How to Conduct a Street Tree Sample Inventory

If you are not sure how many street trees you have or how much to budget for maintenance, a sample inventory can give you reliable, big-picture numbers within a short time frame. Inventorying just 5 percent of your total street trees can characterize your entire street tree population and provide data for planning purposes.

The number of miles of street in your community multiplied by 5 percent determines the ideal number of street miles you should inventory. A map of the community is overlayed with a grid, creating inventory plots of a manageable size. Plots are randomly selected and then street miles within the plots are measured out until the number of required sample inventory miles are reached.

Several tools are available online to assist in generating maps, randomly selecting inventory plots, and measuring out the actual inventory locations. For assistance with a sample inventory contact your local state Urban Forester.

Data are collected and entered into a spreadsheet or database for sorting and easy retrieval. Results from the sample inventory are multiplied by 20 to achieve a sufficiently accurate estimate for your entire community.

BENEFITS

- Lower cost and less time-consuming than a full inventory.
- Assists with maintenance budgeting.
- Helps determine tree diversity.

LIMITATIONS

- Good for large numbers and generalizations, but poor for small numbers and specifics.
- Missed tree species due to too few sample plots.
- Quantity of dead trees known, but not location.

DATA COLLECTION

- Tree species
- Size (diameter 4.5 ft above ground level)
- Condition
- Maintenance needs
- Size and number of planting sites (assists with future planning)
- Tree locations

How Many Street Miles Should You Inventory?

Determine how many street miles are in your community and multiply by **5** percent.

STEP 1: DETERMINE HOW MANY STREET MILES ARE IN YOUR COMMUNITY.

The local engineering department may be your best resource. They likely know the number of lane miles for plowing or paving. A two-lane road would have two lane miles per one street mile, so there might be a little math involved – more if you have to calculate 3-, 4- or 5-lane roads.

STEP 2: MULTIPLY BY 5 PERCENT.

HOW TO CALCULATE

	[ ]	Street Miles Total
x	0.05	(5 Percent Sample Size)
=	[ ]	**Miles Needed for Sample Inventory**

Example A

	70.00	Street Miles Total
x	0.05	(5 Percent Sample Size)
=	3.50	**Miles Needed for Sample Inventory**

Which Streets/How Many Streets Should I Inventory?

Divide the total number of street miles in your sample by a reasonable sample size. (We chose ¼ mile because it is a manageable distance to inventory). This gives you the number of sample areas you need to inventory. Using a map, a grid, and some randomly generated numbers, determine the areas where you are going to conduct your sample inventory. Google Maps is an invaluable tool to plot the sample areas. Sample areas should be chosen impartially and should be at least ¼ mile apart.

STEP 3: CALCULATE THE NUMBER OF SAMPLE AREAS.

One-quarter mile is a manageable distance for inventorying. Divide the miles of inventory needed by **0.25** to get the number of sample areas you need.

HOW TO CALCULATE

	[ ]	Miles Needed for Sample Inventory (from previous)
÷	[ ]	Size of Sample Area in Miles
=	[ ]	**Number of Sample Areas Needed**

Example B

	3.50	Miles Needed for Sample Inventory
÷	0.25	Size of Sample Area in Miles
=	14.00	**Number of Sample Areas Needed**

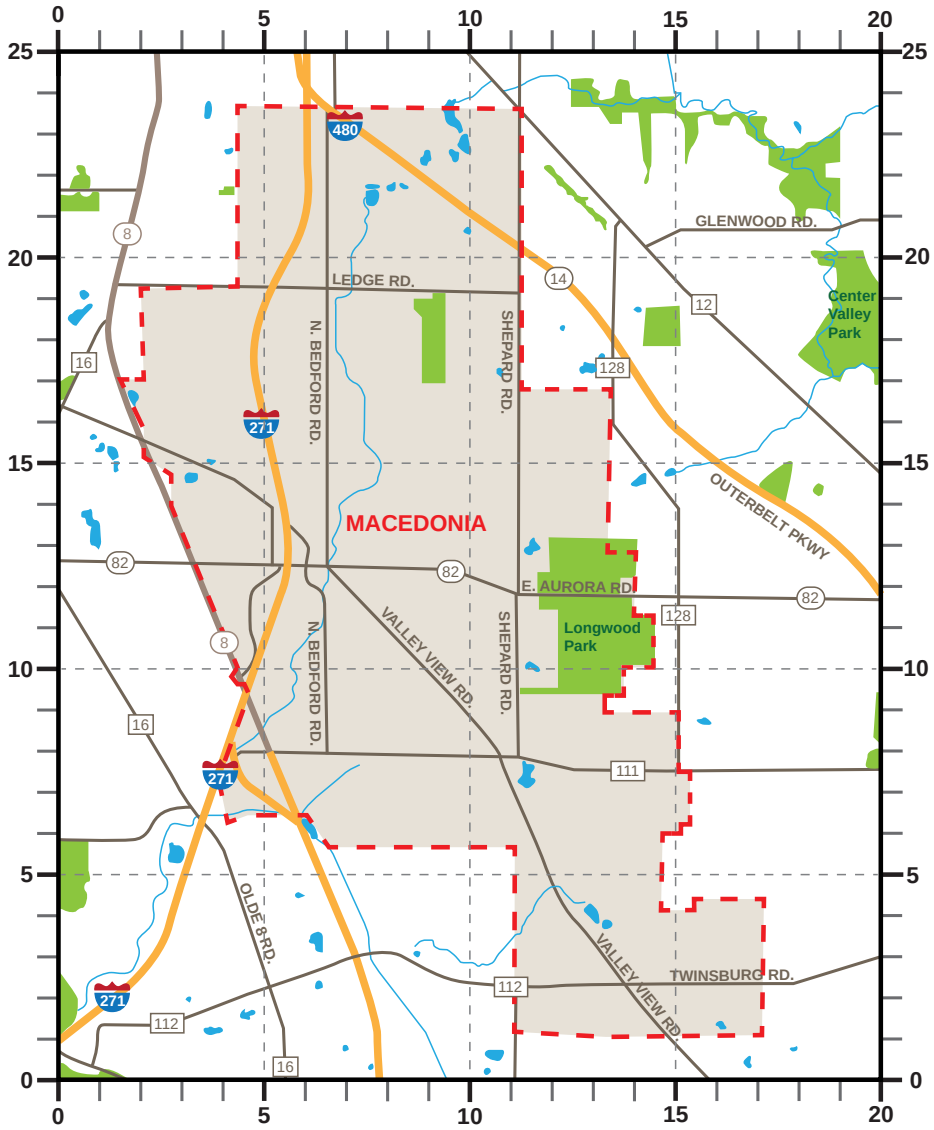
Using the example numbers, you would need to inventory 14 random areas that are ¼-mile long and at least ¼-mile apart in order to have a valid sample of your entire community.

STEP 4: CREATE A GRID.

Start with a to-scale map showing the boundaries of your community. Mark off equal-length units across the top and bottom of the page, being sure to start measuring from the same edge of the map. Then repeat along the left and right sides of the map.

The size of the grid depends on the size of your community and the size of your map: If you have a map that mostly fills an 8.5 x 11 sheet of paper, a half-inch is a good choice. If you are using a poster-size map or other larger size, you might want to make the grid with one- or two-inch squares.

Right: A map showing the community boundaries is marked off to make a grid. The map in this example is a screen capture from Google Maps; the red dashed line depicts city limits.



STEP 5: RANDOMLY CHOOSE AND MARK THE LOCATIONS OF THE SAMPLE AREAS.

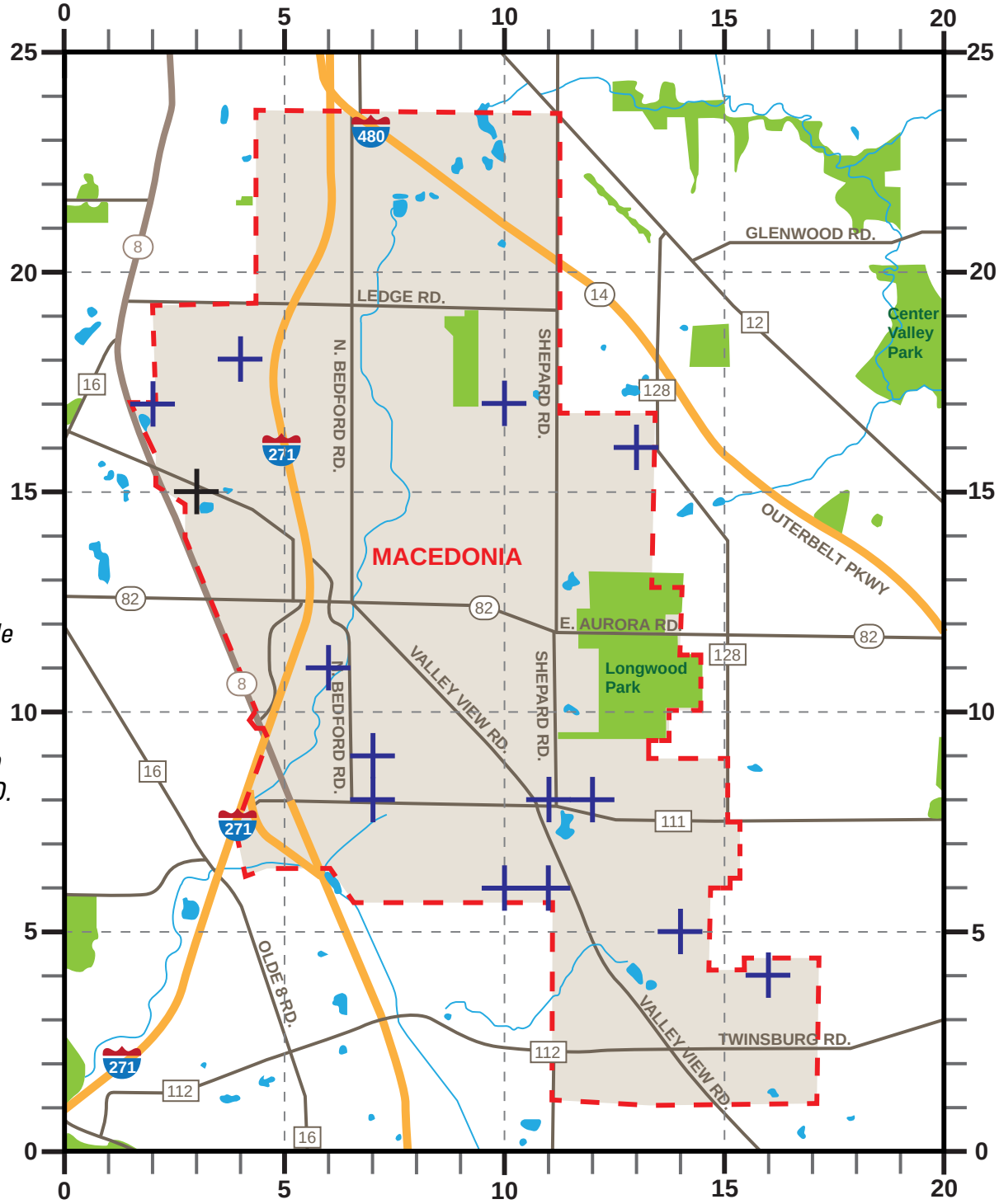
There are a number of ways to choose areas randomly. We suggest using a random number generator to create the 14 **x**- and **y**-coordinate pairs. (See worksheet on how to use random.org). Using your gridded map, locate the 14 points and mark them.

Example C

*We are looking for 14 sample areas that are ¼-mile long. We used a random number generator (random.org) to get a list of **x**- and **y**-coordinate pairs. It generated many more pairs than we needed and not all of the coordinates fell inside the community boundary on our map. Once we locate 14 coordinates that fall within the map, we can continue to plot the sample inventory locations.*

Example Sample Pairs:
x=2, y=17
x=11, y=8
x=7, y=9
x=7, y=8
x=11, y=6
x=4, y=18
x=3, y=15
x=10, y=17
x=14, y=5
x=10, y=6
x=13, y=16
x=16, y=3
x=12, y=8
x=6, y=11

Note: Sample pair x=3, y=15 are coordinates used in Step 6: Example D.



STEP 6: DETERMINE SAMPLE INVENTORY AREAS

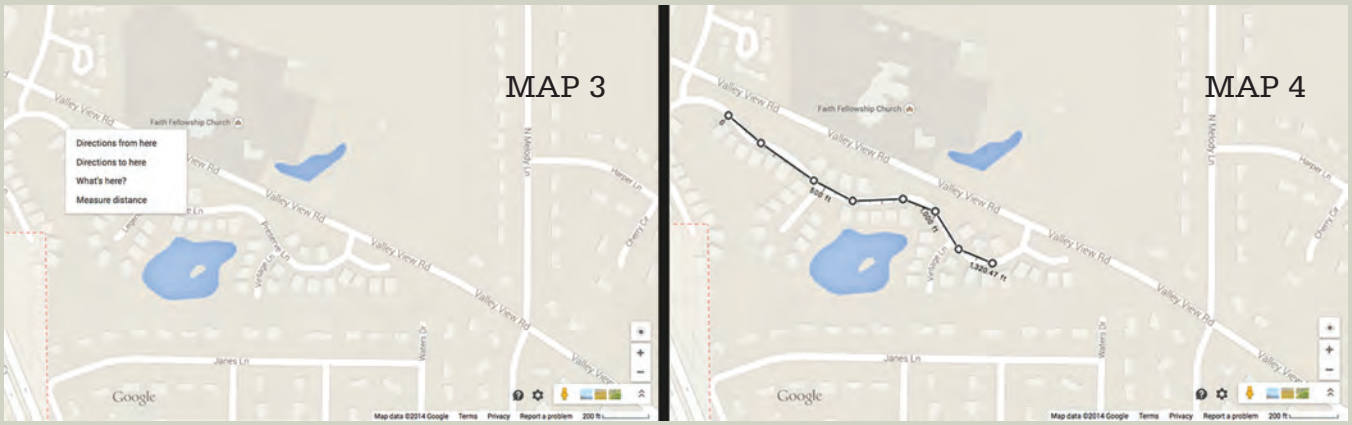
You will need a map that shows very detailed, street-level information to locate the plots. Google Maps (online) is one of the best tools for this step. Whichever map you use, it has to show individual streets and the scale must have a measurable distance for your sample size.

Starting from the marked plot points, find the nearest street and measure a sample inventory area for your sample size (we used ¼ mile). Do this for each of the coordinates. Record the starting and ending location so the person doing the field work has clear indication of where to begin and where to end.

Be sure the plots are at least as far away from each other as the sample size. In our example, this means that no area being inventoried is closer than ¼ mile to another inventory area.

Example D

Return to Google Maps and zoom in on the street closest to a set of plot coordinates. Identify a starting point that you can easily find when you are on the street. We used the pair x=3, y=15. Left-click on the map location and select "Measure Distance" (Map 3). A black circle will appear. Find the next intersection on the other side of the plot coordinate and click so that a ruler appears. Adjust the line to follow the road (Map 4). Lengthen or shorten the line to read 1320 feet (¼ mile). If you need to turn the corner to get 1320 feet, click up the street. This line now becomes your sample plot. Print the map for your field work. Repeat the process for all 14 samples.



STEP 7: DATA COLLECTION

Once you have sample areas that give you a 5 percent tree survey, your next step is to collect data on the trees. Collect data from both sides of the street. With a sample inventory tree data is the most important information: tree species, size (DBH), condition and maintenance needs. These can all be extrapolated to the trees in the rest of the community to answer many of your management questions. Please consider collecting data on planting sites as well: number and size (large, medium, small). This will give you a good idea about your stock rate.

You also may want to collect tree location data: address, cell, or block side. Although not needed for a sample inventory, it would be useful if you foresee doing a full inventory in the next 5 to 8 years. It may also help in the case where more immediate maintenance is needed – for taking care of dead or diseased trees.

STEP 8: USING THE DATA TO ANSWER YOUR QUESTIONS

Enter the data into a spreadsheet or database for easy sorting. Based on the type of data you collected, you can estimate the answer for your entire community. If 40 percent of the trees in the sample inventory are maples, then it is likely that about 40 percent of your community's trees are maples. If you are looking for the number of street trees that need to be replaced in your community, multiply the number in your sample inventory by 20. The sample inventory covered 5 percent of street trees, so multiplying by 20 will give you an estimate of the street trees in your community.

A sample inventory is a tool that can help your community make wise decisions and use public funds efficiently and effectively. For assistance with your sample inventory contact your local state Urban Forester.