2013

Town of Topsham Street Tree Inventory and Management Plan

Topsham Planning Office
100 Main Street
Topsham, ME 04086

Street Tree Inventory - Town of Topsham, Maine

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****Cover Photo – Christine Cole – Founding member of the Topsham Tree Committee and dedicated citizen scientist.*

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Introduction:

The Town of Topsham is a community with a population of 8,874 (2010). It is part of the Portland Maine Metropolitan Statistical Area occupying roughly 35.6 square miles located in Sagadahoc County.

Figure 1 - Topsham Municipal Complex

Over the past decade Topsham has seen a steady amount of growth, both commercial and residential. Most of this residential growth has occurred adjacent to the "downtown" area of Topsham, while the commercial growth has largely been centered around the Topsham Fair Mall area and interstate 295 interchange area. Topsham's planning and zoning have accommodated this growth in large part within Topsham's identified growth area through previous comprehensive planning efforts.

It is within this area where development greatly impacts the existing forest and surrounding environment. Loss of forest canopy and related vegetation add to localized temperature changes and increased storm water run-off. The trees which exist after development and those planted during the process help to mitigate the loss of natural forest cover. By replanting with landscape plants we are able to replace much of the forest lost during development.

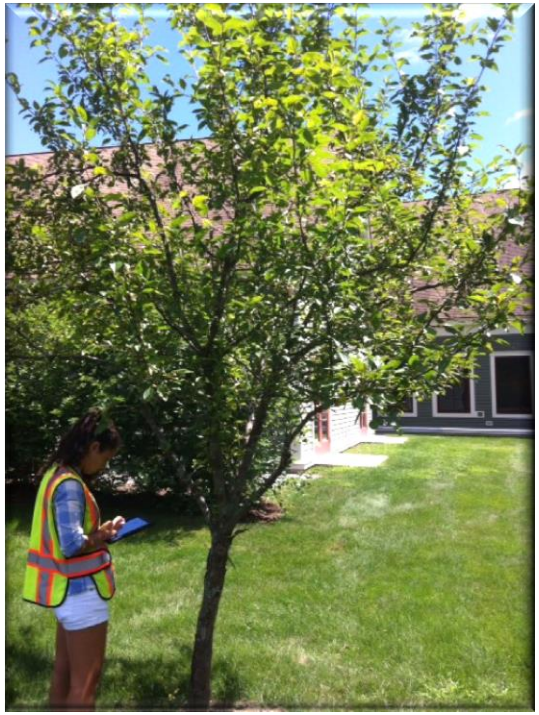


Figure 2 - Inventory at Topsham Public Library

The goal of the Topsham Tree Inventory is to record existing trees found within the right of way (or ROW) of Topsham in the areas where development has the greatest impact. The areas inventoried for this management plan are Main St (201), Town Hall, Topsham Public Library, Foreside Rd. Rec. Fields, Elm St.(24), Lewiston Rd (196) between Main St. (201) to the North bound entrance onto Interstate 295, Topsham Fair Mall Road and Monument Place.

The information gathered helps to establish the number of trees within these areas, their genus and species, trunk diameter, height, and overall health/condition. This information may be used to forecast tree management goals such as pruning, removal or tree planting. Along with directing tree management activities, by recording the number of trees found within the ROW the Town records an asset with each tree entered into the database. In the event of a natural disaster, these trees would provide a means of establishing a dollar value baseline which FEMA may use to fund replanting efforts[1].

[1] http://www.na.fs.fed.us/spfo/pubs/uf/sotuf/chapter_5/appendix_a/appendixa.htm

The Town of Topsham Street Tree Inventory & Management Plan contains recommendations intended to guide the Town in its actions and decisions affecting municipally owned trees. The plan will help the Town effectively manage trees on municipal property. This Street Tree Inventory & Plan focuses on the tree component of an urban forest.

This Plan identifies corridors throughout the Town which have the potential to become or are currently identified as tree—lined streetscapes. Proposed planting recommendations often will occur through a combination of public and private investment. Preferred tree species have been selected by a team including the consulting arborist and the Topsham Tree Committee. The approved street trees for each corridor are suggested which are adaptable for the individual growing conditions.

It is hoped that with the completion of recommendations laid forth by this Plan, the Town of Topsham could lead by example with its actions regarding trees on municipal property, as well as setting the standard for commercial developers. Through this example and an effective public outreach and education program, private property owners can in turn more effectively manage trees on their property.

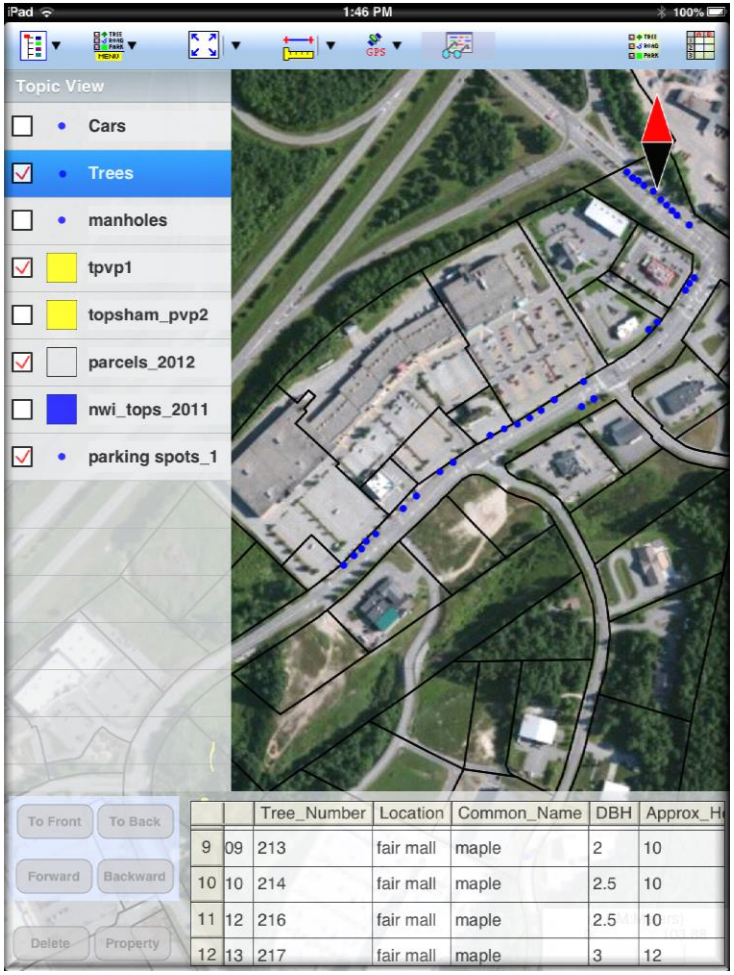


Figure 3- Screenshot from iPad application

Project Background:

The Town of Topsham Planning Office received a Project Canopy Grant

through the Maine Forest Service to inventory street trees along several major streets. The grant included funding for two iPad's, a Bluetooth GPS

device, mapping software application for the iPad (ICMTGISII), and a stipend for professional arborist oversight.

Topsham's Bowdoin College Psi Upsilon Fellow, Molly Sun conducted the volunteer (tree committee) field survey in consultation with the Town Planner and consulting Arborist. Molly also developed the digital database via the iPad application, and coordinated the GIS data, and field survey data into a singular format database.

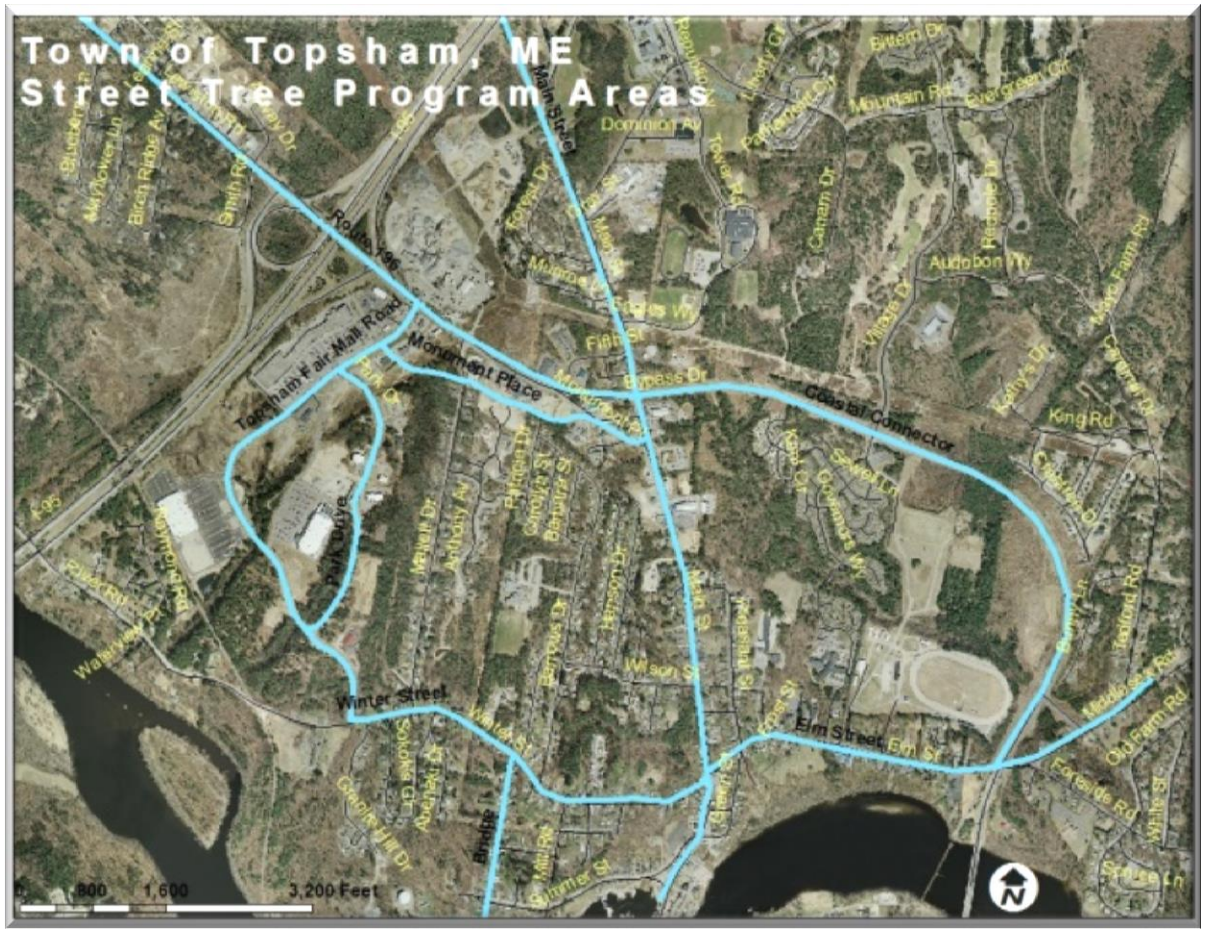


Figure 4 - Approximate streets surveyed

Field attributes surveyed the following: species, location, height, dbh, condition, spacing, overhead utilities, and recorded an image of each tree. Condition attributes included overall health of the tree, identifying any scaring, fungus, pest, or other damage. Images of each tree were then quality controlled by the arborist, as were field visits to the tree sites to inspect the quality of the volunteer data collection.

All tree data recorded reflects the trees that are within the municipal Right of Way (ROW). This includes all trees that in any way are within the ROW, including adjacent trees that are

growing towards the ROW. Field determinations of the ROW were confirmed with the Depart of Public Works Director.

Field recordings were exclusively compiled using the iPad. This included marking the tree location with GPS point data, populating the attribute data directly into the digital table per tree, and acquiring an image of the tree utilizing the iPad camera function. Data was then transferred to desktop applications where ArcGis databases and maps were developed as well as excel spreadsheets.

Summary:

The urban forest in Topsham is a complex network of trees, site conditions, and maintenance requirements. Understanding this system is important for proper decision making regarding species selection and tree care practices. The Tree Characteristics section of this report provides insight into the current composition and condition of Topsham's inventoried tree population. This information comes from an analysis of the data collected during the tree inventory phase of the project. Where appropriate, the data will be presented and analyzed by the total population, street trees, and park and other public property trees. Specific information detailed in this report includes:

- Species Composition and Diversity
- Size Class Distribution
- General Health and Condition
- Tree Maintenance Needs
- Inventory Observations and Concerns
- Recommendations

By accumulating and using this information, urban forest managers can forecast trends, anticipate maintenance needs, facilitate budgeting for tree-related expenditures, and develop a basis for long-range planning. This is necessary to ensure a stable and diverse tree population for future years and to plan for future tree planting operations.

Tree Distribution:

By recording the attributes of tree distribution we are able to gather information pertaining to the genus and species makeup of the forest, the size (relative age), and overall condition of individual trees within the municipal ROW.

The ROW trees found within the survey area vary in many aspects. The aspects of greatest interest found within this plan are those which will enable the Town to manage the urban forest in its current condition while enabling forecasts for future management.

Over 325 trees were surveyed as part of this inventory; the following distribution analysis is broken into species diversity, family composition, and genus composition. This allows for a comparative analysis for the types of trees present within the urban forest.

The selection and placement of trees in the urban environment is a complex task requiring the consideration of many factors. Issues such as visual spatial constraints and disease and insect resistance can sometimes conflict with other design objectives. Perhaps the most troubling conflict arises between the preference for visual uniformity and the practical need for species diversity. Until recently a typical street tree planting consisted of uniform rows of a single species, generally selected for its attractive appearance and high tolerance to urban stresses. However, as over planting has brought about the decline of a number of such favorite species it is clear that design objectives must be balanced against the practical need for species diversity in street tree plantings.

Species Diversity:

It is important to maintain an urban forest with the greatest amount of genetic diversity possible. A rule of thumb used by many urban forest managers is the 10-20-30 rule. The 10-20-30 rule indicates that a healthy forest will contain no more than 10% of a given species, 20% of a given genus or 30% of the given family.

Species diversity is often placed at odds with aesthetic goals where uniformity plays a larger role. That being said, even if aesthetics were the only consideration, the fact that unhealthy or dead trees are unattractive making diversity of plantings unavoidable. Exclusive plantings throughout communities have notable results in pest and disease problems, and in fact, we may be seeing the onset of the Emerald Ash Borer upon our tree populations in Maine very soon.

Figure 5 - Foreside Recreation Fields - Ash Trees

Family Composition:

Thirteen families are represented in the genetic makeup of the urban forest. The top three families by % are Aceraceae (Maple), Rosaceae (Shadblow, Hawthorne, Crabapple, Pear) and Oleaceae (Ash, Tree Lilac). The Maple family exceeds the recommended 30% stocking of a particular family.

Common Name	Family	Total Number	% Stocking
Maple	*Aceraceae*	106	34.00%
Shadblow,Hawthorne,Crabapple,Pear	*Rosaceae*	67	21.00%
Ash,Tree Lilac	*Oleaceae*	59	19.00%
Fir,Spruce,Pine	*Pinaceae*	24	8.00%
Elm, Zelkova	*Ulmaceae*	20	6.00%
Cedar	*Cupressaceae*	13	4.00%
Oak	*Fagaceae*	10	3.00%
Birch	*Betulaceae*	5	2.00%
Dogwood	*Cornaceae*	4	2.00%
Linden	*Malvaceae*	2	1.00%
Magnolia	*Magnoliaceaae*	1	<1%
Poplar	*Salicaceae*	3	<1%
Locust	*Fabaceae*	2	<1%

Genus Composition:

Twenty different genus of trees are found within the ROW of the survey area. As the chart shows below, *Acer* (Maple), *Fraxinus* (Ash) and *Crataegus* (Hawthorne) are the three genus which make up the highest % stocking levels at 33.54%,

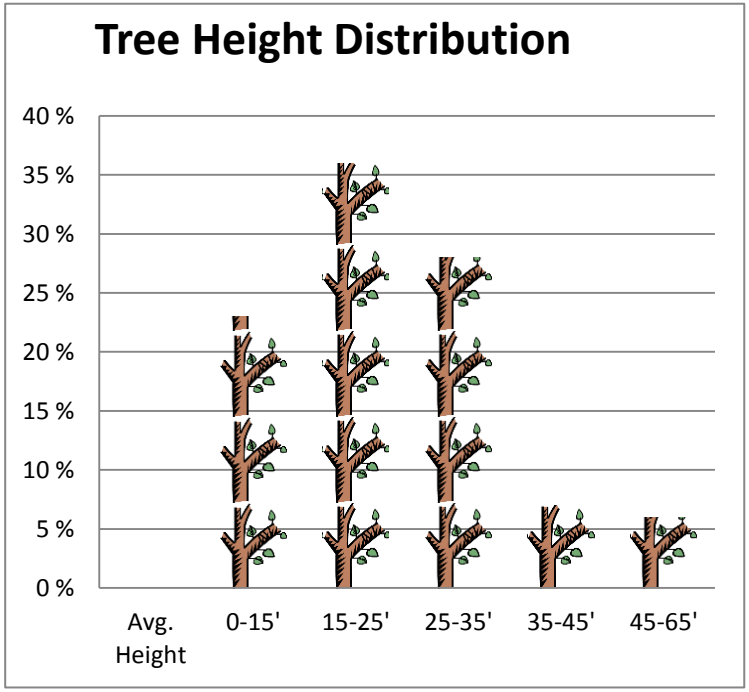
16.77% and 10.12% respectively. *Malus* (Crabapple) is a close fourth at 8.25%. It is interesting to note that of the remaining 16 genus represented, no one remaining genus occupies more than 5% of the population.

Common Name	Genus	Total Number	% Stocking
Maple	*Acer*	106	33.54%
Ash	*Fraxinus*	53	16.77%
Hawthorne	*Crataegus*	32	10.12%
Crabapple	*Malus*	26	8.25%
Cedar	*Thuja*	13	4.11%
Fir	*Abies*	13	4.10%
Zelkova	*Zelkova*	12	3.80%
Oak	*Quercus*	10	3.16%
Elm	*Ulmus*	8	2.53%
Shadblow	*Amelanchier*	7	2.21%
Pine	*Pinus*	7	2.21%
Lilac	*Sirynga*	6	1.90%
Birch	*Betula*	5	1.58%
Dogwood	*Cornus*	4	1.27%
Spruce	*Picea*	4	1.27%
Poplar	*Populus*	3	0.94%
Pear	*Pyrus*	2	0.64%
Linden	*Tilia*	2	0.64%
Locust	*Robinia*	2	0.63%
Magnolia	*Magnolia*	1	0.33%

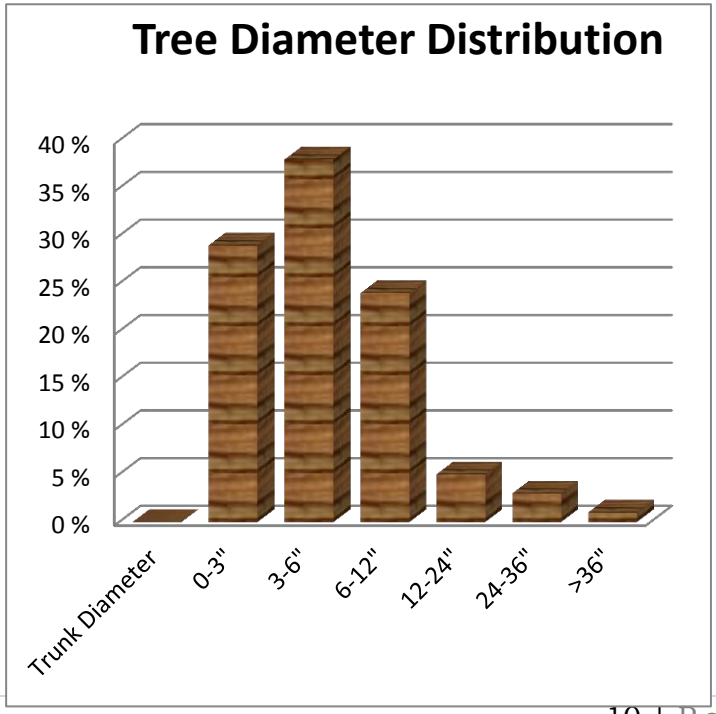
Figure 2 - Rt. 196 Median and Street Trees

Size Class Distribution:

The height and trunk diameter of a tree can be used to determine relative age of the individual. It is the community of individual trees which make up the urban forest as a whole. The information gathered for each tree helps to determine the overall age of the forest and distribution of different ages. It is the goal to have a size class distribution where no one size class is represented in greater proportion over another. Size class diversity (age diversity) and the staggered canopy associated with such diversity ensure canopy cover supplied by smaller/younger trees as mature trees fail or are removed.



The population of trees inventoried range in height from 15-65 feet tall. The vast majority of trees, roughly 36%, are in the 15-25 foot range closely followed by trees in the 25-35 foot range. The highest percentage of trunk diameters is in the 3-6 inch diameter range at roughly 38%. The percentages of overall height and diameter are indicative of trees not yet mature. The forest could be considered even aged and relatively young.



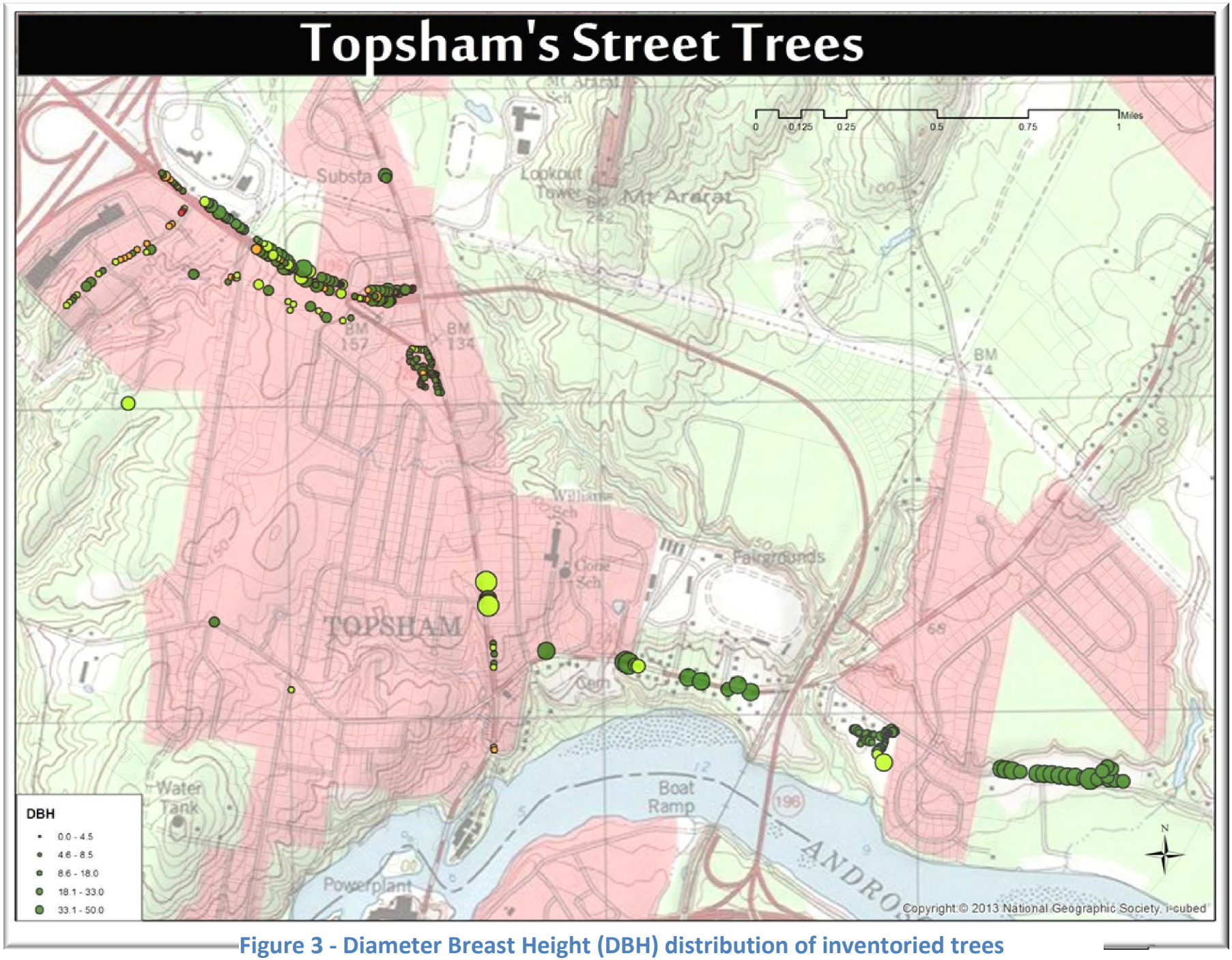


Figure 3 - Diameter Breast Height (DBH) distribution of inventoried trees

Tree Condition:

Condition indicates the current state of a tree's health, structural soundness, overall shape, and growth rate. Symptoms of poor condition include discoloration, decay, dieback, decreased internodal length, and/or disfigured or necrotic stems or roots. To some extent, condition class is also a reflection of the life expectancy of the tree. Crown development, trunk condition, major branch structure, twig growth rate, insects/diseases, and root condition are all considered. In general, the condition of each tree is recorded in one of the following categories adapted from the rating system established by the International Society of Arboriculture (ISA):

Good

79% - 61% condition class. The tree has no major structural problems; no significant damage due to diseases or pests; no significant mechanical damage; a full balanced crown; and normal twig condition and vigor for its species.

Fair

60% - 41% condition class. The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage; significant damage from non-fatal or disfiguring diseases; minor crown imbalance or thin crown; minor structural imbalance; or stunted growth compared to adjacent trees.

Poor

40% - 21% condition class. The tree appears unhealthy and may have structural defects. Trees in this category may also have severe mechanical damage, decay, and severe crown dieback or poor vigor/failure to thrive.

Dead

0% condition class. This category refers to dead trees only.

The tree condition breakdown is 20% good, 69% fair, 9% poor and 2% dead.

Added to these numbers, 12% of the trees in the urban forest are situated under utility lines. These trees may require pruning, maintenance generally performed by the local utility company. Over time, these trees may be removed due to the effects of continuous maintenance efforts.

Other attributes recorder that may help in regards to management recommendations and that are directly related to condition were the following:

- Scaring
- Pests
- Fungus
- Other Damage

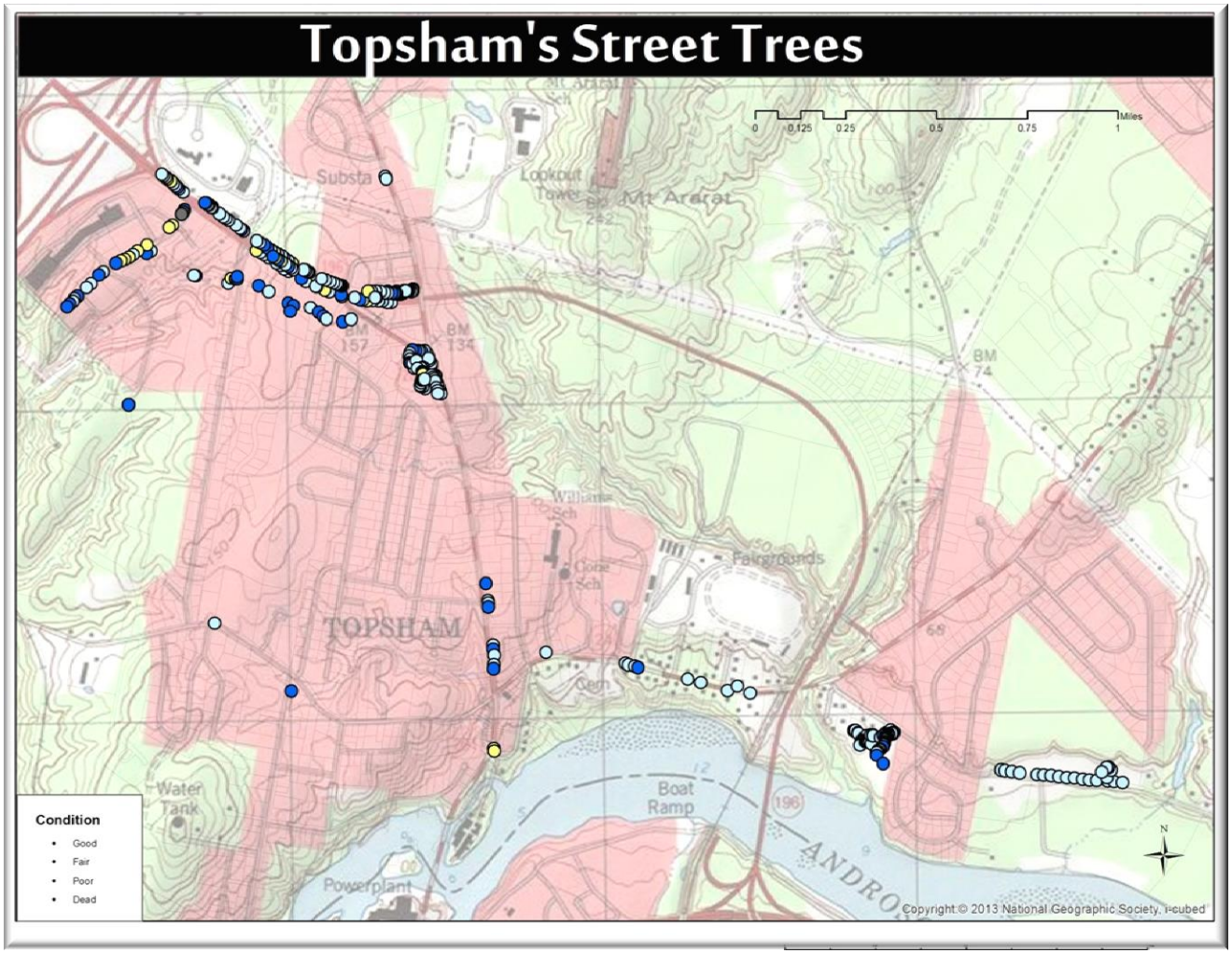


Figure 4 - Tree Condition distribution of inventoried trees

Further Inspection Required

A tree inventory by its very nature involves only cursory, visual observations of each tree in order to gather basic information. No tree is given a detailed examination or inspection in the initial inventory. Trained inventory personnel characterized certain trees as having pruning, removal, or other maintenance needs on the basis of this cursory observation. Other trees will require further examination to determine what measures, if any, are needed to abate or mitigate potential risk of personal injury or property damage.

Overall Forest Value:

Based on a program, iTree, supplied by the USDA Forest Service the urban forest holds a great deal of value for the Town. Inputting data into iTree produced two interesting values.

The actual dollar value associated with the forest is $32,172.00 The value takes into account the genus, species, and size of each tree entered into the inventory.

Another value the forest offers is the capture of storm water run-off. Using iTree, it is determined that the forest captures roughly 185,684 gallons of storm water annually. This reduces the demands on infrastructure including annual and future maintenance requirements.

Data Review:

A review of the field data indicates 34% of the forest is stocked with species in the Maple family. The Maple family stocking level is just over the recommended 30% stocking per family. As a single genus, the Maples are stocked at 33% which is 13% higher than recommended levels. A review of the data also indicates the forest is heavily stocked by members of the Ash and Rose families.

The tree height and trunk diameter size distribution indicate the urban forest is relatively young. However, 10% of the forest is mature. These trees are most likely to be removed before other trees in this population. Also, 9% of the forest is in poor health and 2% are dead. Replanting efforts will most likely focus on open sites and the replacement of trees which may be removed that are mature-over mature, dead, or in poor condition.

Recommendations:

Planting:

- The urban forest is overstocked with Maple trees. Replanting recommendations for future plantings should exclude members of the Maple group at this time.
- Planting considerations should also exclude members of the Ash family. An exotic pest, Emerald Ash Borer, is known to affect all species of Ash and is moving eastward toward Maine. To date, management of this pest is costly and without 100% control.
- Dead trees should be removed ASAP with replanting to follow.
- The Topsham tree nursery located at the transfer station should be stocked with trees for future replanting efforts. The species planted should exclude Maple and Ash trees.

Young Tree Establishment and Maintenance:

38% of the urban forest is made up of trees 3-6" in trunk diameter. Trees of this size are generally established in their perspective plant sites. There are a number of maintenance practices to consider with this size class.

- Structural pruning to remove crossing/rubbing branches
- Crown cleaning to remove large dead branches

- Root collar excavation on trees lacking a visible trunk flare
- Pruning or removal of limbs impacting the line of site for traffic and pedestrians

Mature Tree Maintenance:

Less than 15% of trees are over 12" in diameter or over 35 feet in height. These trees require a certain amount of care. These trees provide a large canopy, interrupt a great deal of storm run-off, and provide living space for wildlife.

- Crown cleaning to remove large deadwood
- Structural pruning to address defects
- Encourage community awareness about the value of mature trees
- Designate mature trees as part of a community Heritage Tree program

Tree Removals:

- Plan for the removal of dead trees or those in poor condition
- Coordinate replanting of removed trees with recommended species with the a tree suited to the planting site

Recommended Tree Species for Replanting:

Common Name	Genus	Species
Balsam Fir	Abies	balsamea
Sugar Maple	Acer	saccharum
Horse Chestnut	Aesculus	hippocastanum
Shadblow	Amelanchier	canadensis
White Birch	Betula	papyrifera
River Birch	Betula	nigra
European Hornbeam	Carpinus	betulus
Katsura	Cercidiphyllum	japonicum
Kousa Dogwood	Cornus	kousa
Copper Beech	Fagus	sylvatica
Honey Locust	Gleditsia	triacanthos
Goldenrain Tree	Koelreuteria	paniculata
Sweetgum	Liquidambar	styraciflua
Magnolia	Magnolia	soulangiana
Crabapple	Malus	sp.
Blue Spruce	Picea	pungens
Norway Spruce	Picea	abies
Austrian Pine	Pinus	nigra
Scotch Pine	Pinus	sylvestris
Bartlett Pear	Pyrus	communis
Pin Oak	Quercus	palustris
Red Oak	Quercus	rubra
Swamp White Oak	Quercus	bicolor
Japanese Snowbell Tree	Styraz	japonicus
Tree Lilac	Syringa	reticulata
Cedar	Thuja	occidentalis
Linden	Tilia	cordata
Elm	Ulmus	americana
Zelkova	Zelkova	serrata

Recommended High Priority Replanting Corridors:

This inventory and report provides the town with the data needed to inform future decisions in regards to the urban forest/ streetscape. There are examples of well-spaced, and appropriately stocked areas that enhance the aesthetic and environmental health of a particular street corridor. There are also examples where these same elements are lacking.

Upon review of the field survey data and mapping efforts we recommend that particular attention be paid to the following street corridors in regards to replanting/ planting efforts by the Town of Topsham.

1. Topsham Fair Mall Road.
    a. Explore the feasibility of planting along the eastern and western side of TFM road. This includes from the entrance off of Route 196 to the traffic light of Park Drive road. A professionally designed planting would be preferred, and consulting with abutting landowners should occur.

2. Main Street (from I-295 to the Frank Wood Bridge).
    a. Areas along this corridor would benefit from efforts that are associated with development projects. Emphasis should be paid to the incorporation of street trees planted as part of these projects. The recent Lee Toyota development is a great example of an street tree planting (aside from a single species planting), and as the planted sugar maples mature, they will add to the aesthetic of a Main Street corridor.
    b. Route 201 out to Howard Sports there are opportunities for plantings.
    c. The “apple orchard” field next to Volvo has potential for planted street trees.

3. Winter Street.

a. The right side of the hill on Winter Street between Main St and Garden drive would make a great spot for a planting and within areas where people walk and drive frequently.

4. Route 196 & 201 Intersection.
    a. Replacing the dead Hawthorns along 196 would be nice especially at the intersection of 201 and 196.

5. Summer Street.
    a. Ornamental tree species planted along the walking trail off of Summer Street.

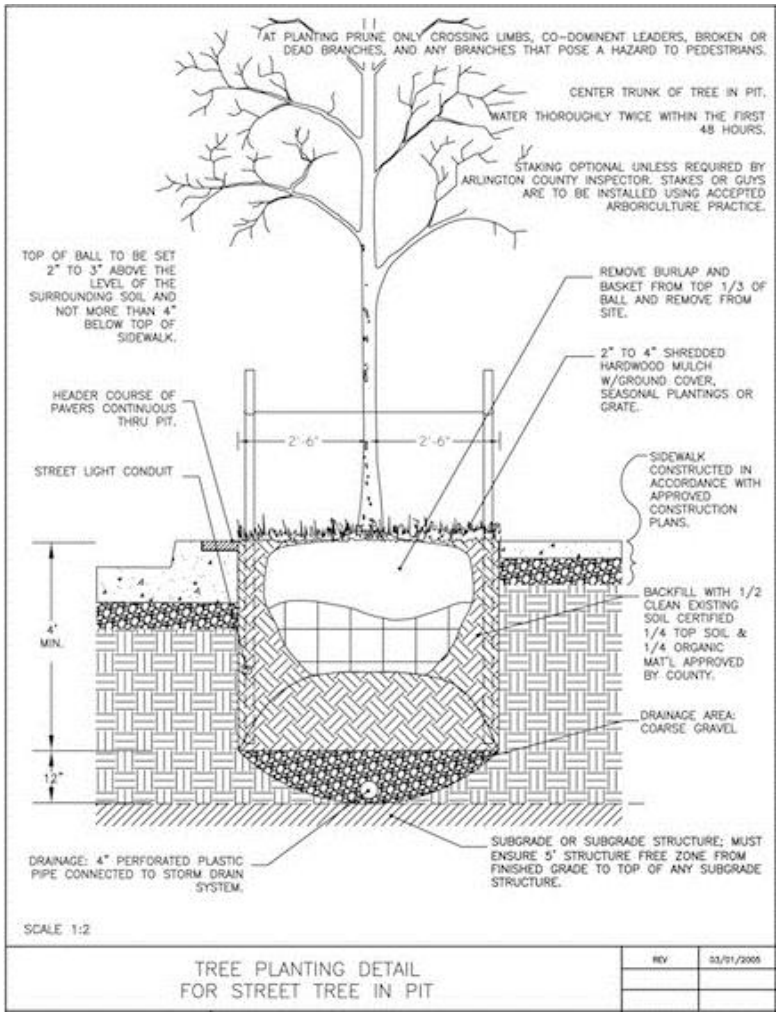
6. A small Arboretum out to the ponds at the Transfer Station would be sweet in time! Across from the nursery

7. The planting on the corner of Monument and Mallet drive across from Rite Aid is a good example of a cluster planting which create a valid wooded buffer between a busy street and residential uses. Areas should be identified where more of these plantings may occur, not always evergreens, but the scale of the planting filling up a small opening that would otherwise just be grass adds to the streetscape.

8. The site of Town Hall often enters the discussion for landscape enhancements, and as of this writing the Town has secured a Project Canopy grant to undertake a design/ planting implementation project. The emphasis of design is something that should be employed on all future town plantings.

Street Tree Planting Details

Typical specification sheets are a decent start in order to create consistent management patterns for installation, care, and removal. The following spec sheets offer examples for street tree management.



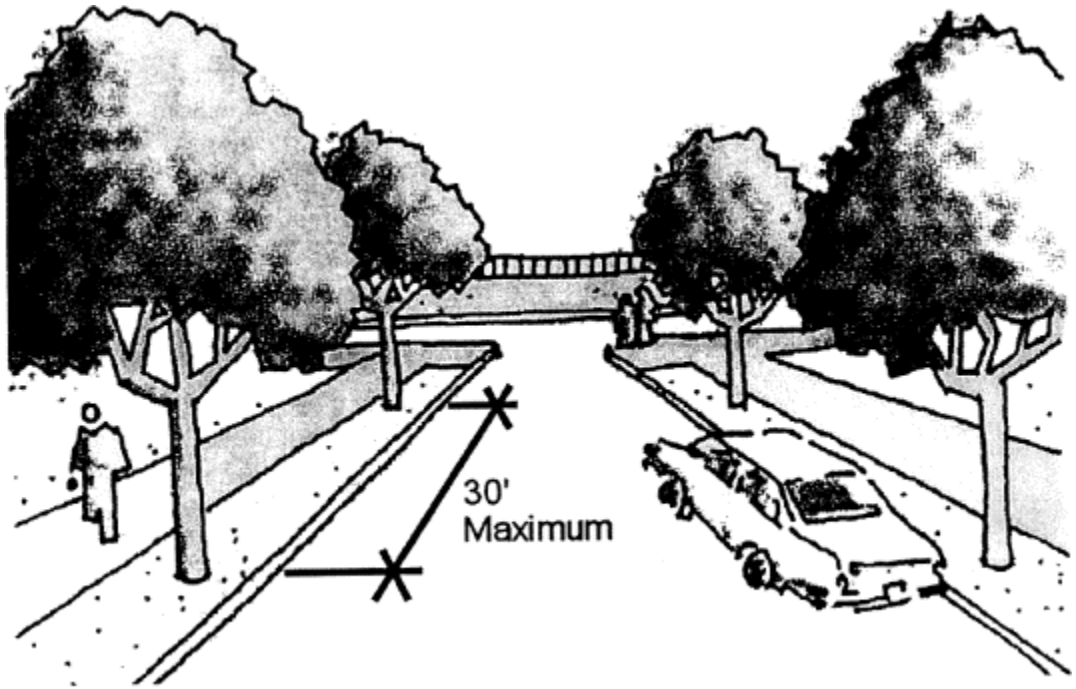


Figure 7.2.1-a

Topsham Fair Mall Road Street Trees - example 30’ spacing layout