

# IMPLEMENTING A STREET TREE INVENTORY AND PLANNING SYSTEM

By Leonard E. Phillips, Jr., Park Superintendent, Wellesley, MA

The planting of street trees has become very scientific and highly specialized. Because so many things must be taken into consideration when planting trees along our streets, it is most important to select the right trees and place them properly for permanent growth and lasting beauty.

This article is intended to summarize two urban forestry studies. The first is the complete inventory and analysis of the existing street trees within a community. This is often followed by the computerization of tree data for ease with record maintenance and information retrieval.

The second study pertains to the development of a comprehensive Master Street Plan. This plan documents and summarizes the inventory and provides the analysis needed to permit the development of a comprehensive master plan.

Why should all of this planning be undertaken for the sake of a few trees? Community trees are like any other community asset, they have value and they must be maintained to protect that value.

Furthermore, trees provide valuable contributions to man and his environment. For example, 78 trees are needed to absorb carbon dioxide and produce the oxygen for one person; 20 trees are required to offset the pollution of a car driving 60 miles per day; trees provide a natural summer air conditioner; and trees provide food and shelter for wildlife. Trees can be used to screen sun, sound, wind and unsightly views; to provide privacy; and to add beauty to our environment with graceful shape, colorful foliage, fragrant flowers and unique fruit. Most communities are proud of their trees.

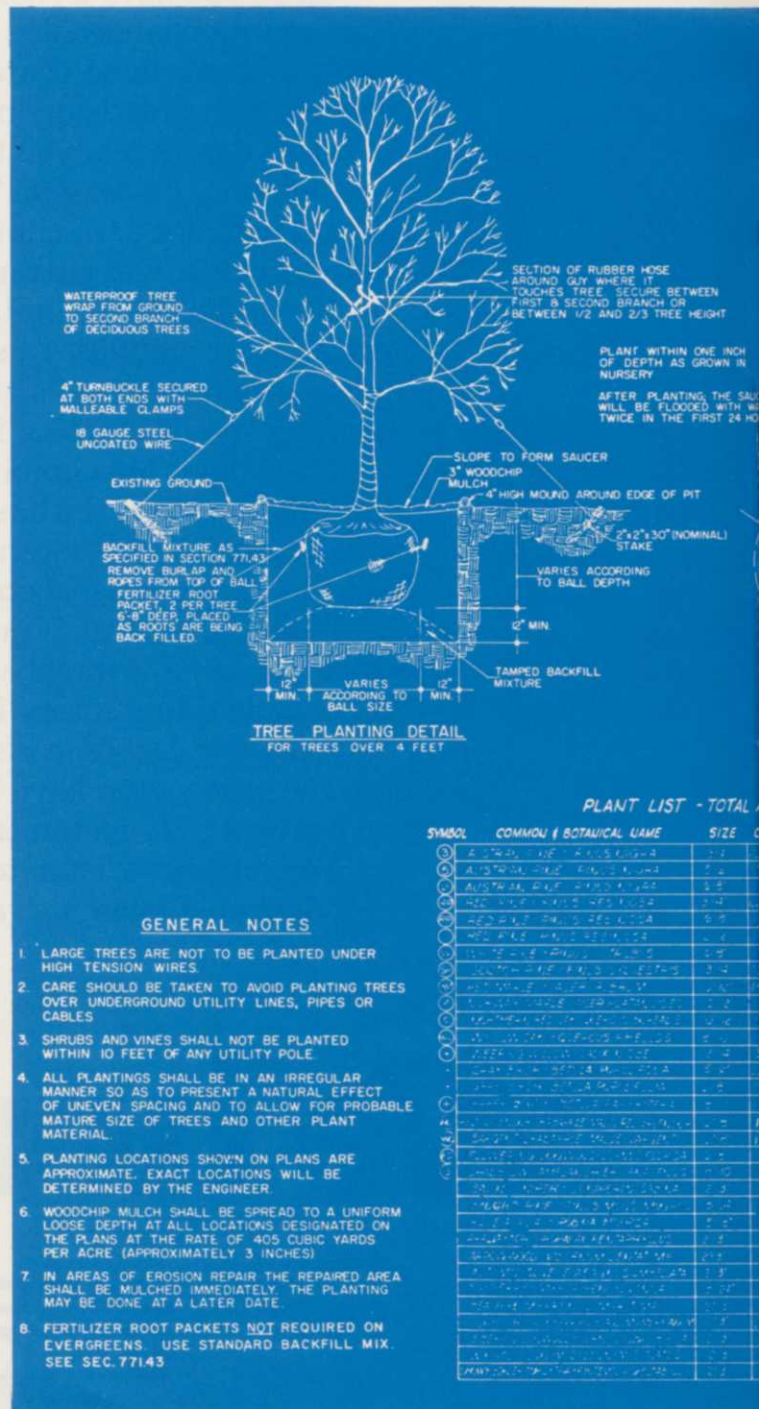
## Street tree inventory

Any street tree inventory should be undertaken with the following objectives:

1. To count all street trees growing within community boundaries.
2. To count all trees by species.
3. To record needs and problems observed, such as fertilizing, disease, shade canopy, insect damage, conflicts with utilities, and other evaluative data.
4. To employ the information gathered in programming tree care activities and to point out needs for additional plantings or alterations to the streetscape.

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Once this data is obtained, it should be organized to serve as a useful and available source of information for an ongoing tree care program. The street trees could be mapped to depict an overall image of the tree canopy throughout the community.





The first step involved in the planning process should be the preparation of lists of the most desirable selections for future planting along the community's streets. The plant materials selected must be hardy and sufficiently tolerant to survive harsh roadside conditions. It is advisable to use trees that are "native cultivars". These are defined as improved strains of the native varieties of trees.

The plant list selection process is quite involved. First, extensive lists of native plant material are prepared. These lists are modified by removing those materials which experience has indicated will do poorly in roadside conditions, have high

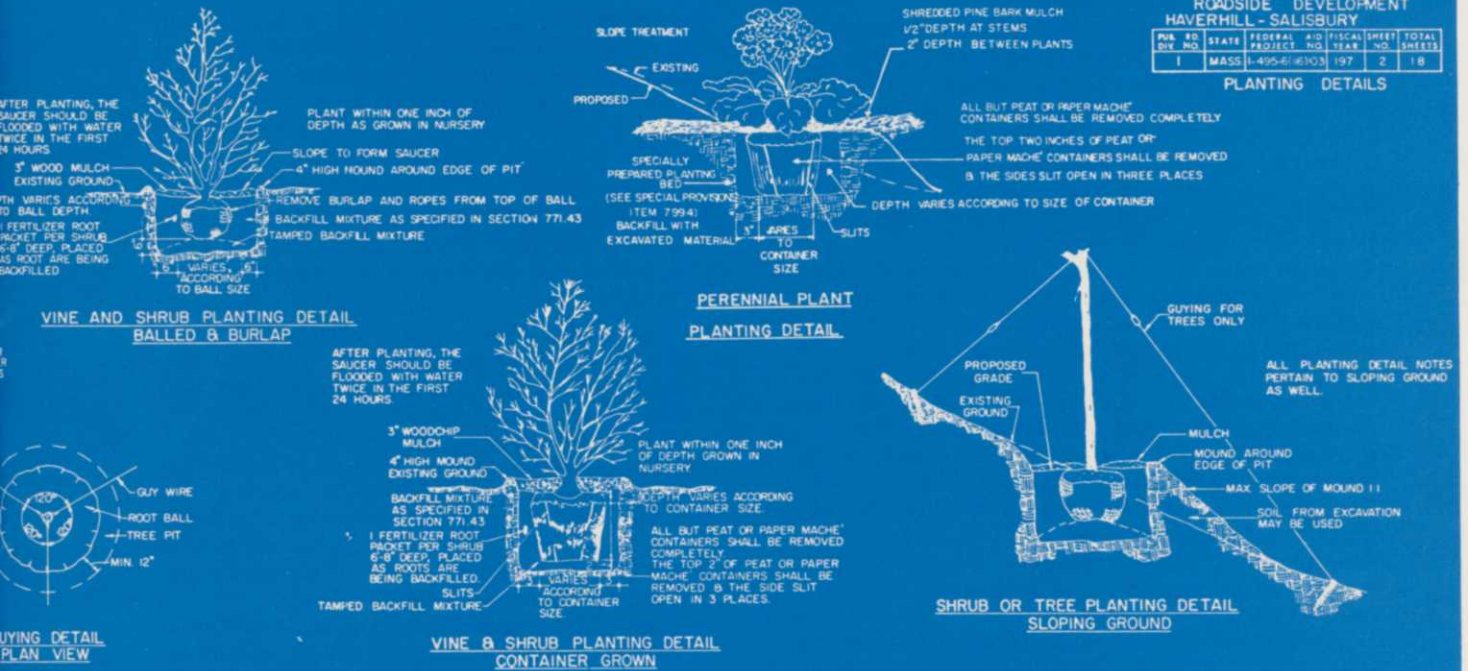
maintenance costs, are disease prone, and have fruiting hazards. Then, the lists are supplemented with cultivars which would be satisfactory substitutions for the native species in terms of disease resistance and improved visual qualities. Finally, the lists are supplemented with introductions which have become established and tolerant of growing conditions in the community. These introductions are included only to provide a well-rounded selection and sufficient number of species for proper diversification.

In order to further refine the selection process, it is advisable to compare the selection with the rec-

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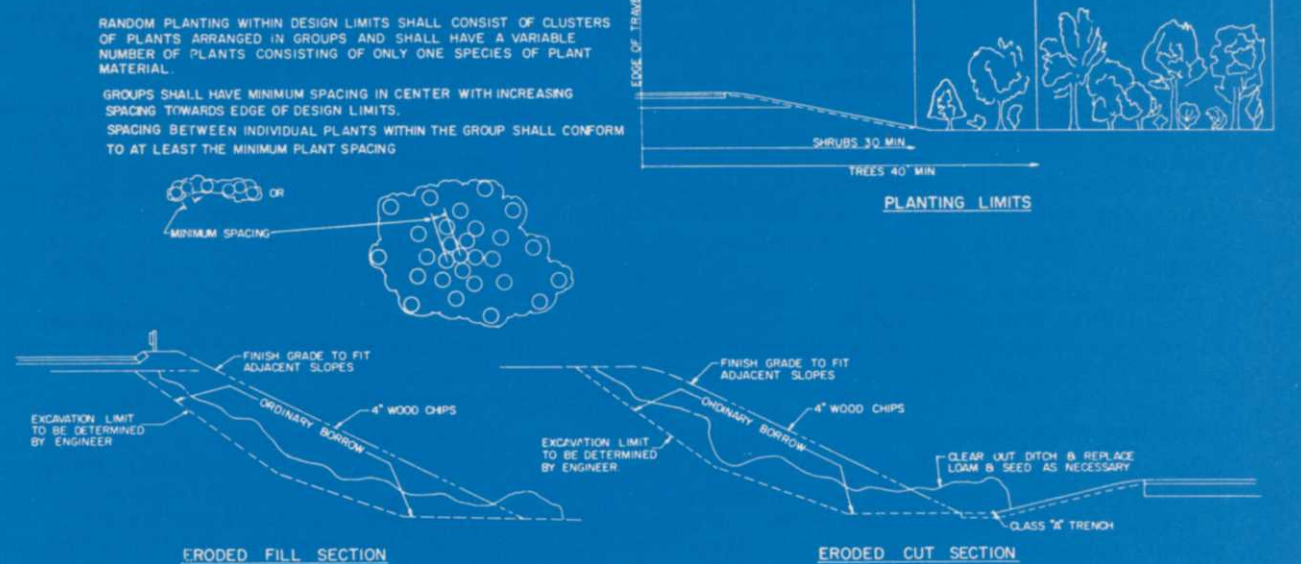
PWA DIST. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS	1-495-6(6)03	197	2	18

PLANTING DETAILS



PLANTING LIMITS

PLANT	SPACING	AMOUNT
1	30	100
2	30	175
3	30	250
4	30	325
5	30	400
6	30	475
7	30	550
8	30	625
9	30	700
10	30	775
11	30	850
12	30	925
13	30	1000
14	30	1075
15	30	1150
16	30	1225
17	30	1300
18	30	1375
19	30	1450
20	30	1525
21	30	1600
22	30	1675
23	30	1750
24	30	1825
25	30	1900
26	30	1975
27	30	2050
28	30	2125
29	30	2200
30	30	2275
31	30	2350
32	30	2425
33	30	2500
34	30	2575
35	30	2650
36	30	2725
37	30	2800
38	30	2875
39	30	2950
40	30	3025
41	30	3100
42	30	3175
43	30	3250
44	30	3325
45	30	3400
46	30	3475
47	30	3550
48	30	3625
49	30	3700
50	30	3775
51	30	3850
52	30	3925
53	30	4000
54	30	4075
55	30	4150
56	30	4225
57	30	4300
58	30	4375
59	30	4450
60	30	4525
61	30	4600
62	30	4675
63	30	4750
64	30	4825
65	30	4900
66	30	4975
67	30	5050
68	30	5125
69	30	5200
70	30	5275
71	30	5350
72	30	5425
73	30	5500
74	30	5575
75	30	5650
76	30	5725
77	30	5800
78	30	5875
79	30	5950
80	30	6025
81	30	6100
82	30	6175
83	30	6250
84	30	6325
85	30	6400
86	30	6475
87	30	6550
88	30	6625
89	30	6700
90	30	6775
91	30	6850
92	30	6925
93	30	7000
94	30	7075
95	30	7150
96	30	7225
97	30	7300
98	30	7375
99	30	7450
100	30	7525



ommendations of other authorities. These authorities can be from nurseries, local universities or the extension service. Books should be checked for ideas too.

Upon completion of a list of street trees, a determination has to be made with regard to the environmental preferences of each tree species. The list of selected trees should be made according to soil preferences: such as trees which tolerate moist soil, dry soil or a wide range of soils; salt tolerance; hardiness; excessive sun; shade tolerance; wind abuse; and finally urban site tolerance in terms of soil compaction, air pollution, and mechanical injury.

This data should be computerized. The purposes for establishing a computerized tree inventory are:

1. To make inventory data more readily available, thereby assisting the tree department staff in intelligently answering complaints and questions from the public.
2. To help in species selection for new planting plans.
3. To improve scheduling of maintenance operations and the overall tree care program.
4. To increase efficiency of administrative duties such as budgeting and preparation of annual reports. The type of data included should be listed according to street address, map number and tree number; the location of each tree and distance from the curb; tree species; house set back; tree caliper, condition and monetary value. The program should be designed to include a history of the tree regarding trimming, spraying, removal or annual growth. From the stored information the program should produce data on street and number, tree condition, distance from the curb, tree caliper, tree value, tree species, work needed, reference number and combinations of these.

Several preprogrammed systems for automating the storage, retrieval and analysis of trees have been developed for municipalities not having the resources or in-house capabilities to develop and operate their own programs. One of the better-known of these systems is called TRESYSTEM. It features an efficient inventory process, routine updating and storage of all practical data needed for the care of every tree. The system was developed by Professor H.D. Gerhold and C.J. Sacksteden of the Forest Resources Laboratory in University Park, PA.

Another street tree inventory and management system has been developed by Asplundh Environmental Services, Blair Mill Rd., Willow Grove, PA, 19090.

Other companies offer similar services to municipalities. However, all of the basic programs, inventory and other services vary somewhat in sophistication as well as cost to the community.

### **Street tree master plans**

Upon the completion of the inventory (unless the inventory is to be considered a part of the master plan), the second study, a master street tree plan, should be undertaken.

Of all the environmental considerations, the soil analysis is by far the most important. The data is

compiled to correspond to the environmental preferences of the trees. A soils map should be prepared to show only the minimum number of categories of soils, examples of which are as follows:

**Moist Soils:** These areas contain muck, peat, silt and sandy soils with a high water table most of the year. These soils may be drained or covered with fill in order to permit development, but the moist, heavy soil types are still present at a depth sufficient to require trees which prefer moist soil. These areas are located in the low lying areas along streams and ponds scattered throughout most communities.

**Dry Soils:** These well-drained areas contain sands or mixed sand and gravel. These soils and water tables are sufficiently deep to provide a dry and well-drained site preferred by many trees. These soils are in the moderate elevations, higher than the wetlands but lower than the stony, irregular topography of the highest elevations.

**Mixed Soils:** These areas contain poorly sorted soil mixtures of rock, gravel, sand, silt, and clay. The depth of this material varies from 0 to 20 ft. over the bedrock.

**Alluvial Soils:** These areas contain the same poorly sorted soils as the mixed soil areas but are located in the original flood plains of rivers and streams. The trees to be planted in these areas may be subject to occasional flooding.

Another environmental consideration pertains to an evaluation of the existing forested areas of the community and, if possible, the native vegetation analysis of the community. The important features to be studied are the species and, if local information is available, the tree height.

A study of land uses must be made in combination with an analysis of the existing street tree inventory in order to establish the aesthetic character of the neighborhoods and areas of the community. The land use map should be simplified to show generalized land uses along with a breakdown of neighborhoods. The combined effort illustrates categories which are shown on a land use map and typically defined as follows:

1. Commercial/industrial areas: these heavily developed areas are for the most part devoid of any significant, healthy street trees.
2. Institutional/open space areas: these areas are the large protected open spaces where the forest succession process will occur naturally and where the existing forest trees often exceed 40 ft. in height.
3. Residential neighborhoods: each neighborhood is defined according to location, lot size and major tree associations.
4. Other areas as they apply to local community.

There are several miscellaneous factors which must be considered prior to the planting of trees in order to insure proper growth and minimum damage. These environmental hazards are:

1. Severe salt accumulation: Winter salting on streets results in accumulations at specific locations which cause tree decline. Trees planted in



these areas must be tolerant of high salt concentrations in the rootzone.

2. High wind stress: Areas which are open, require hardier trees and guy wires until the trees are established.

3. Excessive sun: Areas which are open to full sun require trees which are not susceptible to sun scald.

4. Excessive shade: Areas which are shaded by large buildings, land forms or an established tree canopy exceeding 60 ft. in height, require trees planted in these areas to be tolerant of shade.

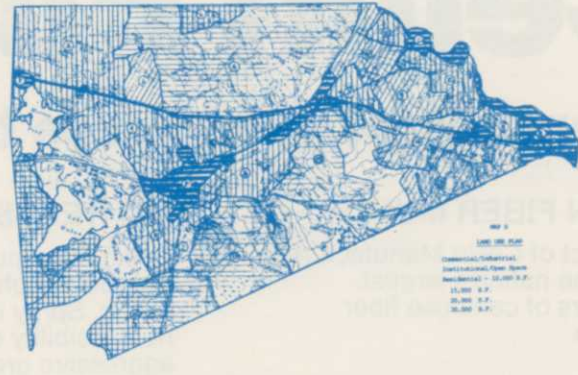
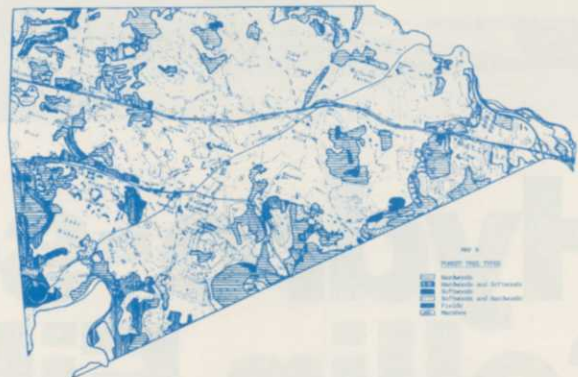
5. Natural gas lines: Many streets contain local gas distribution lines and damage to trees from escaping natural gas cannot be avoided. Any major gas transmission lines going through the community should be avoided to prevent potential tree damage.

6. Mechanical injury: Areas which are subject to severe mechanical injury, frequent construction and sites of severe soil compaction, require trees to

be small in size and where problems are most severe, containerized trees should be considered.

**Tree selection process**

A tree's shape or form is an important consideration when selecting a tree for a particular site. Definitely shaped street trees and ornamental flowering or fruiting trees should be carefully selected and located to avoid distractions to a car's driver while at the same time providing an accent denoting a special view or structure. The trees should be used to frame pictures in the landscape, to hide objectionable views and to assist in defining the edge of the roadway and enhancing spatial qualities. Spacing between trees should vary from 30 to 150 ft. to create a naturalized appearance, and if one tree dies or is removed, it does not spoil the continuity of the planting. Trees need sufficient unpaved areas for maximum health and vigor. They



Six maps are necessary to combine all factors affecting street trees to achieve the best plan. Map A - soil analysis, Map B - forest tree types, Map C - forest tree sizes, Map D - land use plan, Map E - environmental hazards, Map F - street tree assignments.

should not be dangerously close to traffic in the street and should, therefore, be planted behind the sidewalk to achieve as much growing environment as allowable.

Trees should be planted in locations which define an activity. For example, a corridor of trees promotes movement and decisive action; and screening provides a blocked vista and results in interest in the foreground.

Aesthetics and function should work together during the selection of an urban tree.

A diversification formula has been developed to prevent an over dependence on a single genus such as elms or oaks. The diversification formula was established by the International Society of Arboriculture and is now an accepted standard throughout the United States. The formula is defined as a planting plan containing no more than ten percent of one family and five percent of one species.

In order to develop a concept of complementary and coordinated tree planting, the trees selected previously have been grouped together into associations. Tree associations are defined as consisting of a group of trees which are aesthetically harmonious as well as being similar in environmental preferences and tolerances.

Using the lot size as an indication of relative home value and also of potential area for tree

growth, the lists are delegated according to mature tree stature, color and visual appearance.

All of the previous information is brought together to form a street tree planting plan. The different areas of soil types, existing vegetation and environmental hazards can be combined on one map to illustrate different tree planting programs. Each different area contains a different tree list. The tree list is derived by an analysis of the specific environmental qualities combined with the diversification formula.

Thus, lists are established which correspond to a street tree assignment map and indicate the most suitable trees for each area.

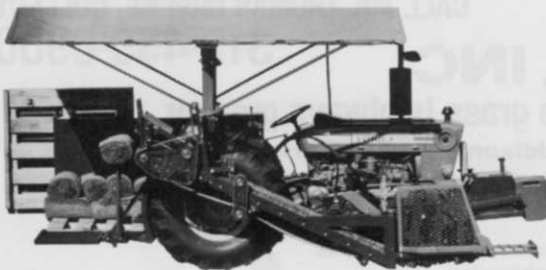
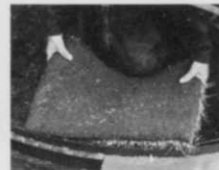
The final selection of a tree should be determined by the municipality's staff working in conjunction with the plan, any local site problems, and the property owner.

The final section of every master plan should pertain to established policies related to the care of street trees. These policies should be approved by the community's tree policy making board or elected officials.

Policies can be prepared to indicate a planting policy, a tree trimming policy, a tree removal policy, a spraying policy, and perhaps procedures to be used for implementing each of the policies.

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