URBAN TREE SURVIVAL: TREES IN THE SIDEWALK[1]

by Ruth S. Foster and Joan Blaine

Boston is an old city. It has parts that go back 300 years. Certain sections of the city have been residential and had trees for centuries. It is possible to survey longevity because the age of the streets is older than the trees. Areas have been replanted a second and third time.

This study deals only with sidewalk trees. Their survival rates and average age differ from trees in parks, parkways, and back and front yards.

Procedure

Every tree is two sections of the city was surveyed. A third section was partially studied for socio-economic comparisons.

Beacon Hill was first settled in 1630. It has always been the best residential part of Boston.

Back Bay was made from filling the back bay behind Beacon Hill in the 19th century. It is mostly expensive apartments in converted brownstone townhouses. There are some stores and office buildings. Both areas have concerned and outspoken citizens.

South End, a poorer section was partially surveyed for comparisons of the differences ethnic and sociological populations make in survival rates. It has stores, public housing projects, skid row, but is mostly apartments in converted brownstone townhouses like Back Bay. It is mixed ethnically and a high crime area. It has concerned and outspoken citizens and has been beneficiary of urban renewal funds.

Every tree in the first 2 areas was surveyed, catalogued, and noted for age, condition, auto damage, vandalism (including broken branches from both people, and trucks). Also damage from tree stakes was noted.

The major tree varieties are as expected, maple, linden, the remaining elms, and lately, plane and honeylocust. A tree survey made 10 years earlier was used for some comparisons.

Conditions of trees

Beacon Hill. In 1976, 64% were in good condition. In 1966, 65% of the 215 trees were in good condition. However, of the original 215, only 83 are still there (39%). In 1976, 556 were on the sidewalks, 407 of them less than 10 years old. Of these 48 (8%) were dead or dying.

Back Bay. In 1976, 66% of the trees were in good condition. In 1966, 91% looked healthy.

South End. In this poorer district, the percentages were actually better. In both 1976, and 1966, 77% of the trees were in good condition.

Age of tree populations

In 1966, the average age was between 15 and 23 years. Sixty-two percent of the trees were large (half elms), 28% medium sized, and 10% small. In 1976, the average ages and size percentages were:

	Age	Large	Medium	Small
Beacon Hill	8 years	7%	20%	73%
Back Bay	13 years	22%	11%	67%
South End	8 years	10%	15%	74%

The lower age is the result of community pressure to replace trees that had died over a long period. Actually all areas had many more total trees in 1976 than in 1966.

Sidewalk tree survival

Chart 1, the survival rates of trees on Beacon Hill points out the problem. Only 38% survived from 1966 to 1976. More instructive than totals is the record of individual streets. For example:

Beacon Street (Back Bay) was planted in 1910 with about 350 lindens. The neighbors, led by prominent dowager, Mrs. Frederick T. Lord, raised the money and hired a landscape architect, to do the planting. Even then the city of Boston did not plant adequate trees. The architect wrote to Mrs. Lord a quarter of a century

[1] Presented at the ISA Conference in Philadelphia, Pennsylvania in August 1977.

later in 1937, "How thriving the trees are. You remember we were afraid the horses were gnaw off the bark."

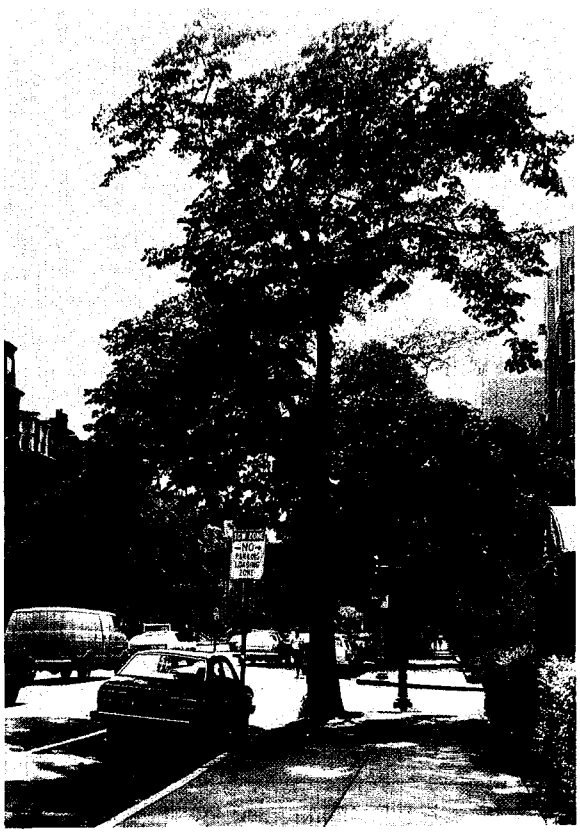
However, only 81 of her thriving 350 trees remain, a survival rate of 23%. Of those 35 were in poor condition. In other words, very few healthy lindens have survived to the ripe old age of 65 years.

A hazard now is not horses but cars. Forty-eight percent of the trees have auto wounds. Originally the sidewalks were brick set in sand. Now they are new, impervious concrete.

Chart I

BEACON HILL TREES (38% survived from 1966 to 1976).

	Total	*Large*	*Med.*	*Small*
Existing 1966	215	85	98	32
Existing 1976	83	39	44	
New since 1966	473		66	407
Total trees on streets 1976	556			



Beacon Street with 65-year old, healthy linden.

Boylston Street (Back Bay) an area of stores and offices, has young trees and a worse survival rate. It was planted between 1972 and 1974 with 136 planes, honeylocust and maples. In 1976, only 38% of the trees were healthy. Thirty-six percent were in fair condition. A shocking 26% were already dead.

Irving Street (Beacon Hill) is a steep, narrow street with 5' wide brick sidewalks. A planting of columnar maples was done in fall 1974. By 1976, 38% were dead or in poor condition. *On Phillips Street* (Beacon Hill) the figure was 33% dead and dying after only 1 year. On *Mount Vernon Street* (Beacon Hill), one of the most affluent streets of private townhouses, the rate was 23% dead and dying after 2 years.

What do these individual survival rates tell us? Mainly that the average age of close to 10 years for sidewalk trees is the rule, not the exception. Sidewalk trees do not live long.

Beacon Street with only 23% of the linden surviving.

Other statistics. The incidence of various kinds of injury was surveyed too, to see what statistical significance each had, and the weight to be attached to each in decision making. Vandalism was the least important in the areas as a whole, although in some corners it was high. (All trees are 2½" caliber to prevent casual breaking, and have wrapped trunks for added protection.) However, vandalism is not worth worrying about compared with other problems relating to survival. (See Chart 2.)

Chart 2

Auto damage		
Beacon Hill	42%	Streets are narrow and steep
Back Bay	61%	Worse on streets with stores
South End	33%	High crime area
Vandalism		
Beacon Hill	12%	Trees with flowers around the base rarely vandalized
Back Bay	33%	*Some is truck damage of high* branches
South End	7%	Although this is the high crime area, vandalism is less, except around playgrounds
Stakes damaging trees		
Beacon Hill	84%	Obviously staking is not healthful for sidewalk trees
Back Bay	50%	
South End	66%	

Effects of Staking Trees			
Stated trees	33 trees	Stakes damaging trees	27 (81%) need attention
Unstaked	131 trees	Trees leaning	2 (1.5%) need attention

Conclusions

The average survival rate for sidewalk trees is about 10 years. Put another way, the sidewalk tree population needs to be renewed every 10 years. At any given time, about 1/3 of the trees are in poor condition. An adequate replacement program has to be part of a rational urban policy. The City of Washington, D.C. replaces 6000 of its 100,000 trees each year, or it's total canopy once in 18 years (street and park trees).

There are many reasons for the poor survival rate. They are not necessary or unavoidable. However, the bottom line is what actually exists. Given the total politico-engineering-ecosystems of the city, the survival rate is not surprising.

The worst offender is the city engineer. Continuing construction kills more trees statistically than any other cause. Both actual construction damage and altered, unsuitable growing environments left after construction, are the culprits.

Water stress is the second most important factor, particularly for new trees. If the trees do not suffer too much shock the first year, they will often survive quite a while. First-year shock manifests itself in tree losses for the next several years. Water-stress is a constant problem.

Autos are a significant factor. The wounds allow fungus entry, which kills the tree. Many trees are actually just snapped off. High curbs, setbacks, and protective bollards, help.

Statistically, the City Engineer is the most frequent cause of tree decline.

Tree stakes turned out to be the sleeper in the study. If not removed within a month or two, they cause more damage statistically than autos or vandalism.

Vandalism and air pollution are highly overrated as statistically significant factors, although they do contribute to poor tree vigor, poor wound healing and fungus susceptibility. Salt, however, is a major problem.

City trees in parks and yards live close to a normal expected life span, if not abused by construction, and if they have good soil and adequate water.

Different contractors have different survival rates. In a planting of several thousand trees in 1975-76, the best contractor lost about 3% the first year. Two others lost between 9-12%. A fourth managed to kill over 38% the first year,

through careless handling of plant material. Cities, often obliged by law to accept low bidders, are often stuck with poor workmanship. Many good firms will not work for cities if graft, slow payment or political favoritism is involved.

Sidewalk trees are expensive. To cut a hole in concrete, bring in loam, buy a tree big enough to withstand casual vandalism (2-2½" diameter), water it, plant it carefully, and add bollards and protective devices adds up. The real cost for a 3" tree, the fashionable size these days, is between $200 and $300.

There is a cost-benefit-ratio between whether to plant new trees more frequently, or take better care of those growing and newly planted. However, the bottom line remains . . . in one city, given actual urban realities, the average age of sidewalk trees is around 10 years.

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THE MORGAN ARBORETUM AND URBAN FORESTRY [1]

by Dr. Dan McArthur

The Morgan Arboretum and Woodlands occupies a 530-acre forested tract of land on the western extremity of Montreal Island and forms a northern extension of the McDonald College experimental farm. The principal function of this forested area is to serve as a research, teaching, and demonstration forest. It is owned by McGill University and administered by the Department of Renewable Resources of the McGill Faculty of Agriculture located on the McDonald Campus. By its location, nature and mission, this small forest is ideally suited to serve as an example of multiple-use forestry and also as an example of a special kind of urban forest.

Essentially the forest consists of some 350 acres of natural stands, 87 acres occupied by miniplantations of a variety of coniferous and broad-leaved species, a 23-acre ecological preserve, 40 acres occupied by the Arboretum tree specimens, and 30 acres occupied by a tree nursery, building sites, roads, and open areas.

Although human activity in the area probably goes back some 200 years, we will only note briefly more recent results. In the early 1930's there was, it seems, an exodus of small landowners from the area. Their farms and farmsteads, some 22 in all, were purchased by the Morgan Estate and amalgamated into one large holding.

In 1945 a 1000-acre portion of this holding was acquired from the Morgan Trust Company by the Royal Institution for the Advancement of Learning, otherwise known as McGill University. The transaction was initiated by the late Cleveland Morgan, an eminent amateur horticulturist and botanist who was motivated by a desire to secure the permanent preservation of the woods. It was assisted by the interest and generosity of the late J.W. McConnell and the

[1] Presented at the 27th International Shade Tree Conference-Canada, Quebec City, February 1976.