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Virtual Street Tree Surveys in Google Street View

Hello, thank you for participating in our study! The information below will link you to important study documents including technical guidance and data collection forms.

Study overview. Street tree inventories are important for urban forest management, but costly to conduct in the field. This project will investigate the use of Google Street View in Dolton, IL to generate street tree data and reduce the need for field work. In particular, the investigators are interested in quantifying the overall performance of virtual surveys in Street View compared to field surveys; to do this, participants will navigate through a city using Street View and record estimated characteristics about street trees including species, size, and mortality status.

The following links will guide you through the study procedures. Please work through these documents *in 1-2-3 order* to familiarize yourself with the study procedures before collecting data.

1. **Informed Consent and Participant Questionnaire [link removed, see document S1]**: *Please complete this questionnaire before collecting any data.* Your responses will be used to associate your self-assessed level of expertise with the data you generate to understand how expertise relates to data quality.

2. **User Manual**: Prior to collecting data, use these resources to familiarize yourself with the study procedures. Includes links to instructional videos that demonstrate study protocols.

3. **Collect Data:** Use the Street Segment List and the Tree Data Collection Form to collect data about street trees. The Tree Identification Guide and DBH reference sheet are provided to assist you in the data collection process. The User Manual contains more details on data collection.

> **Street Segment List [link removed]**: You will collect data along these street segments. Begin at Segment 1 and proceed down the list. You are not required to complete the entire list, but we sincerely appreciate you completing as many segments as possible!

> **Tree Data Collection Form [link removed]**: Your personalized data form. You can open and close this document, and resume data collection later as your schedule permits.

> **Tree Identification Guide [link removed, see document S4]**: Provides pictures of the most common street trees in the Upper Midwest, along with internet links to more information to help identify trees.

> **DBH Reference Sheet [link removed, see document S3]**: Examples of trees in each diameter class for your reference. Each tree is linked, so you can view it directly in Google Street View. The species name is also provided so you can view examples of that species to aid in identification.

If you have any questions or difficulties completing this work, please contact Dr. Adam Berland by email (amberland@bsu.edu) or phone (765-285-1334).

User Manual for Virtual Street Tree Surveys in Google Street View

Please read this document before completing virtual street tree surveys in Google Street View. If you have questions about any aspect of the study, please contact Dr. Adam Berland by email (amberland@bsu.edu) or phone (765-285-1334).

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## What is a street tree?

Street trees are *trees* that are *planted* in the *public right-of-way* along streets. Let's define those terms.

- *Trees*: We will consider a *tree* to be any woody vegetation with an upright growth form. It will usually be obvious if you're looking at a tree, but some plants are tougher to classify. Follow these rules:

    o Do not include lower growing shrubs that do not have a primary trunk growing up from the ground. Shrubs will not have an upright form, and may have many stems emerging from the ground.

    o Do not include non-woody plants such as perennial flowers.

- *Planted:* Only include open-grown trees that appear to have been planted (that is, they were intentionally placed by humans rather than growing naturally). In the image at right, you *would not* include the trees on the right side of the street because they do not appear to have been planted by people.
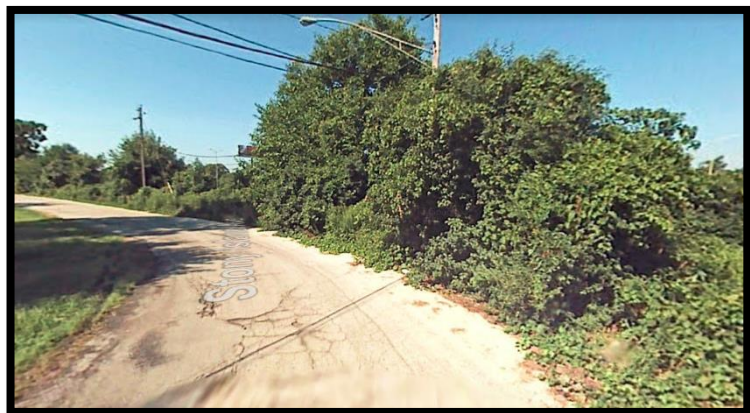
- *Public right-of-way:* The public right-of-way is space for streets, sidewalks, public utilities, and trees. It extends outward from the center of the street to include the entire street and some land adjacent to the street. In suburban settings, the right-of-way typically extends to the outer edge of both sidewalks, so street trees are those trees planted in the planting strip between the street and the sidewalk. The extent of the right-of-way is pictured below in red – you should include any trees planted in this zone.


  o When there is a grass planting strip between the street and sidewalk, any trees planted *beyond* the sidewalk in private yards *should not* be included in this study.

  o When there is no sidewalk present, the right-of-way extends about 10 feet beyond the street. Use your judgment to determine whether you will include a tree or not. Objects like fire hydrants, road signs, and utility poles will be located in the right-of-way, so trees in line with those objects are likely street trees that should be included.

  o When the sidewalk is immediately adjacent to the street (that is, there is no planting strip between the street and the sidewalk), the right-of-way typically extends a few feet beyond the sidewalk into the yard. Use your judgment as to whether trees in these settings appear to be street trees or should be excluded as private trees.

What is a street segment?

You will collect data along a random sample of individual street segments. A street segment is the portion of a street between two intersections. In the image below, individual street segments are shown in different colors, and they begin and end at red dots.

When you inventory street trees along a street segment, include any trees found in the right-of-way associated with the street segment of interest. Consider the diagram below, in which streets are shown in dark gray, street centerlines are shown in brown, and sidewalks are shown in light gray. For Segments 1 and 2, the right-of-way extends out from the street centerline to the dashed line, which includes the yellow planting strip areas marked A for Segment 1, and the blue planting strip areas marked B for Segment 2. Any trees found in the areas marked A should be recorded for Segment 1, and any trees in the areas marked B should be included for Segment 2.
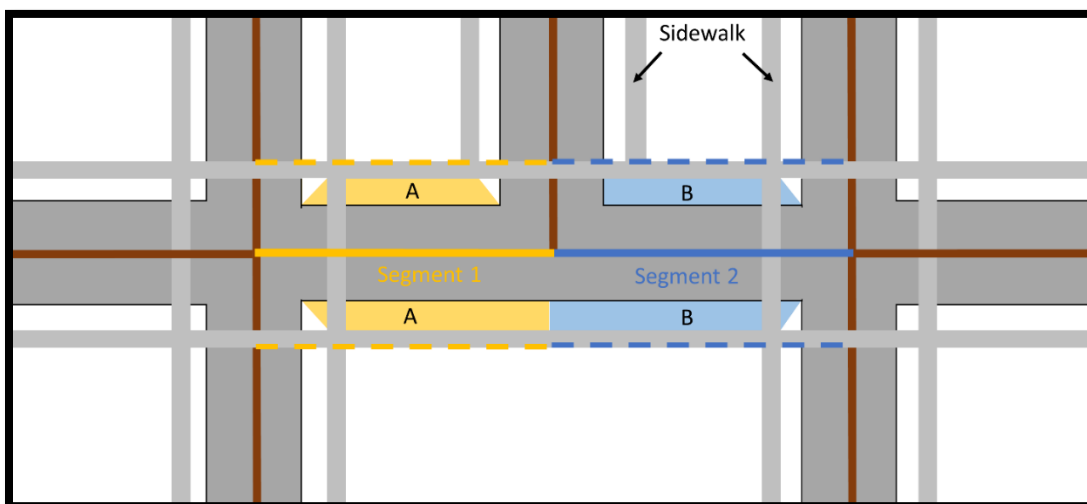
Instructional videos

Now that we have defined some terminology related to this project, the videos below will demonstrate the procedures for using Google Street View to collect data about street trees.

The data forms and resources referenced in these videos were delivered with your project documents. If you have trouble using any of these resources, or experience problems completing the survey, please contact Adam Berland via email (amberland@bsu.edu) or phone (765-285-1334).

Is this a street tree? What is the right-of-way? (https://youtu.be/Vizr21TjPBQ)
> Provides guidance to help you decide if a plant qualifies as a street tree. Is it a tree? Was it planted? Is it in the right-of-way?

Estimating tree diameter (https://youtu.be/FJtaFhz1lYo)
> Guides you through the reference materials provided to help estimate diameter at breast height (DBH), and covers the technique for dealing with trees with irregular trunks or multiple stems. View & download the DBH reference guide here [link removed – see document S3].

Tree identification (https://youtu.be/6ear_1yJ0h0)
> Provides guidance on identifying trees to the genus and species levels. You can view & download the tree identification guide here [link removed – see document S4]. This document shows the most common street trees in the Upper Midwest, but you may encounter trees that are not included in this list.

Tree data collection (https://youtu.be/y31QNXJXJ9w)

> Outlines the procedure for recording tree observation data in the Google Sheets data collection form.

> *Note: The 'Root Suckers' column shown in this video was intentionally removed from your data collection form. Do not worry that you are missing that column.*

How to collect data

This is a brief overview of the data collection procedure. The instructional videos above demonstrate these procedures in greater detail – do not collect data until you have watched the videos.

<u>Using the Street Segment List to survey streets</u>

1. Open the Street Segment List [link removed] and your personalized Tree Data Collection Form [link removed].

2. Begin by clicking on Segment 1 in the Street Segment List (or if you are resuming data collection after an earlier session, pick up where you left off). This link will take you to the starting point for the segment.

    a. Note the *from* and *to* intersections listed on the Street Segment List. Make sure you only collect data between these intersections.

    b. Navigate down the *left* side of the street.

        i.   If you encounter a street tree on the left side of the street, record it on the Tree Data Collection Form by filling in columns A-H.

        ii. Record all street trees present on the street segment in a separate row of the data form.

        iii. If there are no street trees present on the left side of the street segment, record the segment number and enter *no* for 'Tree present?' in column B. A value of *no* is important to indicate you surveyed the street segment and found no trees.

3. Next, click the link for Segment 1 *again* in the Street Segment List. This time, survey the right side of the street for street trees. Record data for the right side of the street as described in the previous step.

4. Proceed down the Street Segment List in order. You may stop working and resume later. When the Tree Data Collection Form says *All changes saved in Drive* near the top of the page, you can close the window and your data will be saved for you to resume later.

<u>Entering data in the Tree Data Collection Form</u>

1. Enter each tree in a separate row. If there are no trees on a street segment, select the Segment ID in column A, select *no* in column B, and leave the rest of the columns blank.

2. Guidance for each column in the data form:

    A. **Street Segment ID**: Select the segment number *and* side of the street. Please collect all data for the left side of the street, then click the link again in the Street Segment List to start from the beginning of the segment and survey the right side of the street.

B. **Tree present?:** Is there a street tree present?

    i. If yes, select *yes* and complete a separate row for each tree on the street segment. The cell will turn red until you have filled out all the required information for the tree.

    ii. If no, select *no*, leave the rest of the row blank, and proceed to the next street segment.

C. **Street address number**: Enter the street address number of the tree's location, which is given in the upper lefthand corner of the Street View interface. If no address appears in the Street View interface, describe the location of the tree.

D. **Diameter class**: Use your judgment to estimate the tree's diameter at breast height (DBH). Select a diameter class from the dropdown list. Follow guidance in the DBH reference guide [link removed – see document S3] for estimating DBH.

E. **Mortality status**: Indicate whether the tree appears to be alive, standing dead, or a stump.

F. **Genus**: Select the genus from the list. If the genus is not listed, choose 'Other' and provide the genus and species below. Please provide a best guess whenever possible, but select 'Unknown' if you absolutely cannot identify the tree.

G. **Species:** Common or scientific names are acceptable. The tree identification guide [link removed – see document S4] provides information on common street tree species. No species required for the following smaller ornamentals: crabapple, cherry, dogwood, hawthorn, serviceberry.

H. **Identification confidence:** Indicate your degree of confidence in the identification.

I. **Other notes:** *(not required)* Anything else to note about this tree? For example, does it have multiple-stems? Are you unsure if it is located in the right-of-way? Is it in poor condition though technically still alive?

J/K. **Time started/finished:** Do not modify these cells. A time stamp will be generated automatically when you start and finish recording data for the tree. We are recording this information to compare the pace of data collection using this type of survey vs. traditional field data collection techniques.

Questions? Please contact Dr. Adam Berland by email (amberland@bsu.edu) or phone (765-285-1334).