2.638
23	3.662	0.292	23	11.500	2.883
24	3.822	0.318	24	12.000	3.139
25	3.981	0.345	25	12.500	3.406
26	4.140	0.374	26	13.000	3.684
27	4.299	0.403	27	13.500	3.973
28	4.459	0.433	28	14.000	4.273
29	4.618	0.465	29	14.500	4.583
30	4.777	0.497	30	15.000	4.905
31	4.936	0.531	31	15.500	5.237
32	5.096	0.566	32	16.000	5.581
33	5.255	0.602	33	16.500	5.935
34	5.414	0.639	34	17.000	6.300
35	5.573	0.677	35	17.500	6.676
36	5.732	0.716	36	18.000	7.063
37	5.892	0.757	37	18.500	7.461
38	6.051	0.798	38	19.000	7.870
39	6.210	0.841	39	19.500	8.289
40	6.369	0.884	40	20.000	8.720
41	6.529	0.929	41	20.500	9.161
42	6.688	0.975	42	21.000	9.614
43	6.847	1.022	43	21.500	10.077
44	7.006	1.070	44	22.000	10.551
45	7.166	1.119	45	22.500	11.036
46	7.325	1.170	46	23.000	11.532
47	7.484	1.221	47	23.500	12.039
48	7.643	1.274	48	24.000	12.557
49	7.803	1.327	49	24.500	13.085
50	7.962	1.382	50	25.000	13.625
51	8.121	1.438	51	25.500	14.175
52	8.280	1.495	52	26.000	14.737
53	8.439	1.553	53	26.500	15.309
54	8.599	1.612	54	27.000	15.892
55	8.758	1.672	55	27.500	16.486
56	8.917	1.733	56	28.000	17.091
57	9.076	1.796	57	28.500	17.707
58	9.236	1.859	58	29.000	18.334
59	9.395	1.924	59	29.500	18.971
60	9.554	1.990	60	30.000	19.620
61	9.713	2.057	61	30.500	20.279
62	9.873	2.125	62	31.000	20.950
63	10.032	2.194	63	31.500	21.631
64	10.191	2.264	64	32.000	22.323
65	10.350	2.335	65	32.500	23.026
66	10.510	2.408	66	33.000	23.740
67	10.669	2.481	67	33.500	24.465
68	10.828	2.556	68	34.000	25.201
69	10.987	2.632	69	34.500	25.947
70	11.146	2.709	70	35.000	26.705
71	11.306	2.786	71	35.500	27.473
72	11.465	2.866	72	36.000	28.253
73	11.624	2.946	73	36.500	29.043
74	11.783	3.027	74	37.000	29.844
75	11.943	3.109	75	37.500	30.656
76	12.102	3.193	76	38.000	31.479

FIGURE 1. **Setback Area for Tree Protection**

(See Article VII for dimensioned minimum setback requirements for each zoning district).



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TABLE 1. SOIL MOISTURE DETERMINATION (FROM HARRIS, 1983)

SANDY LOAM (gritty when moist; some grit and clay)	CLAY LOAM (sticky and plastic when moist)	
FEEL OR APPEARANCE OF SOILS		AMOUNT OF MOISTURE READILY AVAILABLE FOR TREES
Dry, loose, flows through fingers	Dry clods that break down into powdery substances	Close to 0%. Little or no moisture available
Still appears to be dry: will not form a ball	Somewhat crumbly; will hold together with pressure	50% or less. Approaching time to irrigate
Tends to ball under pressure but will seldom hold together	Forms a ball; somewhat plastic; will sometimes stick slightly with pressure	50% to 75%. Enough available moisture
Forms weak ball; breaks easily; will not become slick	Forms a ball and is very pliable; becomes slick readily if high in clay	75% field capacity. Plenty of available moisture
Upon squeezing, no free water appears, but moisture is left on hand	Same as sandy loam	At field capacity, soil won't hold any more water (after draining).
Free water is released after kneading	Can squeeze out free water	Above field capacity. Unless water drains out, soil will be water logged

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TABLE 2. CALIPER TO HEIGHT RATIOS FOR DECIDUOUS TREES

CALIPER IN INCHES	STANDARD SHADE TREES	SLOW GROWING TREES		SMALL UPRIGHT
	AVERAGE RANGE	MAXIMUM HEIGHT IN FEET	MINIMUM HEIGHT IN FEET	AVERAGE RANGE
5/16				2 TO 3
7/16				3 TO 4
9/16				4 TO 5
11/16				5 TO 6
7/8				6 TO 8
1/2 to 3/4	5 to 6	8	3.5	
3/4 to 1	6 to 8	10	4	
1 to 1 ¼	8 to 10	11	5.5	
1 ¼ to 1 ½	8 to 10	12	5.5	
1 ½ to 1 ¾	10 to 12	14	6.5	
1 ¾ to 2	10 to 12	14	6.5	
2 to 2 ½	12 to 14	16	8	
2 ½ to 3	12 to 14	16	8	
3 to 3 ½	14 to 16	18	9.5	
3 ½ to 4	14 to 16	18	9.5	
4 to 5	16 to 18	22	10.5	
5 to 6	18 and up	26	12	

TABLE 3. HEIGHT TO SPREAD RATIOS FOR CONIFEROUS NURSERY TREES

HEIGHT IN INCHES	SPREAD RANGE IN INCHES
12 to 15	8 to 12
15 to 18	9 to 15
18 to 24	12 to 18
24 to 30	15 to 21
30 to 36	18 to 24
36 to 48	21 to 30
48 to 60	30 to 36
60 to 72	36 to 48

Generally, the Height : Spread ratio should be no less than 2:1

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TABLE 4. MIN. ROOT SPREAD AND BALL DIAM. FOR NURSERY TREES

Caliper	Bare Root Diameter Spread For All Trees	Ball Diameter for Standard and Slow Growing Ball and Burlapped Trees	Ball Diameters for Small Upright Trees	
INCHES	INCHES	INCHES	HEIGHT FEET	DIAM. INCHES
½ to ¾	12	12	2 to 3	10
¾ to 1	16	14	3 to 4	12
1 to 1 ¼	18	16	4 to 5	14
1 ¼ to 1 ½	20	18	5 to 6	16
1 ½ to 1 ¾	22	20	6 to 7	18
1 ¾ to 2	24	22	7 to 8	20
2 to 2 ½	28	24	8 to 9	22
2 ½ to 3	32	28	9 to 10	24
3 to 3 ½	38	32	10 to 12	26
3 ½ to 4		38		
4 to 4 ½		42		
4 ½ to 5		48		
5 to 5 ½		54		

TABLE 5. RECOMMENDED BALL DIMENSIONS FOR LARGE TREES

Tree Diameter	Ball Diameter	Ball Depth	Approximate Weight of Ball and Tree
INCHES	FEET	INCHES	TONS
5	4	30	1.5
6	5	32	2.4
7	6	34	3.7
8	7	36	5.4
9	7 ½	36	6.2
10	8	38	7.4
11	9	40	9.9
12	10	40	12.2

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TABLE 6. MINIMUM BALL DIAM. FOR BALLED AND BURLAPPED CONIFERS

HEIGHT IN FEET	DIAMETER IN INCHES
1 ½ to 2	10
2 to 3	12
3 to 4	14
4 to 5	16
5 to 6	20
6 to 7	22
7 to 8	24
8 to 9	27
9 to 10	30
10 to 12	34
12 to 14	38
14 to 16	42
18 to 20	50

Figure 3. Typical Critical Root Zone

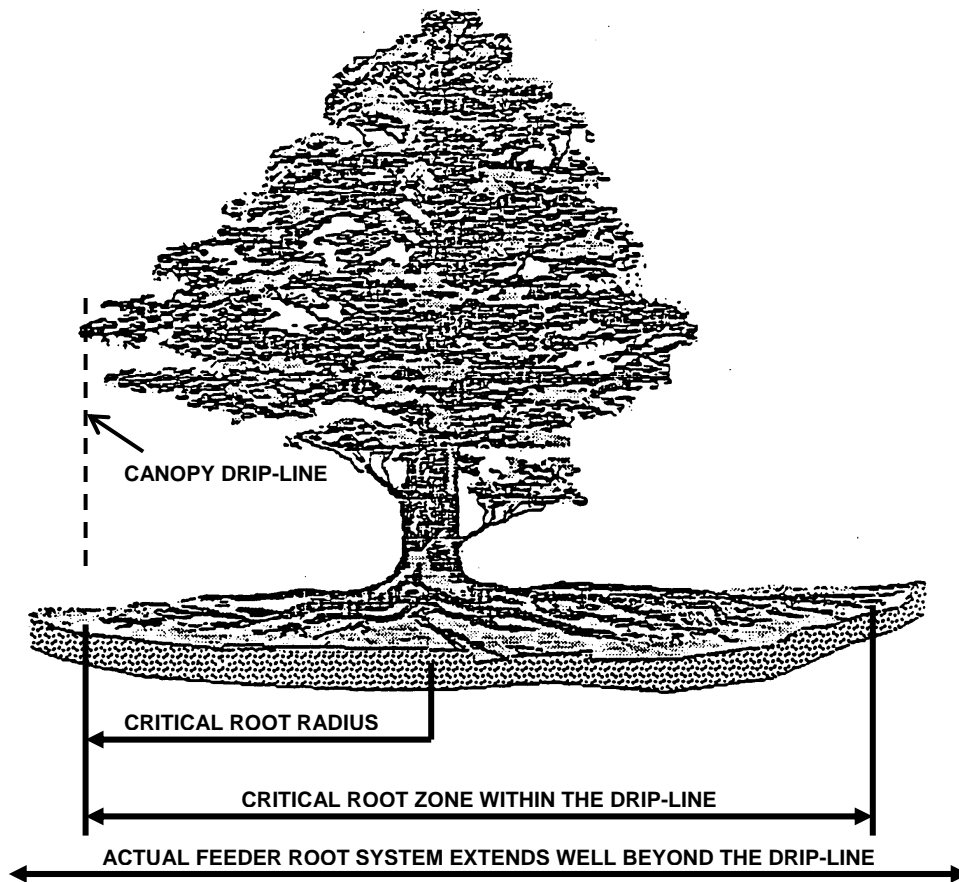


Figure 4. Active Protective Tree Fencing Detail



Figure 5. Alternative Protective Tree Fencing Detail

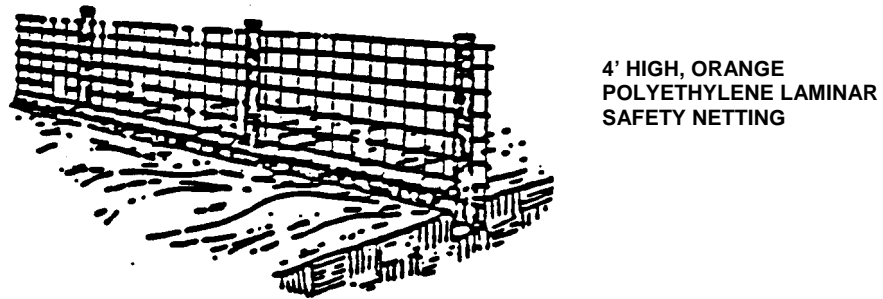


Figure 6. Passive Tree Protection Detail

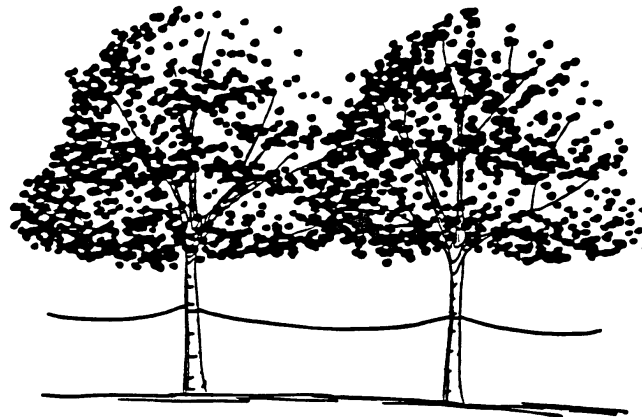


Figure 7. Root Loss From Trenching vs. Tunneling

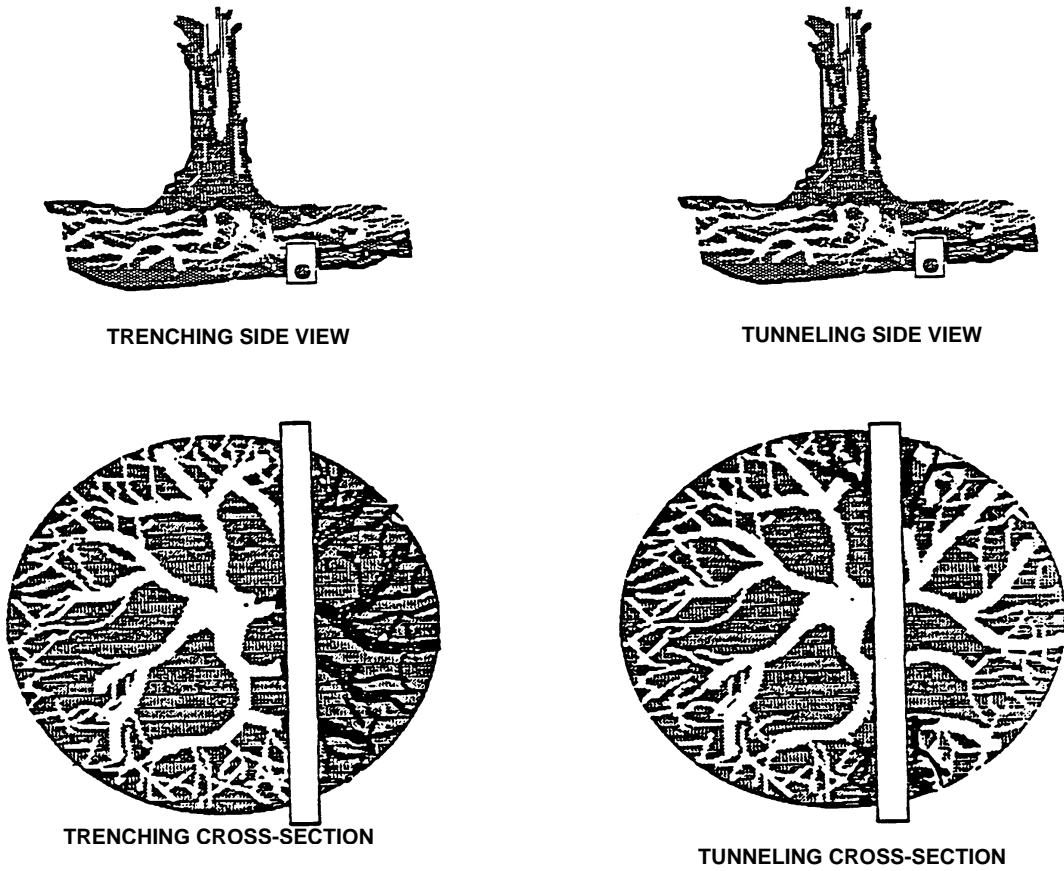
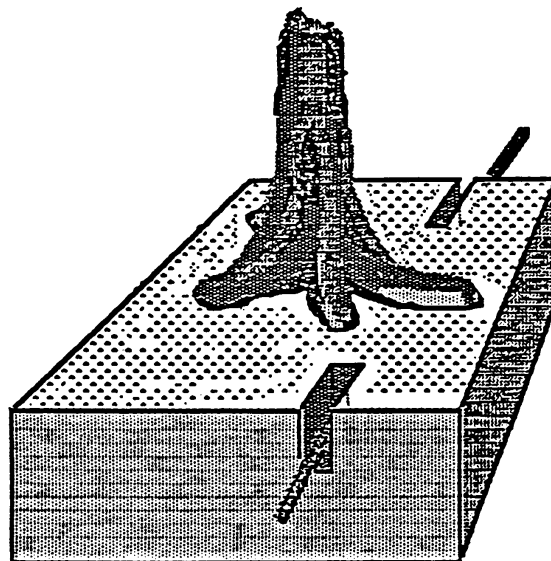


Figure 8. Tunneling for Underground Utilities



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Figure 9. Aeration System

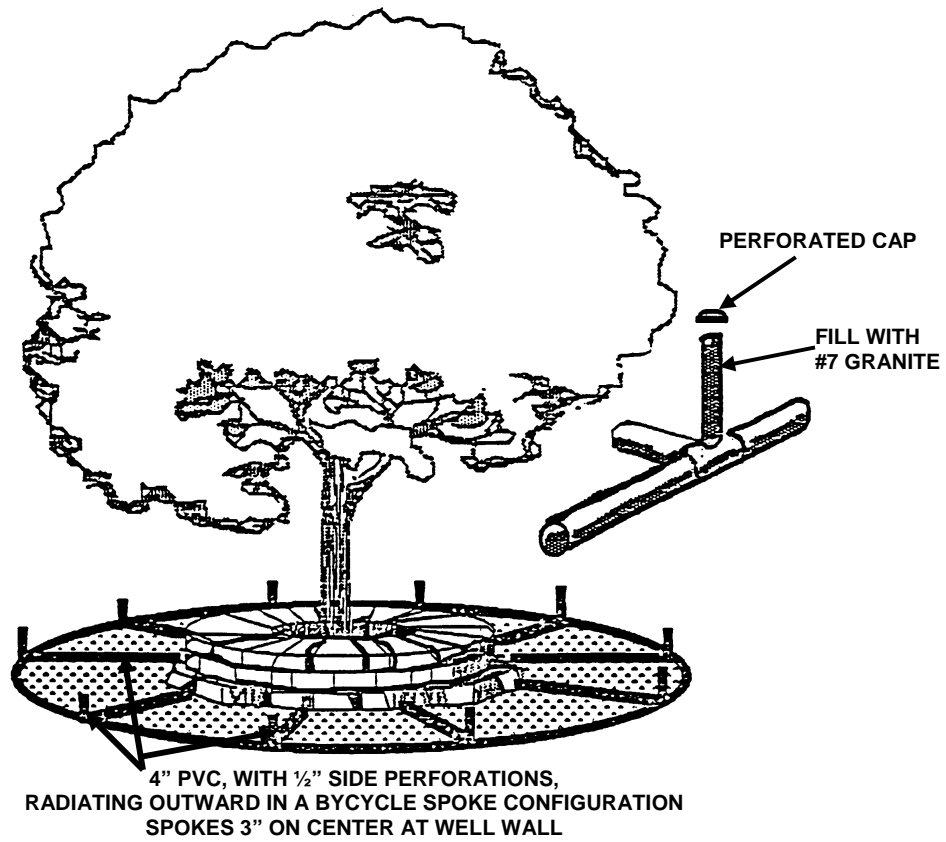


Figure 10. Aeration System – Vertical Profile

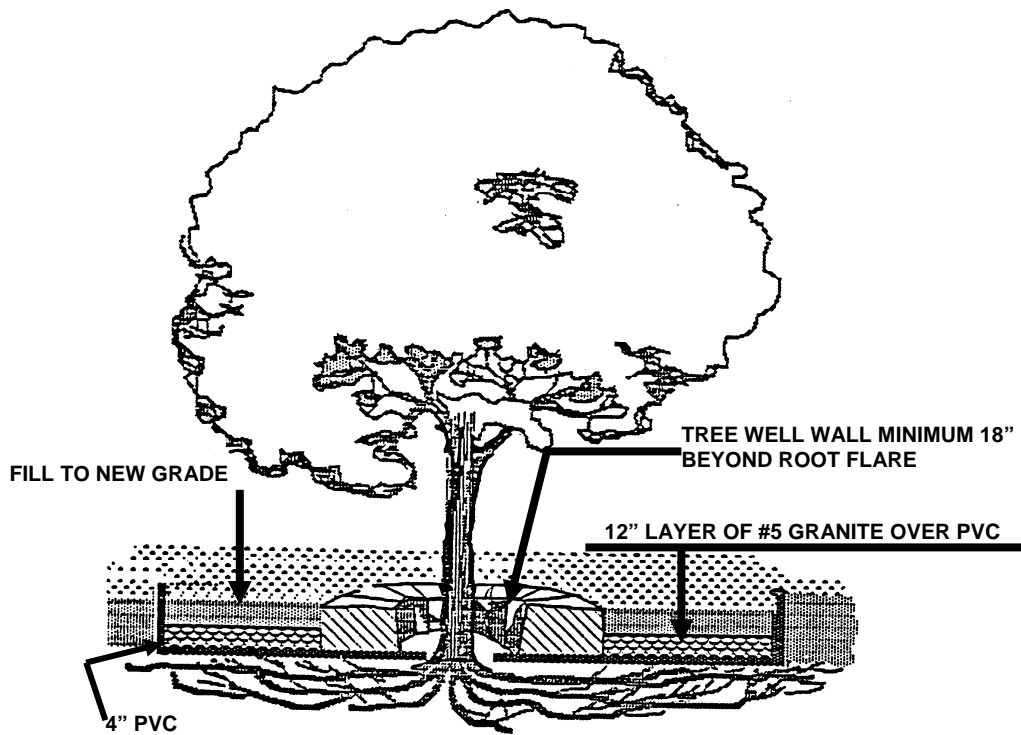
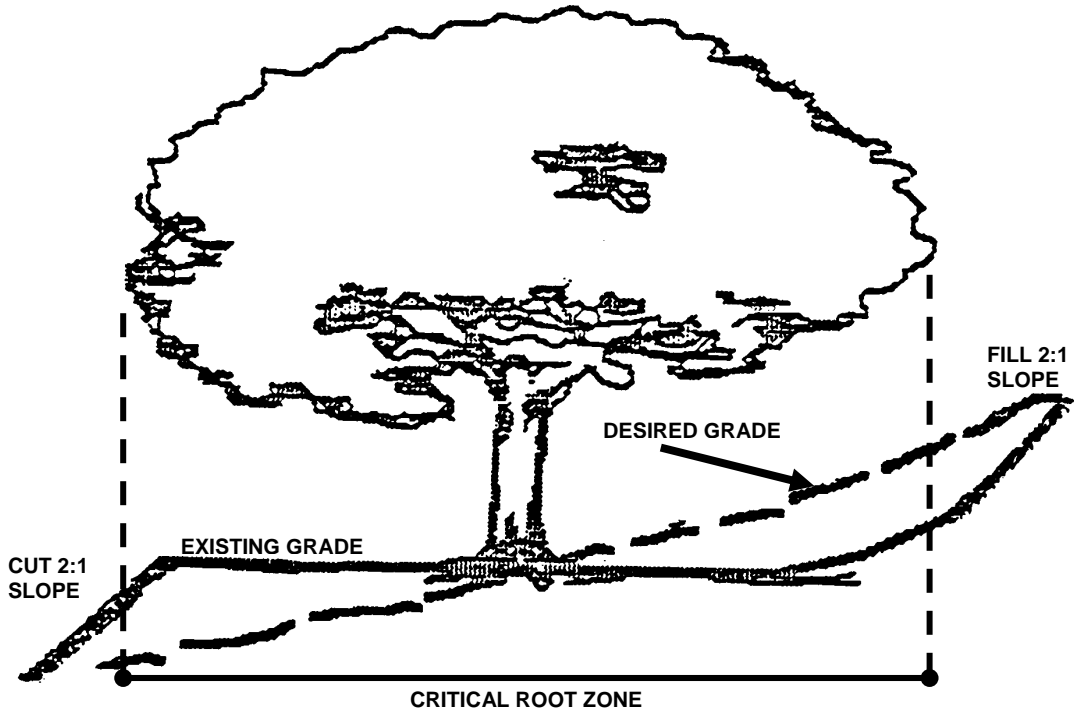
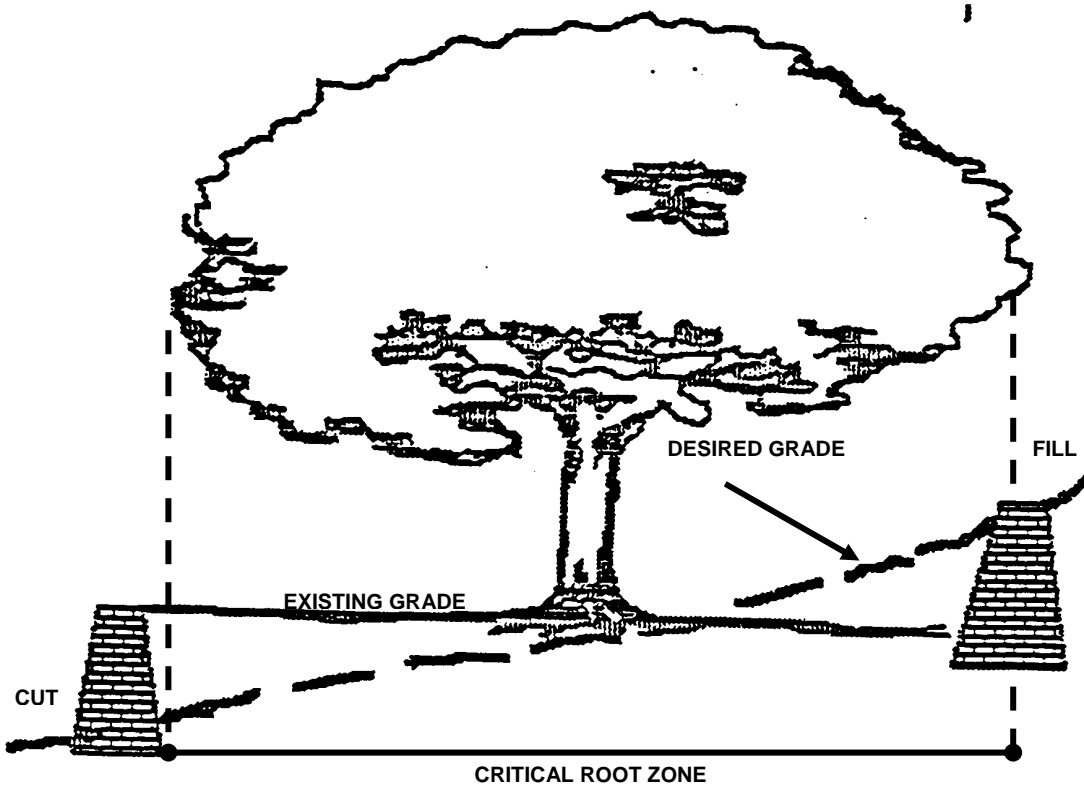


Figure 11. Terracing and Retention Walls for Grade Changes

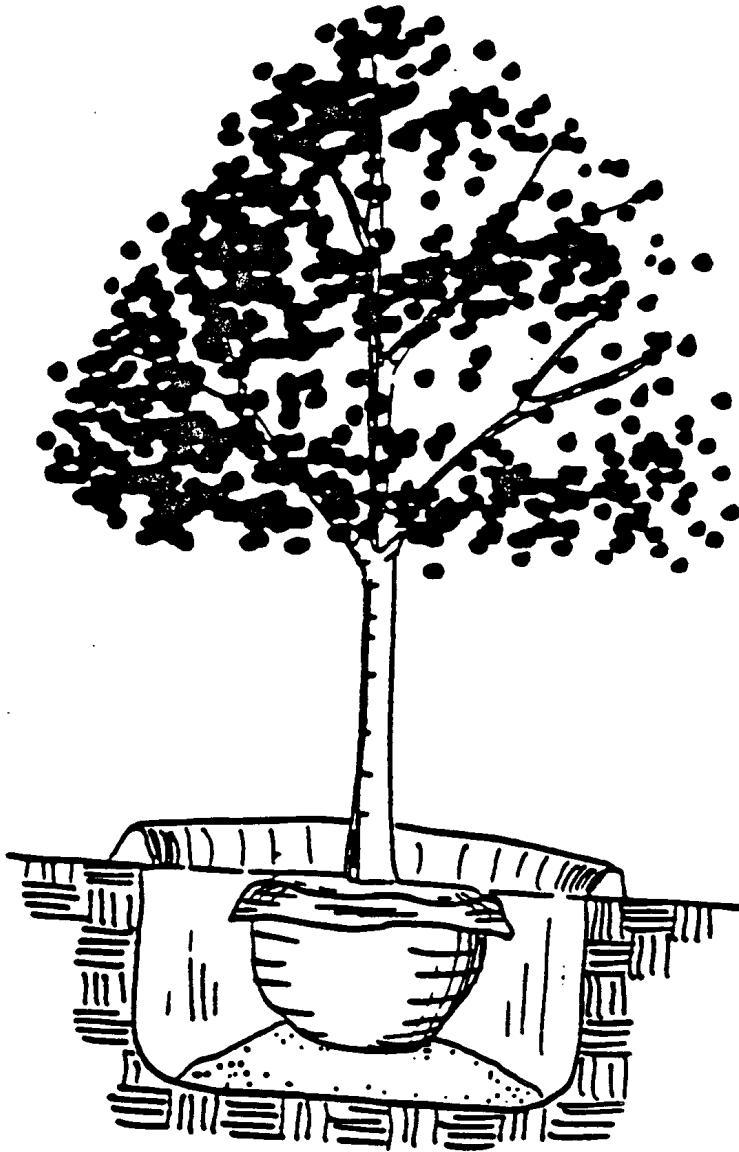


TERRACING FOR GRADE CHANGES



RETENTION WALLS FOR GRADE CHANGES

FIGURE 12. PLANTING DETAIL



- TREE WRAP
- BERM/DIKE TO FACILITATE WATERING
- MULCH 4" – 6" DEEP
- TREE SHALL BEAR SAME RELATION TO FINISHED GADE AS IT BORE TO PREVIOUS EXISTING GRADE
- FINISH GRADE
- REMOVE BURLAP AND TIES FROM AROUND TREE COLLAR
- USE NATIVE SOIL FOR BACKFILL – TAMP LIGHTLY
- SCARIFY BOTTOM AND SIDES OF HOLE
- HOLE TO BE TWO TIMES WIDER AND 6" DEEPER THAN ROOT BALL
- UNDISTURBED GRADE
- STAKE WHERE APPROPRIATE

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Figure 13. Protective Staking, Trunk Damage

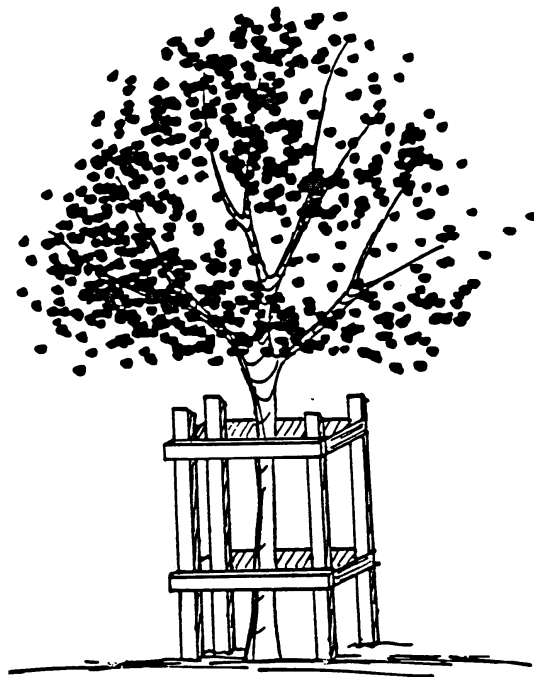


Figure 14. Staking for Trunk Support and Root Anchorage

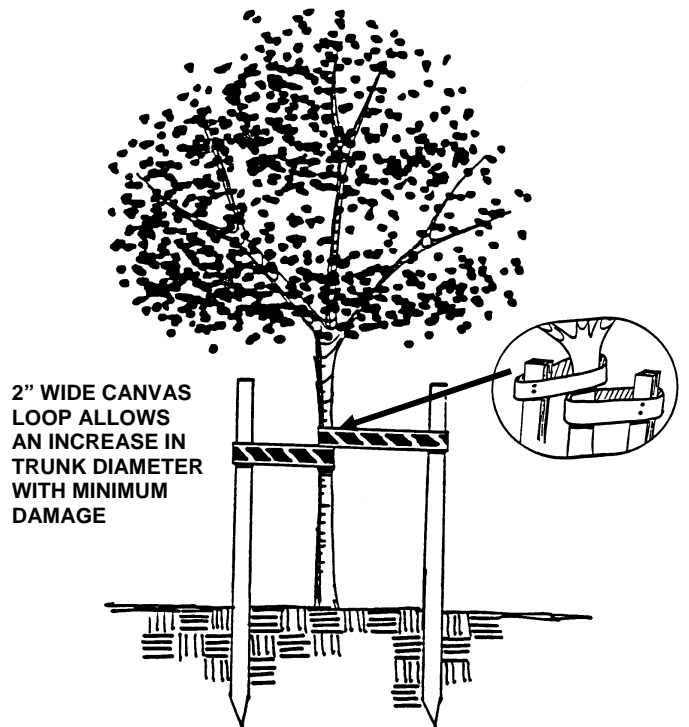


Figure 15. Support and Anchorage of Large Transplanted Trees

