DETAILED SCHEMA

The details of these data sets are outlined below:

"BC_FORESTRY_TREES" POINT FEATURE CLASS

The information collected for each existing tree or planting location will include:

Tree ID number: A unique object ID assigned to each tree, stump, or planting site. These numbers must be sequential without any gaps created by deletions in post processing or deletions created in the field.

Coordinates: This data will be collected automatically by the data collection equipment.

Staff: Name of the staff collecting the data.

Location Type:

Street - Tree is in the street right-of-way (ROW)

City Park - Tree is located in a city park along a road or in an open space.

Lot Side: The location of each tree and planting site in relation to a lot will be recorded (front, side, rear of lot, or opposite). For trees within the parks this field will be left null.

Street: The name of the street the tree is on.

Address: The address of the lot adjacent to the tree being inspected if easily visible. If the address is not posted on the building or it is not apparent which address to assign the tree to leave this field blank. Do not guess an address.

Tree Height: An estimated tree height will be recorded in feet. The estimated tree height shall be within a 25% margin of error.

Stems: This field indicates the number of stems the tree has. There will be 6 possible options: null, 2, 3, 4, 5, >5. The default should be null which will be used for trees with 1 stem, planting sites, and stumps.

Tree DBH: Diameter is to be measured to the nearest tenth of an inch at 4 1⁄2 feet above the ground, or diameter at breast height (DBH) using International Society of Arboriculture (ISA) methods. A diameter tape must be used for all measurements. If a tree has more than 5 stems the 5 largest stems should be measured and DBH calculated from those 5 stems. If a tree is measured at a height other than 4.5 ft the height should be recorded in the notes. Refer to Appendix A for detailed instructions. If a tree is less than 4.5 feet tall or has a DBH of less than 1 inch, the diameter should be measured at 12 inches (one foot) above ground for this project. For stumps the diameter of the stump will be recorded here. The diameter will be measured on the cut surface of the stump, not the root flare. For new planting sites the DBH will be recorded as 0.

Tree Genus: This will be a selection list for tree genus. Genus, species and cultivar should be recorded as separate fields.

Tree Species: This will be a selection list for tree species. All trees should be identified to species level at a minimum. If the tree cannot be identified to species "Recheck" should be selected and the tree properly identified by another forester.

Cultivar: This will be a selection list or open text field for the cultivar if applicable. This is only to be collected if the cultivar is obvious and known by the observer. No additional time should be spent identify-

ing species cultivars if not known upon initial identification at the site. If the tree is obviously a cultivar, but the exact cultivar is not known, this will be denoted with the abbreviation "cv.".

Condition: The general condition of each tree is to be rated according to the following categories, and is also based upon the contractor's data collection staff attending at least one pre-performance site meeting with Baltimore City Forestry representatives to ensure clarity when determining a condition rating. The data collector must also look at each tree from multiple angles and from top to bottom, including the trunk, branches and crown – and to observe where and how the tree is growing in relation to the surrounding elevation and adjacent structures. A tree must exhibit these characteristics to reflect the condition rating:

Good	A fully branched and leafed canopy, and with little to no mechanical damage to the trunk, and little to no branch dieback over one inch in diameter, and little to no suckering (water sprouts on the trunk or limbs, nor sprouts from the roots), and the form of the tree is characteristic of the species.
Fair	The canopy is thinning and there is little to low amounts of new growth; or there is noticeable dead wood over one inch in diameter – or crown dieback - throughout a majority of the crown; or there is significant mechanical damage to the trunk and/or to two or more scaffold limbs; or insect/disease damage is visibly affecting growth; or the tree is visibly stunted causing the form not to be representative of the species.
Poor	The tree is in decline. There are significant dead or dying limbs over one inch in diameter – or crown dieback - throughout the entire crown; or there are one or more dead, dying or broken limbs seven inches or greater in diameter; or there is severe mechanical damage to the trunk and/or to two or more scaffold limbs causing decay; or new growth is minimal or absent.
Dead	Standing dead tree, no signs of life with new foliage, and bark may be beginning to peel; or the tree, alive or dead, has fallen or partially fallen.
Sprouts	Only a stump of a tree is present with one or more water sprouts of 18 inches or greater in height growing from the base or remaining root system.
Stump	Only a stump remains, no water sprouts over 18" high present.
Absent	At an obvious existing location for a tree, such as an empty tree ring in open ground or a tree pit within a sidewalk, no tree or stump is present. "Potential Tree Planting Sites" would also include such locations with this condition.

Note: Trees found to have a structural defect in which the likelihood of failure and impact would have extreme consequences for damage to people or property will be reported to the Forestry representative within 24 hours of observation.

Maintenance Needs: Maintenance needs will be recorded as:

Maintenance Prune	A tree that requires maintenance pruning will exhibit one or more of the following: • Dead limbs over two inches in diameter throughout the crown.

- Suckers or water sprouts throughout the scaffold limbs or on the trunk.
- More than one large crossing or rubbing limbs.
- A younger tree with a double lead in which removal of one lead would be advantageous.
- Tip dieback throughout the crown.

Priority Prune — A tree that requires priority pruning will exhibit one or more of the following:

- One or more dead limbs over seven inches in diameter.
- Limbs resting on roof or pushed up against a window.
- Low limbs impeding traffic, where the tree is large enough so that the limbs can be raised to 7 feet over sidewalks or to 14 feet over roads.
- Limbs blocking the needed visibility for safety related items, such as stop signs, stop lights, or when the natural shape of the tree can be maintained - sidewalk lighting.

Tree Removal — Tree must be removed. The tree is either dead, or no remedial action can alleviate the poor condition of a tree.

Stump Removal — There is an existing stump at the site that needs to be removed. The diameter of the stump should be measured on the cut surface and recorded in the DBH field.

Vines: This is a Yes/No field indicating the presence of vines above 4.5 feet on 50% or more of the scaffolding limbs of the crow. The default should be “No” because most of the trees will not have vines present.

Permanent Trunk Protection: This is a Yes/No field indicating the presence of permanent trunk protection

Utility Line: The presence and type of overhead utility line at the location will be recorded by selecting one of the following:

None
Communication (phone or cable)
Electric
Both

Planting Space Type: The type of area the tree is planted or will be planted in will be recorded by selecting one of the following:

Tree Lawn/Grass Strip
Open/Unrestricted
Well/Pit
Median/Island
Bumpout
Natural Area
Planter/Raised Bed
Other - See notes

Hardscape: This field describes any hardened surface placed over the root surface up to the trunk. These hardscapes are typically found in tree pits or wells. Data will be recorded by selecting one of the following:

None
Steel Grate
Brick/Paver/Gravel
Solid Concrete

Space Length: The length of the planting area parallel to the curb will be recorded to the nearest half foot. This will be an estimated number selected between 1 and 20 or >20. The minimum length for a planting space to be recorded is 2.5 feet. The minimum length for a potential planting space to be recorded is 2.5 feet.

Space Width: The width of the planting area perpendicular to the curb will be recorded to the nearest half foot. This will be an estimated number selected between 1 and 20 or >20. The minimum width for a potential planting space to be recorded is 2.5 feet.

Notes: Field notes will be recorded here.

Date: The date and time of the data collection.

Observations: General observations about the tree condition and its environment will be recorded, the ability to make more than one selection will be required for this field. The options for this field will be as follows:

Temporary Staking	Stake and wire/rope support present on the tree.
Temporary Trunk Protection	Typically wire fence, plastic pipe or tape
Permanent Trunk Protection	This includes bolted down steel rod fencing and cages
Improperly mulched	Over mulched (over 3”) remove mulch from trunk
Mechanical Damage	The tree has obvious mechanical damage that may affect the health of the tree.
Nutrient Deficiency	The tree is showing signs of nutrient deficiency.
Other - See notes	

ILLUSTRATIONS

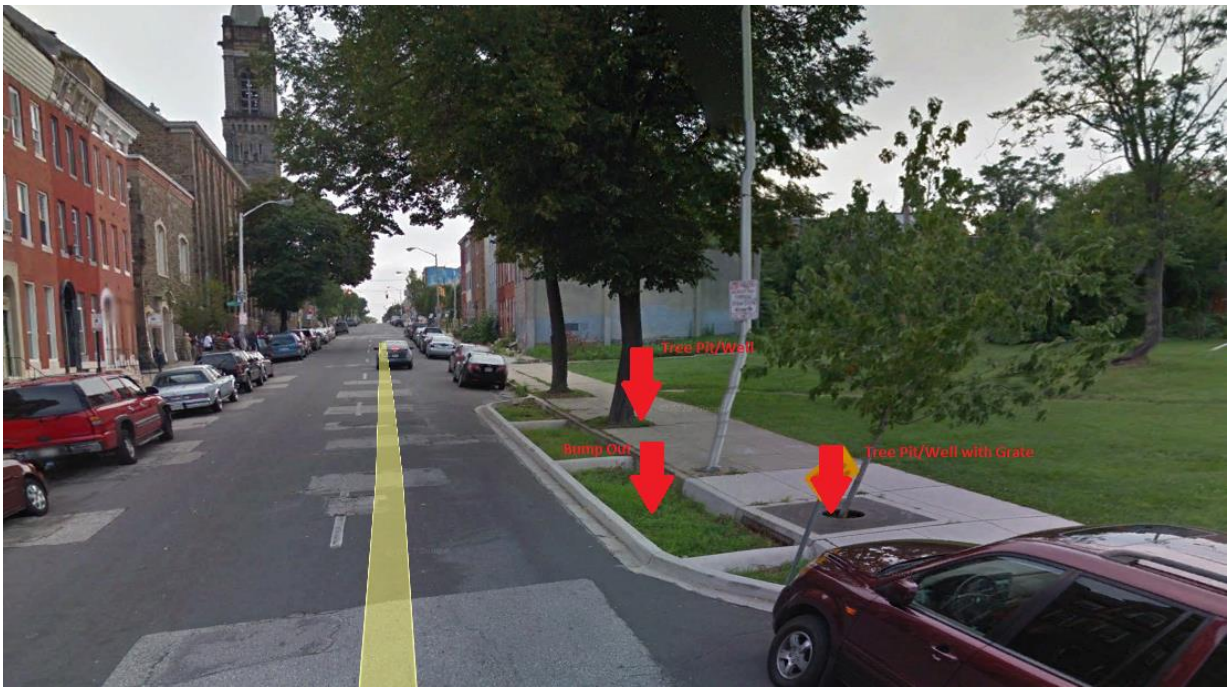


Figure 1: Example of a Bumpout, Tree Pit/Well, and a Grate over a Tree Pit/Well.

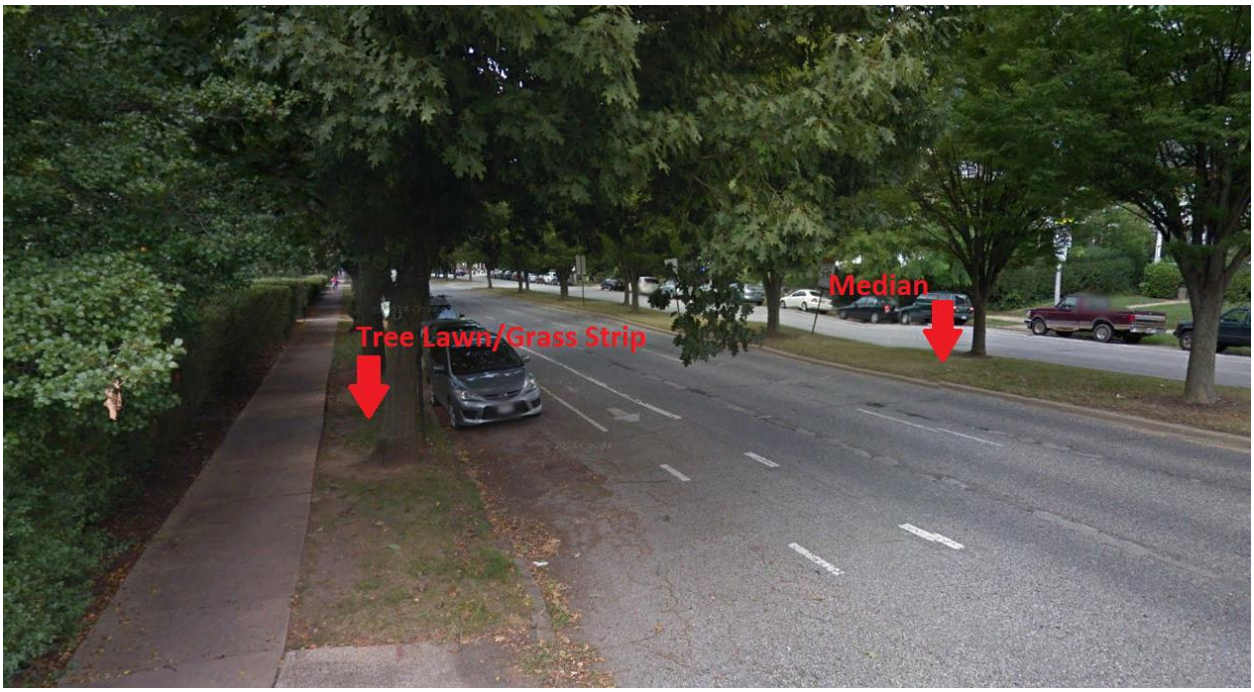


Figure 2: Example of a trees in a Median and Tree Lawn/Grass Strip.

Figure 3: Examples of trees planted in an Island.

Figure 4: Example of a tree in a Planter/Raised Bed

Figure 5: Example of trees in an Open/Unrestricted area of a park.

Figure 6: Example of a tree in a Natural Area. Typically individual trees will not be collected in theses areas, but a line for natural area “bc_forestry_natural” will be collected if it is in the ROW.

Figure 7: Examples of a “fence row” where trees are present. Individual points would not be collected here, but a line would be collected in the “bc_forestry_natural” feature class if the fence was in the ROW.

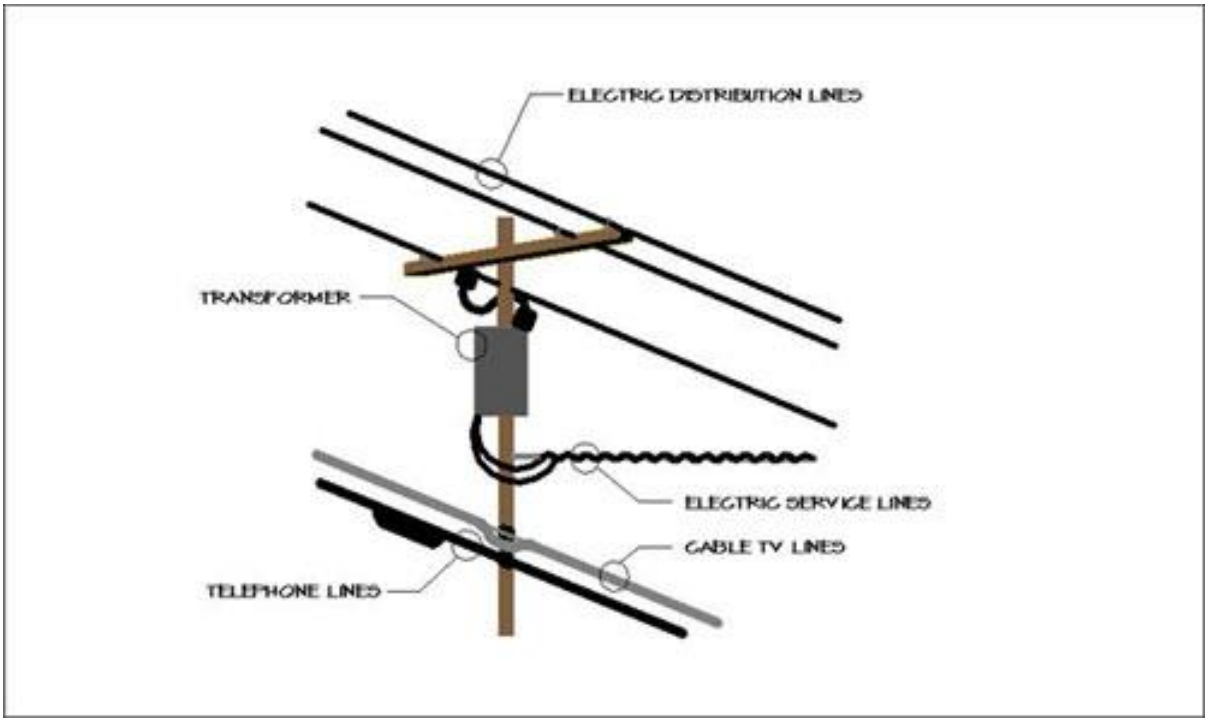


Figure 8: Example of typical utility pole configuration depicting the location of electric lines and communication lines.

Figure 9: A paver vs. a steel grate hardscape.

Figure 10: This diagram demonstrates how "Lot Side" is assigned. NOTE: Opposite is only used if the address for the actual location is hard to find, a very large property, or park opposite a residence.

Figure 11: Row houses are very common in Baltimore. The address of the row house directly adjacent to the tree should be recorded. To determine where one row house ends and the next begins look for changes in trim paint, brick, and curtain style/color. If the tree appears to be exactly between two row houses one of the addresses should be recorded if visible and the fact that the tree is between two addresses should be recorded in the notes. For example "Between 1122 and 1124".

Figure 12: Four examples of trees in “Good” condition.

“Good” definition: Full canopy, minimal to no mechanical damage to trunk, no branch dieback over 2” in diameter, no suckering (root or water sprouts), form is characteristic of species.

Figure 13: Four examples of trees in “Fair” condition.

“Fair” definition: Thinning canopy, new growth in medium to low amounts, tree may be stunted, significant mechanical damage to trunk (new or old), insect/disease is visibly affecting the tree, form not representative of the species, premature fall coloring on foliage, needs training prune.

Figure 14: Five examples of trees in “Poor” condition.

“Poor” definition: The tree is declining, visible dead branches over 2” in diameter in canopy, significant dieback of other branches in inner and outer canopy, severe mechanical damage to trunk usually including decay from damage. New foliage is small, stunted, or minimal amount of new growth, needs priority pruning of dead wood. Some poor trees will be removals, and others may become fair with some corrective action such as pruning.

Figure 15: A couple examples of “Dead” trees.

“Dead” definition: Standing dead tree, little or no signs of life with new foliage, bark may be beginning to peel a few suckers or water sprouts may be present.

Figure 16: An example of what would be recorded as “Sprouts”.

“Sprouts” definition: Only a stump of a tree is present with one or more water sprouts of 18” or greater in height growing from the remaining root system.

APPENDIX A

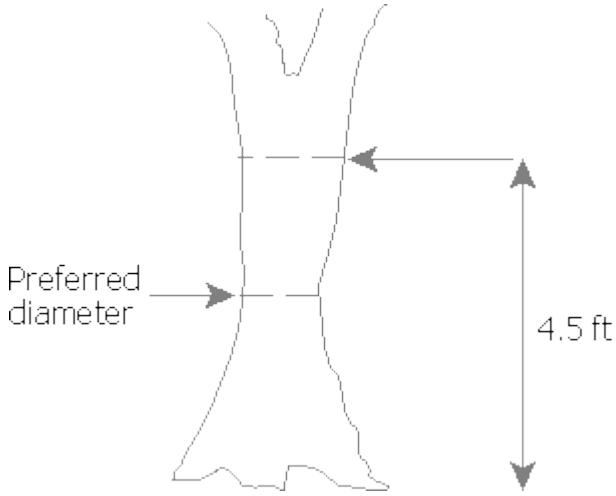
Simplified guide to measuring DBH

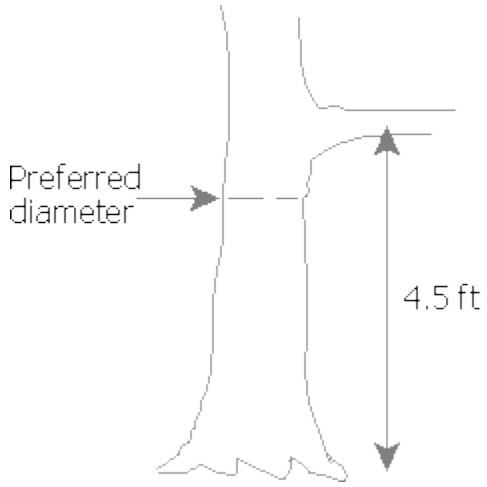
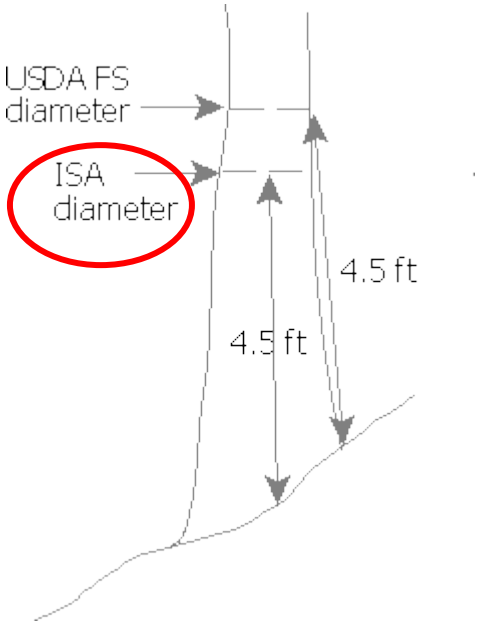
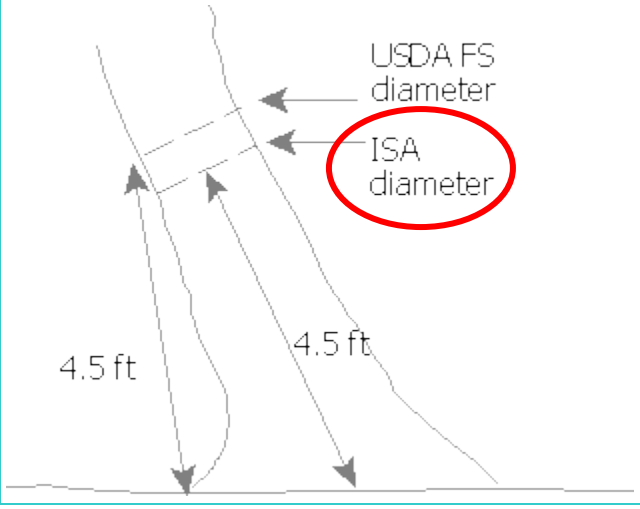
In the US, tree diameter is usually measured at 4.5 ft (137 cm) above ground level. Measurement at this height is referred to as diameter at breast height or DBH. DBH can be measured with a specially calibrated tape measure called a diameter tape (d-tape) available from arborist or forestry supply dealers. In a tree with a clear gradually tapering trunk, measuring DBH is straightforward, but there are a number of circumstances in which questions arise about how to measure DBH. The following guide can be used to solve some of the more common complications. In the guide below we have generally used the simplest methods we found recommended in other sources. Other guides with illustrations can be found at:

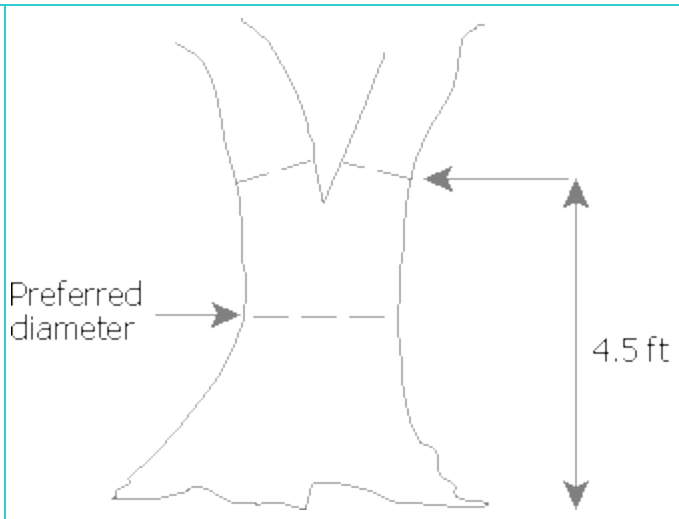
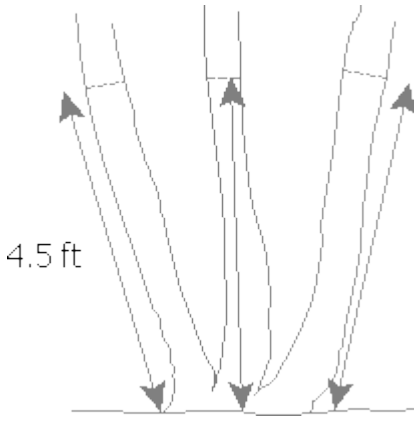
The Tree Register of the British Isles - http://www.tree-register.org/tree-conservation.htm

Canada's National Forest Health Monitoring Plot Network Manual on Plot Establishment and Monitoring (Revised) from the Environment Canada Ecological Monitoring and Assessment Network (EMAN) site - http://www.lib.unb.ca/Texts/Forest/arnews_site/arnews_e/arnews_e.pdf

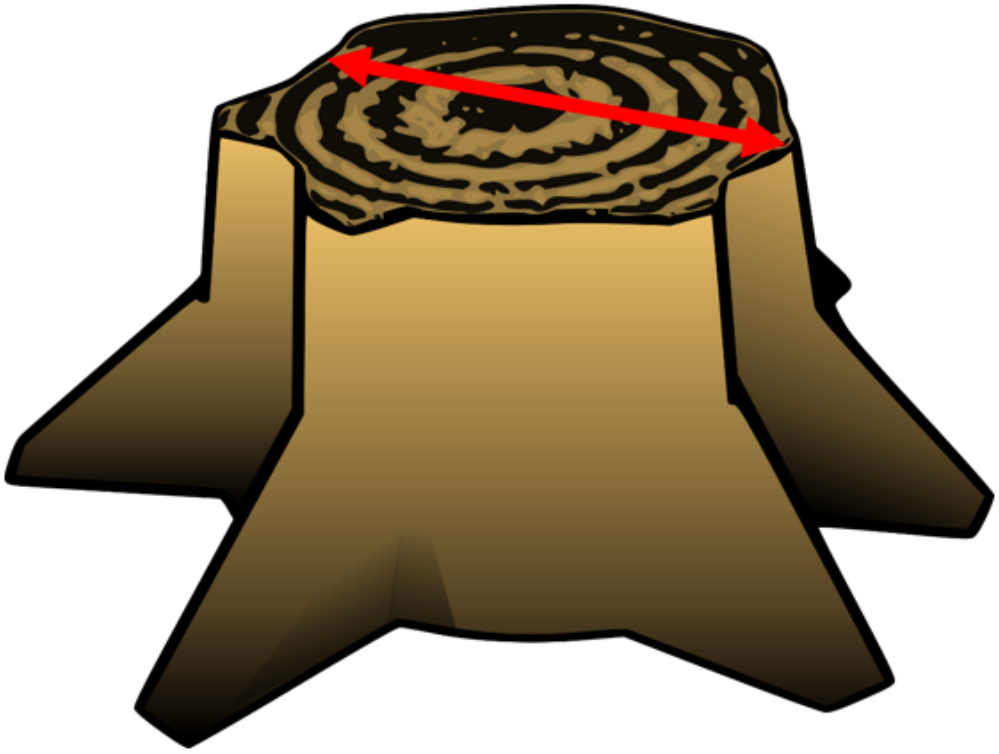
USDA Forest Service's Forest Inventory and Analysis (FIA) program manual Phase 2 Measurement Field Guide Version 4.0 -(rules for determining DBH heights for forked trees become very complicated in this manual)

1. **The tree tapers in such a way that the diameter at a point below 4.5 ft is actually smaller than the diameter at 4.5 ft.** Measure diameter at the smallest point and record the height at which diameter was measured on the data sheet. For example, if the tree diameter is smaller at 3.5 ft measure the DBH at 3.5 ft, and then indicate the height you measured the tree at in the notes field "DBH at 3.5ft".	

2. **Tree has branches or bumps which interfere with DBH measurement.** Measure DBH below the branch or bump. Some references say to measure a foot below the branching point, which assumes this point is the smallest diameter of the trunk below 4.5 ft. US Forest Service measures DBH immediately above point were bumps or branches cease to affect diameter of the stem. The underlying concept is to measure the diameter that would be closest to the expected DBH if branches or other irregularities were not present. Record the height at which the diameter measured. Once again be sure to indicate the height the tree is measured at in the notes field if it is not measures at 4.5 ft.	
3. **Vertically growing tree is on a slope.** There are several commonly accepted ways to find the DBH height. Probably the easiest method is to measure diameter 4.5 ft from the ground on the upper side of the slope. This method is used by the US Forest Service. Some references (e.g., International Society of Arboriculture Tree Appraisal Manual) say to measure 4.5 ft from the midpoint of the trunk along the slope. However, finding the location of the trunk midpoint is probably subject to more error than finding the upper side of the trunk, so the USFS method is likely to be more repeatable than the ISA method.	
4. **Tree leans.** There are several commonly accepted ways to find the DBH height. The US Forest Service measures 4.5 ft up the stem in the direction of the lean. Some references (e.g., ISA) say to measure 4.5 ft from the midpoint of the lean. As noted under 3 above, the USFS method is probably less prone to error and more readily repeatable by different observers.	

5. **Tree forks below DBH or near DBH.** The measurement is recorded at the narrowest part of the main stem below the fork. The height of the DBH measurement and the fork should be noted (e.g., 3 ft diameter @ 2 ft [Forks @ 4 ft]).	
6. **Tree splits into several trunks close to ground level.** Measure DBH of each trunk separately, using the principles shown in categories 1-5 above. The DBH for the tree is found by taking the square root of the sum of all squared stem DBHs. **Example:** **Step 1:** The three trunks shown to the right measured 8", 4" and 6" DBH. **Step 2:** "Square" each of these: 8x8=**64**, 4x4=**16**, 6x6=**36**. **Step 3:** Find the sum of these; in other words, add them: 64+16+36=**116** **Step 4:** Find the square root of this sum: √116=10.77 (Round this to **11"**) **For this tree inventory only the largest 5 stems will be measured for trees with more than 5 stems.**	

NOTE: If a tree is less than 4.5 feet tall or has a DBH of less than 1 inch, the diameter should be measured at 12 inches (one foot) above ground for this project.



Stump diameter should be measured on the cut surface.