A GUIDE TO ELM TREE REMOVAL IN URBAN AREAS

by

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MARITIMES FOREST RESEARCH CENTRE

FREDERICTON, NEW BRUNSWICK

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DEPARTMENT OF THE ENVIRONMENT

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ABSTRACT

A legacy of mature and overmature elm trees, and the current impact or threat of Dutch elm disease, is forcing authorities in cities and towns in the Maritimes to consider tree removal to reduce public hazard and losses from the disease. This report, based on experience in Fredericton, New Brunswick, outlines some problems and procedures in tree removal, and offers guidelines for estimating costs, an important component of budgetary planning.

Résumé

Vu la présence de nombreux ormes matures et surannés et les effets de la maladie hollandaise de l'orme, les autorités civiques dans les Maritimes doivent enlever des arbres afin de réduire le danger public et les pertes dues à la maladie. Les auteurs, se fondant sur ce qui s'est passe à Fredericton, au Nouveau-Brunswick, résument les problèmes à résoudre et les méthodes d'enlever les ormes. Ils montrent aussi la façon d'estimer les coûts d'enlèvement.

INTRODUCTION

Our native white (or American) elm, Ulmus americana L., was planted extensively in settled areas throughout Eastern Canada 100 to 175 years ago. Highly favored as an ornamental and shade tree because of its distinctive form and ease of transplanting, it now arches over the streets and lanes in many towns and cities. Even for trees, decadence and death are to be expected with advancing age, and the demise of many stately elms is being hastened by Dutch elm disease. This disease was inadvertently introduced into Canada before 1944, and was first found in New Brunswick in 1957. The cause of the disease, its spread, symptoms and history, as well as measures for reducing its impact are adequately described in other leaflets available from the Canadian Forestry Service. This pictorial booklet attempts to provide: (1) an appreciation of the considerable difficulties inherent in removing massive dead and decadent elm trees before they become a serious public hazard; and (2) approximate removal costs for trees in certain situations. This information should help municipalities anticipate their needs, and budget objectively for either direct tree removal or for negotiation of contracts.

Most Maritime municipalities have many mature and overmature elm trees, which because of old age or disease or both, may soon have to be removed. Dead and decadent trees are not only aesthetically unpleasant but are hazardous to life and property (average-sized dead elms, often weigh several tons). Unfortunately, fatalities associated with dead trees

have occurred in Fredericton, in Kansas City, and in Illinois when a dead elm was ignored in a schoolyard. "Near misses" and reports of property damage are all too common. As dead trees have to be cut eventually, they should be removed before risks to life and property increase greatly. Furthermore, as the wood dries, its breaking points become unpredictable, and climbing, cutting and felling become increasingly dangerous.

In 1961, Dutch elm disease was first detected in Fredericton, a city with about 7,500 elm trees. To date, only 377 trees have been removed because of the disease, a testimony to the excellent sanitation program strictly adhered to since 1952. In the same period, more than 700 elms have been felled because they were overmature, decadent, obstructed vision at intersections, or for road widening programs, etc. In 1973, following amalgamation with several outlying communities, the City acquired many dead and decadent trees, and during the winter of 1973-74, undertook the removal of almost 1,000 hazardous trees. We are indebted to City officials for sharing their cost figures and expertise for the preparation of this booklet.

In the following pictorial sequences, we have shown the step by step removal of a typical urban elm tree. It is not a "do it yourself" guide but simply outlines for the benefit of municipal administrators, the removal process, and problems faced by removal crews. Photos, with removal times and costs, are presented for several trees and a variety of circumstances. These are intended only as guides to removal costs, because each tree is different as to site, location of wires, buildings, and other

obstructions. Nonetheless, the estimates should be useful to obtain average costs for several trees, and thereby facilitate budgeting and planning.

Should a municipality, lacking trained personnel and realizing there is no cheap way to remove street trees, hire an independent tree contractor or form its own tree maintenance crew from existing public works employees? If only a few trees are involved and a bid seems reasonable, a contract may be the best short-term alternative. A contractor's bid will no doubt exceed the actual costs presented in this booklet that are based on the cutting of individual trees by experienced, efficient city crews and does not include travel costs. There are few tree service contractors, so bids may lack competitiveness, and some contractors may even try to take advantage of municipalities, inasmuch as the latter often know little of the removal process or costs. Most, however, are honest, sincere businessmen, faced with legitimate operating expenses (equipment, insurance, travel expenses, and men to be paid despite poor weather, sickness, holidays, etc.) and, justifiably, they expect a reasonable profit.

On the other hand, if numerous trees are to be maintained or removed, a community should consider forming its own tree-removal crew. It is not as difficult as it may appear, and at first, a fully trained crew is not essential. One man with climbing experience, or one who could be sent to work with an existing tree crew for basic training, is often sufficient. In turn, he can train others until an efficient crew is formed. In the long run, there are many benefits to a city or town having a trained crew: (1) availability on short notice in case of

emergencies; (2) better control of results; (3) controlled costs that should be lower than contract prices; (4) systematic sanitation of all trees, thereby lowering tree losses and public hazard, instead of simply removing dead trees; and (5) easy communication and continuity with and among programs involving tree removal, maintenance, and planting.

The fixed costs or charges experienced by the City of Fredericton in the 1973-74 tree removal program (including employer contributions to medical insurance, pension plans, and unemployment insurance) were:

tree climbers	$ 6.00/hr
ground men	$ 3.50/hr
front end loader	$10.00/hr
trucks (3 ton)	$ 6.50/hr
foreman	$ 4.50/hr
chain saw	$ 5.00/day

General crew compositions and equipment lists are presented in the appendices.

PROCEDURES IN TREE REMOVAL

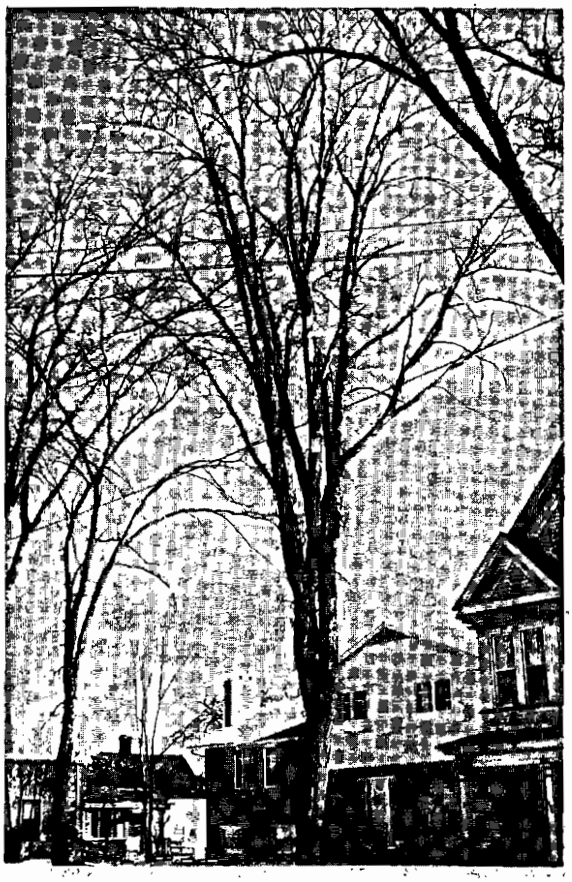


Figure 1.

Evaluate situation and tree to be removed, noting height and width of tree, direction of lean, location of wires, houses, hedges, flower beds, etc., and determining the safest direction to fall the tree. For this 24.5" DBH, 60 ft tree, the crown will be lowered to clear the hydro and service wires, leaving a butt short enough to safely fall onto the frozen lawn in front of the new house.

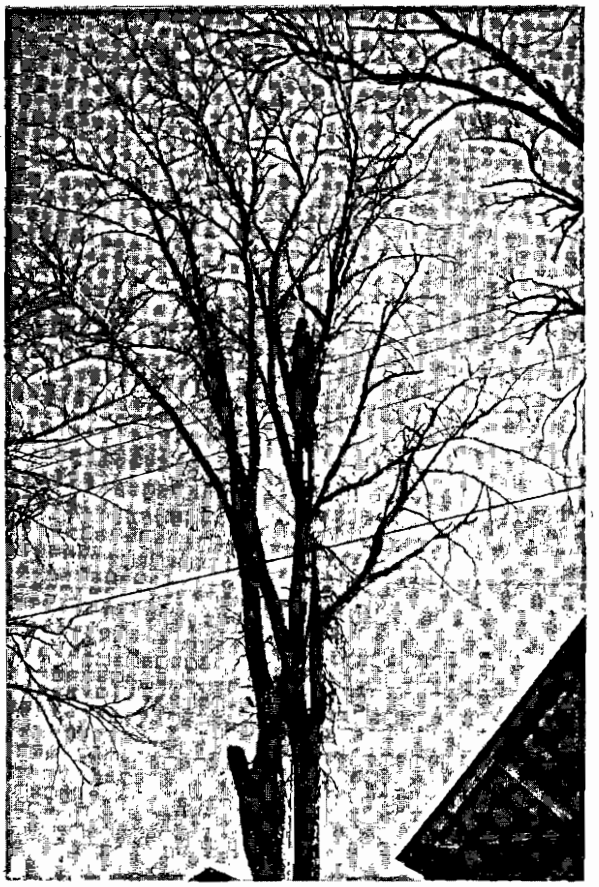


Figure 2.

Climber closely examines the crown to select a sound anchor for his sling and the highest, soundest, best centered, crotch for lowering limbs.

Figure 3.

Each limb is individually tied, cut and lowered.

Figure 4.

Ground crew keeps work area clear for greater safety and so ropes don't become entangled. Some branches may be laid in a bed in which to fall the butt, thus reducing damage to soft lawns during summer removals.

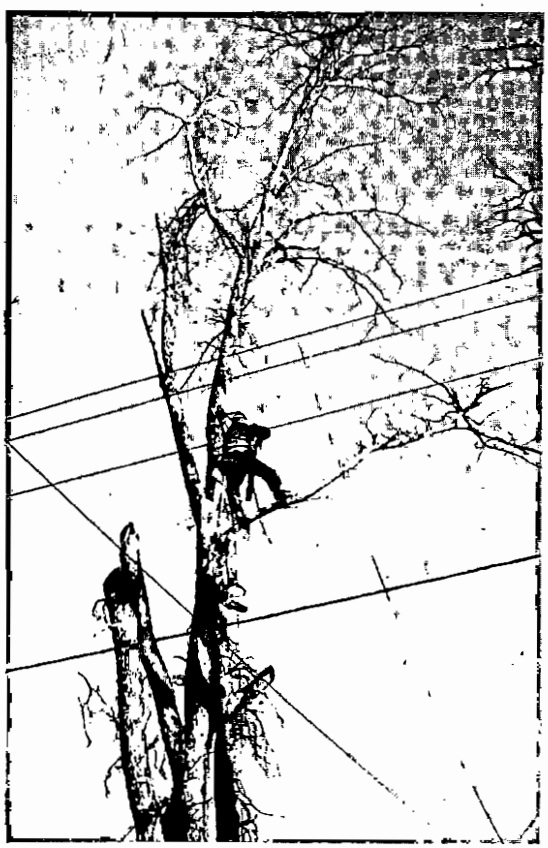


Figure 5.

With most of the crown removed, note climber and saw are tied in the tree beneath the crotch used for lowering branches. Climber is preparing to rig the branch to his right before cutting it.

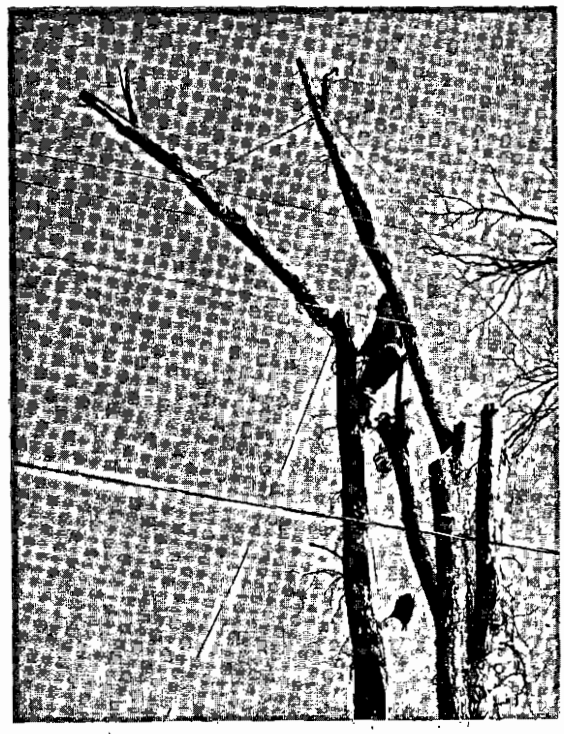


Figure 6.

Large branch after cutting: a lowering rope tied near top passes through crotch and is held by ground men; the butt hitch tied above and below the cut prevents a "kick back" striking the climber. After branch is cut, climber loosens lower knot, slips the rope over the stub, allowing it to be used as a pull line to guide the branch down.

Figure 7.

A branch section is lowered.

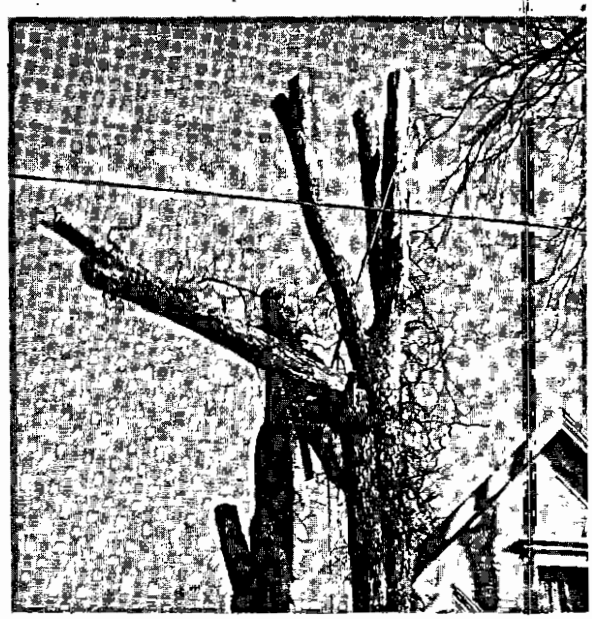


Figure 8.

Large, lower sections may often be free felled; in many cases suitable rope supports may not be available. Note climber is supported by a rope and sling.

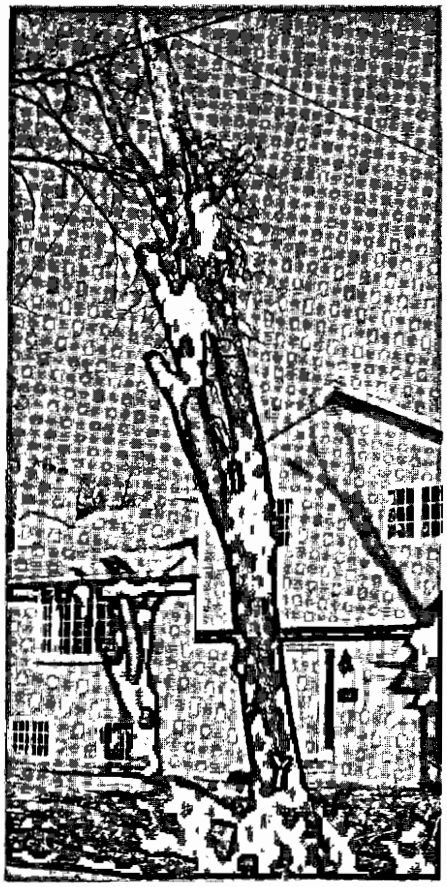


Figure 9.

Felling the butt. Tension applied, by man or machine, to rope attached to the top of the stub ensures that the fall direction is the desired one and it allows more wood (the hinge) to be left when making the backcut, reducing the risk of the tree twisting as it falls.

Figure 10.

Merchantable wood cut to length and loaded, providing movement to the mill site will not increase the risk of spreading the disease.

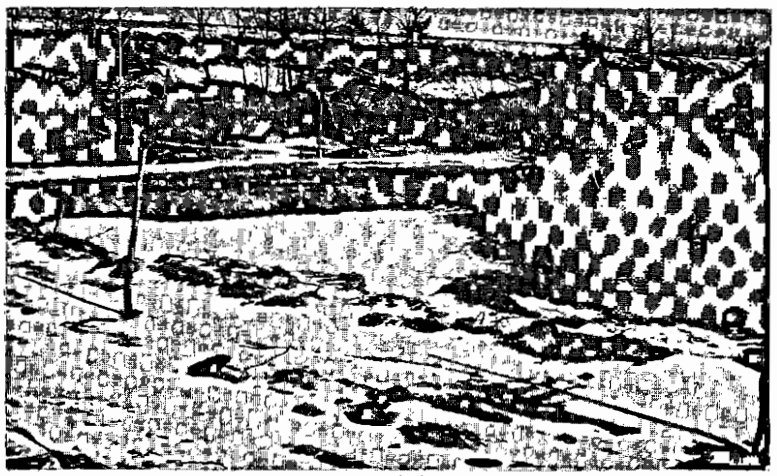


Figure 11.

Unmerchantable material is hauled to a disposal pit to be buried under six inches of soil.

Removal costs for tree shown in Figures 1-11 were:

Men and Equipment	Total Time	Costs
1 tree climber	4 hr	$24.00
1 foreman	6	24.00
1 ground man	6	21.00
1 loader	1	10.00
1 truck	1	6.50
1 chain saw	4	2.50
	TOTAL COST...	$ 88.00

Figure 12. Unmerchantable material may be burned on site if conditions permit.

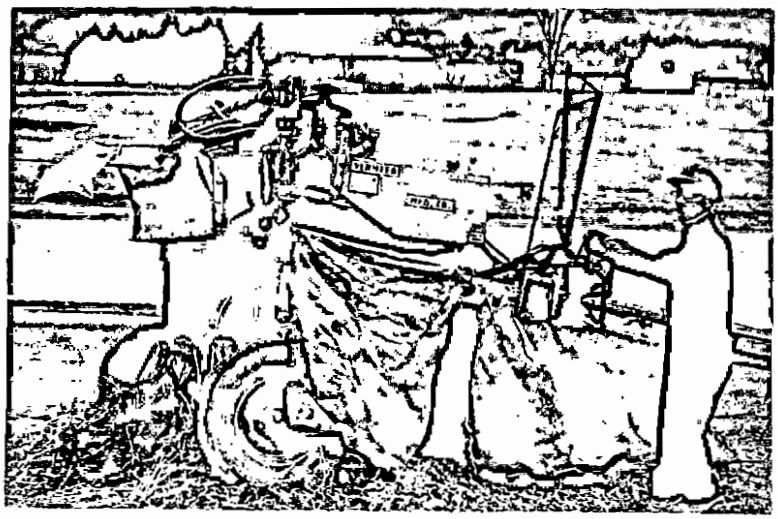


Figure 13. Stump cutter. Average removal cost per stump is $10.00 for machine charge and two operators.

Figure 14. After stump is cut, soil can be added and seeded.

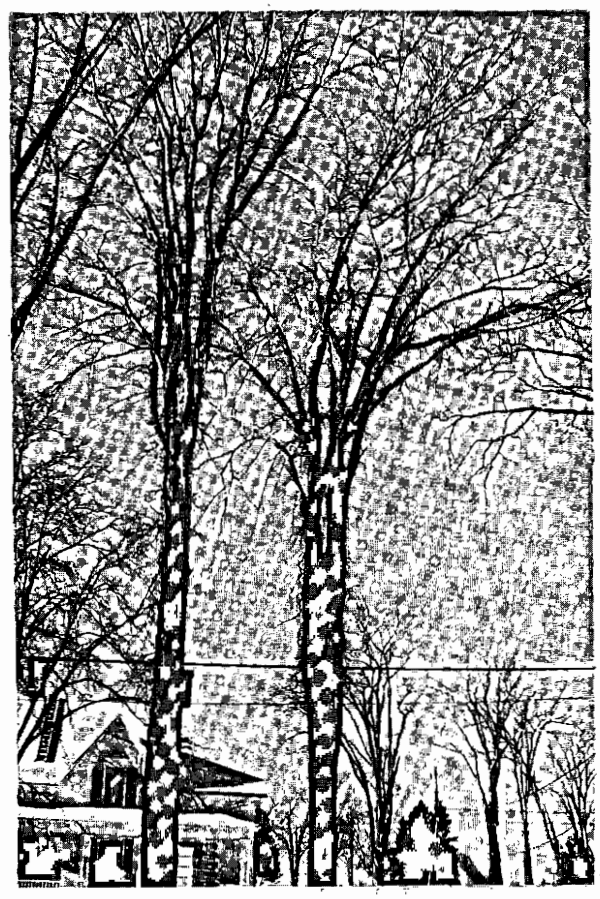
Figure 15. Clean up after stump and tree are removed.

Figure 16. In areas inaccessible for cutting, stumps may have to be left, but they should be debarked to reduce beetle breeding sites. Average cost per stump is $1.00.

Figure 17. A tree planting program, started immediately will ensure orderly and suitable replacement of trees and help maintain the aesthetics of the area.

REMOVAL COSTS FOR REPRESENTATIVE TREES

1 2

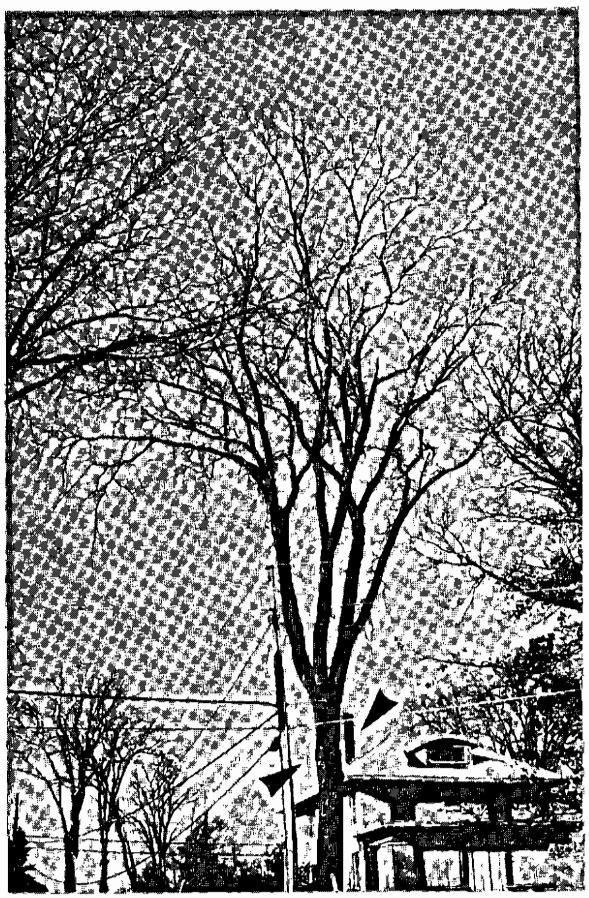


2 3

DBH: 28.7", 30.8", 27.0". Three, 70 ft hedgerow trees 30 ft from house, were removed in one operation. Upper branches were lowered by climbers and rope because of hydro wires, then trees were felled onto the frozen lawn. Flagmen were required on the street at times during the removal.

Men & Equipment	Total Time	Cost
3 tree climbers	12 hr	$ 72.00
6 ground men	72	252.00
1 foreman	12	48.00
1 loader	8	80.00
2 trucks	24	156.00
3 chain saws	4.5 days	22.50
	TOTAL COST.....	$630.50

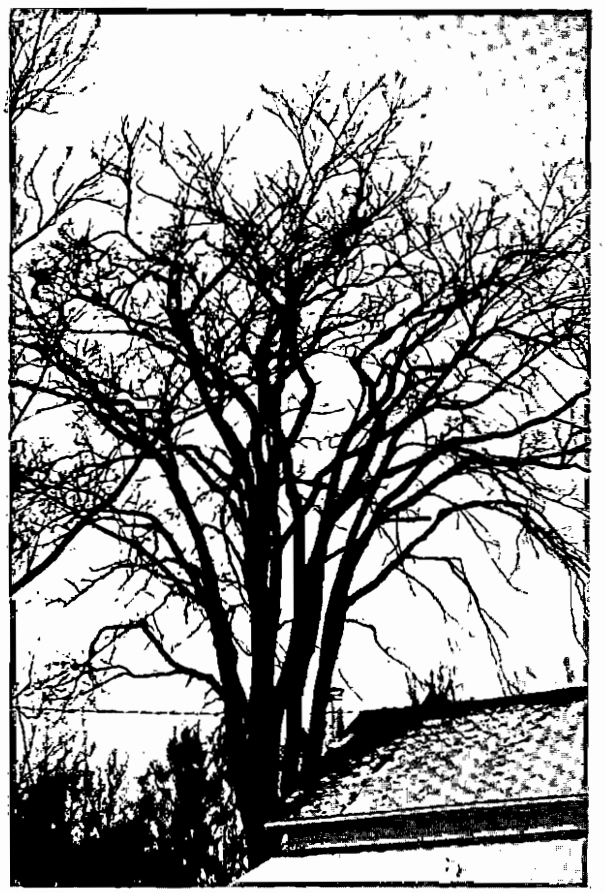
Approximate cost per tree. $210.00



4

DBH 32.0" The nearby wires, house, and oak tree (right side of photo) made removal of this tree more difficult. A Power Commission crew rerouted a service wire that passed through the crown. A climber then removed the crown to prevent injury to the adjacent oak, and to clear the wires when the butt was felled towards the street.

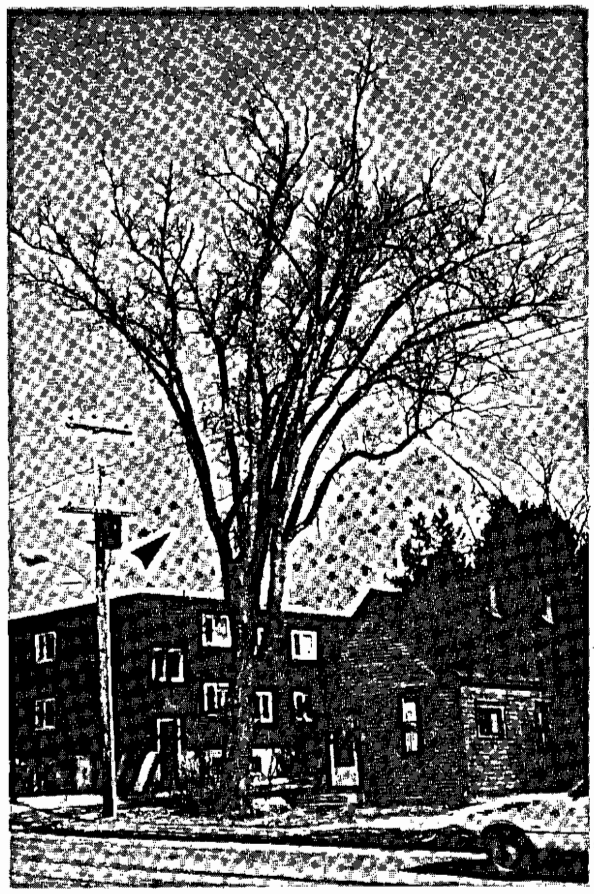
Men & Equipment	Total Time	Cost
1 climber	3 hr	$ 18.00
6 ground men	18	63.00
1 foreman	3	12.00
1 loader	3	30.00
2 trucks	6	39.00
1 chain saw	8	5.00
	TOTAL COST.....	$ 167.00



5

DBH 39.3" Very wide, decadent crown was dried out and too dangerous for climbing, (a serious problem if dead trees are left too long), so ropes to the crown were held tight by the loader. Because of the nearness of buildings on both sides, great care was necessary in making the final cuts to ensure control and direction of fall. Several spikes and iron pieces had to be chopped out and slowed the cutting. Clean-up was slowed by high alder ground cover.

Men & Equipment	Total Time	Cost
1 climber	2 hr	$ 12.00
3 ground men	15	52.50
1 loader	5	50.00
1 truck	5	32.50
1 chain saw	4	2.50
	TOTAL COST.....	$ 149.50



6

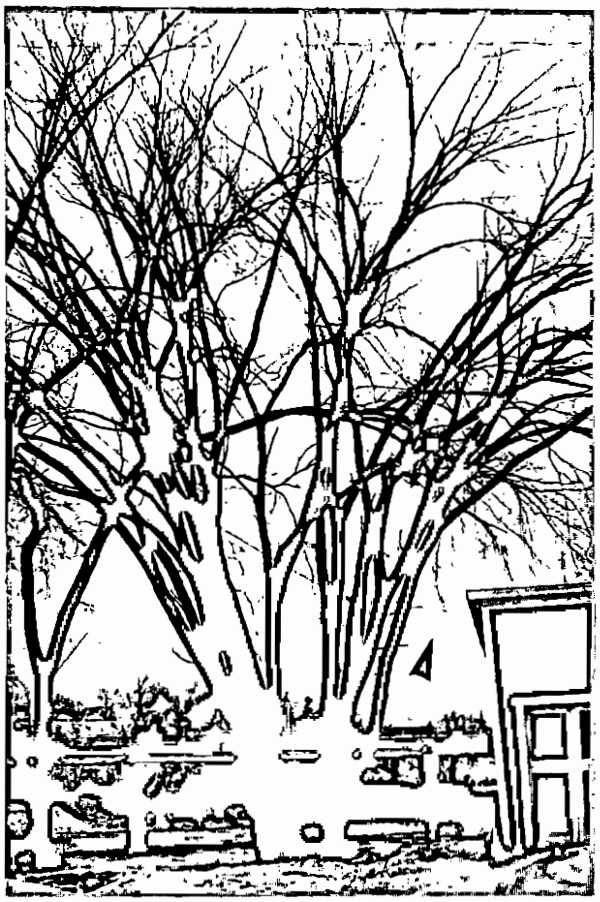
DBH 31.5" Three quarters of the crown hung over the house, and wires were present on two sides. Climber had to cut, swing, and lower all branches in front of the house, the only unobstructed area. The butt was carefully felled between the house and sidewalk.

Men & Equipment	Total Time	Cost
1 climber	8 hr	$ 48.00
2 ground men	16	56.00
1 loader	2	20.00
1 truck	2	13.00
2 chain saws	16	10.00
	TOTAL COST.....	$147.00

7

DBH 29.5" Tree 1 ft from house, over-hanging it and wires. Entire crown was removed by a trainee-climber, requiring 50% more time than a fully experienced climber.

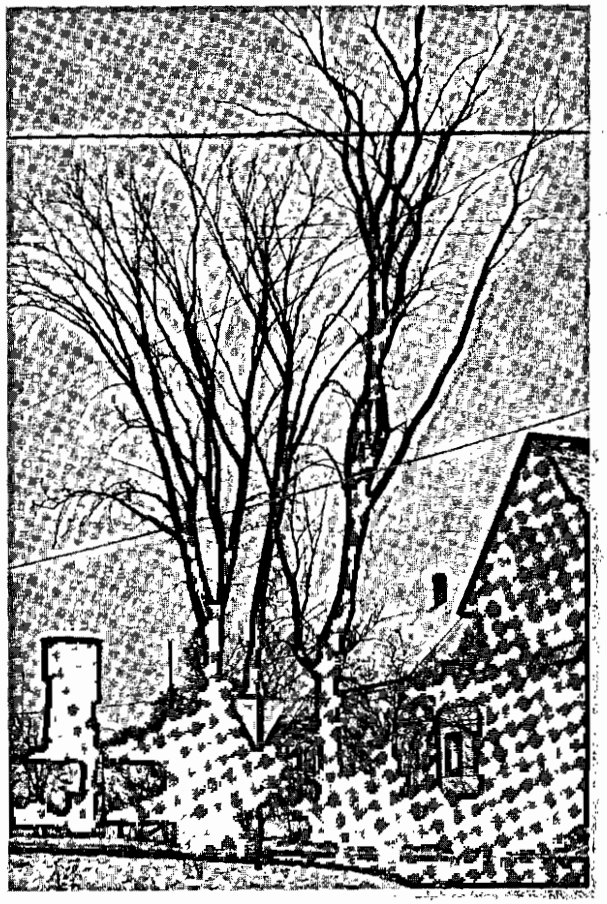
Men & Equipment	Total Time	Cost
1 climber (trainee)	8 hr	$48.00
1 foreman	8	32.00
1 ground man	8	28.00
1 loader	1	10.00
1 truck	1	6.50
2 chain saws	16	10.00
	TOTAL COST.....	$134.50



8

DBH's 39.2", 20.0" Tree was joined at butt below line of sight. One section (right side) was felled over river bank (because of garage location), then towed up bank with cable. Larger section leaned towards wires so climber trimmed crown before felling. All brush was burned on river bank.

Men & Equipment	Total Time	Cost
1 tree climber	2 hr	$ 12.00
3 ground men	15	52.50
1 loader	2	20.00
2 trucks	4	26.00
2 chain saws	8	5.00
	TOTAL COST.....	$115.50

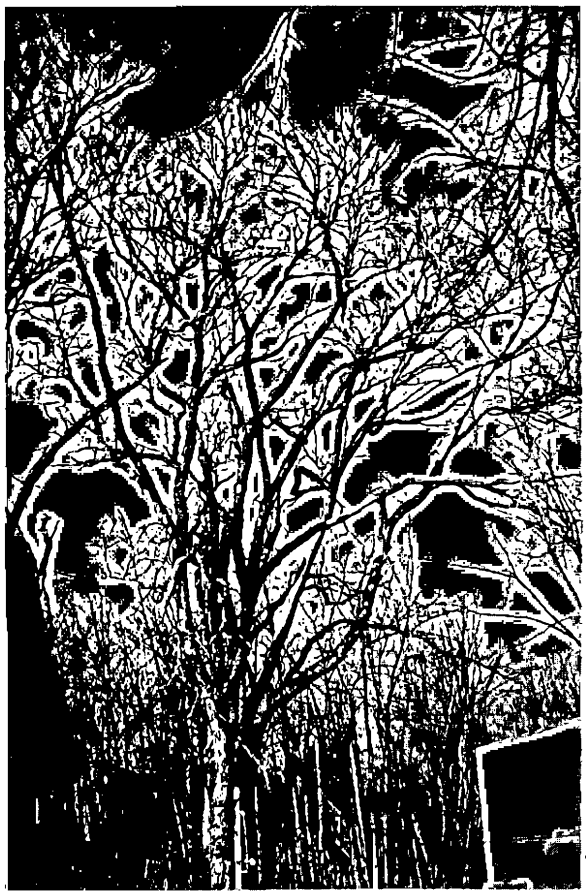


9 10

DBH 32.6" Climber removed crown of tree #9 because of houses and wires, then butt was felled on street.

Men & Equipment	Total Time	Cost
1 climber	4 hr	$ 24.00
3 ground men	15	52.50
1 loader	2	20.00
1 truck	2	13.00
1 chain saw	4	2.50
	TOTAL COST.....	$ 112.00

#10, DBH 27.0" Removal was delayed until the clothesline was relocated. The climber then removed 75% of the crown and the butt was felled on the street. Labor and equipment requirements were similar to tree #9; total cost was $110.50.

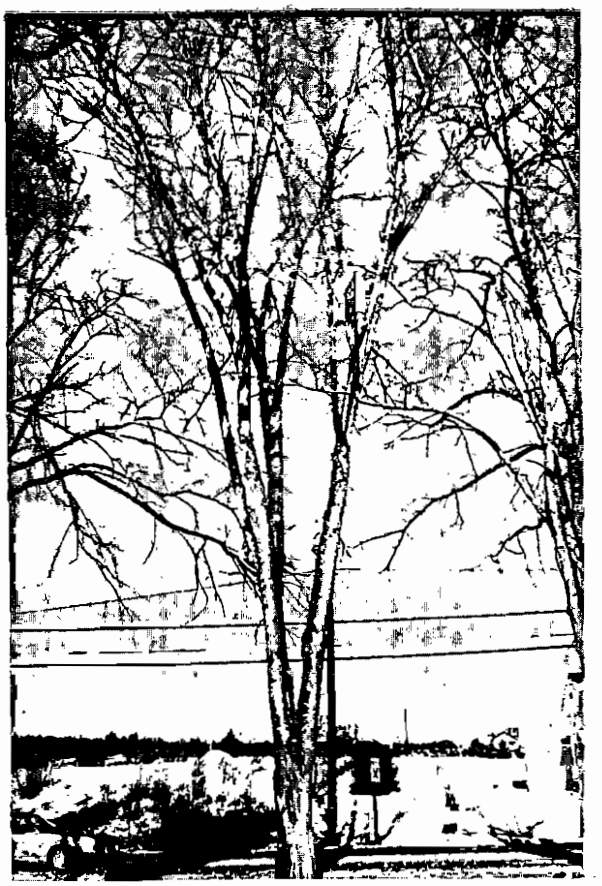


11

DBH's 35.5" and 17.4" joined near base. This tree was very decadent, dangerous to work in, and leaned over the house. Climber attached cable to upper limbs, passing the other end through a cable block chained to a stump in the gully behind the tree, then attaching it to the loader. The tree was cut, but the loader couldn't pull it down; further cutting was unwise in case the tree fell on the house. The climber then attached a rope high in the crown, and by using a mechanical come-along chained to another tree, the tree was pulled back into the gully. Bole wood was salvaged, unmerchantable material was burned.

Men & Equipment	Total Time	Cost
1 climber	2 hr	$ 12.00
3 ground men	15	52.50
1 loader	2	20.00
1 truck	2	13.00
2 chain saws	4	2.50
	TOTAL COST.....	$ 100.00

12



13

DBH 32.4" Tall tree (#12) with very bushy crown. Climber lowered crown (to line) to clear house and wires, then tree was felled towards the road.

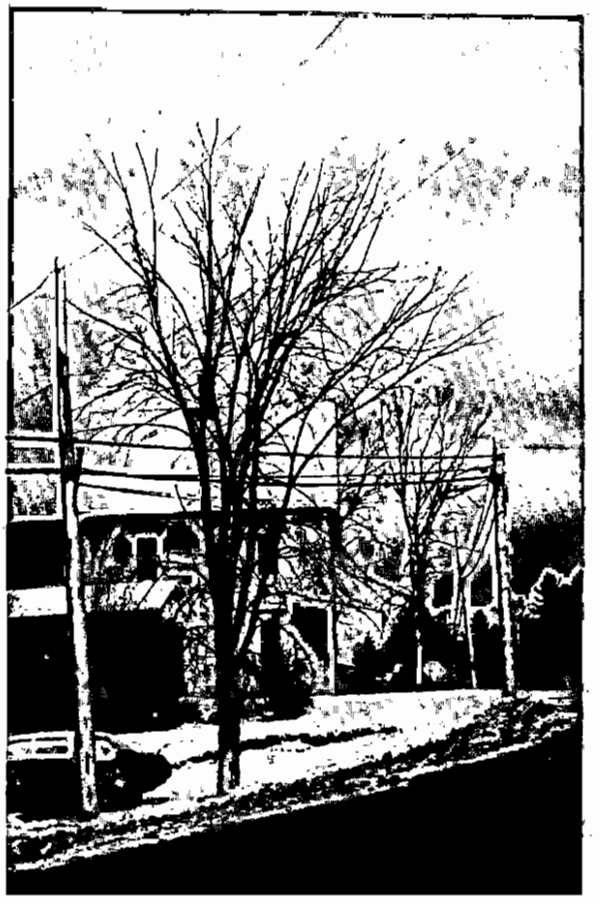
Men & Equipment	Total Time	Cost
1 tree climber	1.5 hr	$ 9.00
4 ground men	8	28.00
1 loader	2	20.00
2 trucks	4	26.00
1 chain saw	2	1.25
	TOTAL COST.....	$ 84.25

#13, DBH 28.2" Crown, less bushy than #12 but close to wires, was trimmed, then butt was felled into the yard. Times and cost same as above.

14

DBH 22.2" Tree was 2 ft from house and close to hydro wires and spruce hedge. Climber removed entire crown so butt could be felled towards the street.

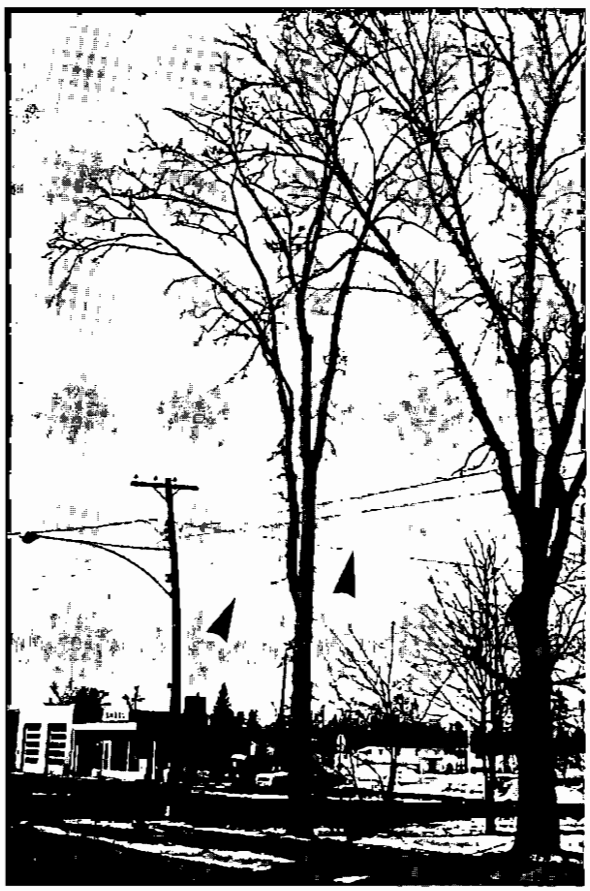
Men & Equipment	Total Time	Cost
1 climber	4.5 hr	$27.00
2 ground men	9	31.50
1 loader	1	10.00
1 truck	2	13.00
1 chain saw	4	2.50
	TOTAL COST.....	$84.00



15

DBH 15.5" Small tree was felled onto road. Note that wires are behind and clear of the tree. Flagmen were required because of curve and blind hill.

Men and Equipment	Total Time	Cost
2 flagmen	2/3 hr	$ 2.33
2 ground men	2/3	2.33
1 loader	1/3	3.33
2 trucks	2/3	4.34
	TOTAL COST.....	$12.33



16

DBH 18.5" Tree was surrounded by wires. Climber could have removed crown in about 3 hours, costing about $55.00 with the extra men and equipment time. Instead, a Power Commission crew lowered the service entrance wire for 15 minutes and a TV cable wire was removed temporarily. The tree was then felled towards the service station, with the front end loader pushing it in the desired direction.

Men and Equipment	Total Time	Cost
1 climber	1/3 hr	$ 2.00
3 ground men	1	3.50
1 loader	1/3	3.33
1 truck	1/3	2.17
	TOTAL COST.....	$11.00

Because of the large number of dead, decadent or diseased trees in this gully, the area was clear cut of elm. Trees ranged from 6" to 24" DBH, but averaged about 10" DBH. Work, done periodically on wet, windy days when more difficult removals were hampered, involved a 7 man crew for 6 days. In total, 181 trees, including slash, were cut, piled, and burned (the wet terrain with restricted access made wood recovery uneconomical). All stumps were debarked. Average cost per tree, for men and equipment, including diesel fuel and scrap tires for burning, was $9.00 to $10.00.

Appendix I. Typical Crew Composition for Tree Removals.

The best composition of crews for elm tree removal in Fredericton was: 1 foreman, 2 tree climbers, 3 ground men, 1 truck driver, and 1 loader operator. A crew such as this is efficient on large jobs or may be split for smaller jobs and pruning. Large cities with many trees may have a supervisor to organize and direct all crews. The supervisor may have other related duties such as tree planting and park maintenance. The individual requirements and characteristics of each position are as follows:

Foreman: experience in dealing with workers and the public, with at least 1 year of service on a tree crew, not necessarily including climbing experience. He should be ambitious and take pride in a job well done.

Tree Climber: requires strength and stamina, well experienced in using a chain saw, with at least 1 year of trainee experience with a removal crew. He must be cautious and able to plan each move. He should be replaced if property damage occurs regularly because of his actions.

Ground Men: experience with chain saws, willing to learn and to work as a team with the climber; each man must know at all times what the climber is doing. He should be safety conscious to avoid mishaps.

Truck and Loader Operators: must be safety conscious as they will often be working on busy streets and highways. They must know crew procedures, as they assist ground men when not driving, and must work with the crew in guiding-down trees and large butts with the loader, and in loading the truck. The truck driver must check and carefully secure each load to insure safe transport to its destination.

Supervisor: must be able to organize work schedules to minimize property disturbance and plan for the most efficient use of men and machinery

regardless of weather conditions (large hazardous trees can only safely be removed on warm, calm days, but less hazardous work should be scheduled for windy, rainy days). He must display tact, tolerance, and patience in dealing with tree owners and the public to explain programs and obtain permission to enter private property (see Appendix III). He maintains contacts with and seeks the cooperation of other City Departments, Telephone and Power companies, and Federal and Provincial Government departments. He must maintain adequate records to report to the city engineer or councillors; and be responsible for the efficient operation of his crew, ensuring that they have adequate equipment and supplies, and ensuring that private property is left in good condition. One unhappy, letter-writing citizen can create much bad publicity that may complicate future negotiations between City Hall and the public.

Appendix II. Typical Equipment Requirements for a Removal Crew.

All crew members should wear hardhats and those operating chain saws should have safety pants and power saw gloves. Only the tree climber requires additional personal equipment such as climbing spurs, safety belt, climbing rope (150 ft of 1/2-inch manila rope), and a short power saw safety rope. Cost of these items if $150 to $200.

General equipment requirements include:

three chain saws with gas and oil cans,

six (1/2-inch) manila ropes, 150 ft long, used for lowering limbs and climbing,

one 1-inch manila rope, 150 ft long, used for lowering large limbs,

one 5/8-inch chain with hook and grab, 15 ft long, used for loading,

one ½-inch steel cable with hooks, 80 ft long, used to direct tree when it is felled -- ropes are too easily weakened or cut when trees fall on them.

Major machinery requirements include:

one 3-ton truck with hoist,

one front-end loader (no smaller than Michigan 55 or Case W9),

one 1-ton truck to transport men and equipment.

Many of these items are often already available in city or municipal departments and unusually large expenditures are not necessary.

Appendix III. Legal Release Form Used in Fredericton for Trees to be Removed on Private Property.

KNOW ALL MEN BY THESE PRESENTS that I,

in consideration of the promise or undertaking of The City of Fredericton to remove the trees hereinafter referred to, do hereby remise, release and forever discharge The City of Fredericton and its successors, assigns, contractors, employees and agents of and from all manner of actions, causes of action, debts, claims and demands whatsoever existing at the present time or which may hereafter arise against the said The City of Fredericton and its aforesaids, or any of them, by reason of entry upon the lot and property at

in the City of Fredericton and the cutting and removal therefrom of a certain decadent elm tree standing thereon by reasons of trespass, conversion or otherwise.

IN WITNESS WHEREOF I have hereunto set my hand and seal this day of , 197 .

SIGNED, SEALED AND DELIVERED)
in the presence of)
)
.....) .....
)
)