Tree Preservation Board Regular Meeting

Agenda

July 27, 2021 @ 5:00 pm

Winter Park Community Center
721 W New England Ave
Winter Park, FL 32789

welcome

Agendas and all backup material supporting each agenda item are accessible via the city's website at cityofwinterpark.org/bpm and include virtual meeting instructions.

assistance & appeals

Persons with disabilities needing assistance to participate in any of these proceedings should contact the City Clerk's Office (407-599-3277) at least 48 hours in advance of the meeting.

"If a person decides to appeal any decision made by the Board with respect to any matter considered at this hearing, a record of the proceedings is needed to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based." (F.S. 286.0105).

please note

Times are projected and subject to change.

agenda	time

1. **Call to Order**

2. **Consent Agenda**

   a. Minutes Approval - June 22, 2021 — 5 minutes

3. **Staff Updates**

   a. Tree Preservation Board Overview — 10 minutes
      - Goals & Discussion

   b. Code Compliance Protocols — 20 minutes
      - Staff trained with Code Compliance Manager.
      - Developing standards of protocol.
        - Code complaint response.
        - Issuance of Code Violations.
        - Obtaining compliance.
        - Process for non-compliance.
      - Code Enforcement Board vs Tree Preservation Board Roles
        - Tree Preservation Board hears appeals of denied tree removal permits.
        - Code Enforcement Board handles all other code compliance matters.

   c. Tree Barricade Reference Material Update — 10 minutes

   d. Tree Equity Score — 10 minutes
      - Review https://treeequityscore.org/
      - Review ongoing Urban Forestry project for increasing canopy coverage in the CRA
        - Data sources and methodology
        - Field assessment and implementation
        - Current status of the project
        - Discuss challenges related to planting space, soil quality, species selection and social acceptance of trees in historically underserved neighborhoods

4. **Citizen Comments (for items not on the agenda): Three minutes allowed for each speaker**

5. **Action Items**

6. **Board Comments**

7. **Adjournment**

Tree Preservation Board agenda item

item type Consent Agenda	meeting date July 27, 2021
prepared by Kesha Thompson	approved by
board approval	
strategic objective	

subject
Minutes Approval - June 22, 2021

motion / recommendation

background

alternatives / other considerations

fiscal impact

ATTACHMENTS:
0622.21 Minutes.pdf

Tree Preservation Board Minutes

June 22, 2021

Hybrid

Winter Park Commission Chamber
401 Park Ave South, Winter Park FL 5:00pm

Board Members Present

Jill Bendick, John Nico, Christina Schloot, Melanie Love, Steve Carras, Kim Ashby

Board Members Absent

Meggen Wilson

Call to Order

Meeting called to order by Jason Seeley at 5:00pm

Selection of New Board Chair & Vice Chair

Motion made by Melanie Love to nominate Kim Ashby as Chair and John Nico as Vice Chair, seconded by Steve Carras. Motion carried unanimously

Consent Agenda

Approval of Minutes- April 27, 2021

Motion made by Jill Bendick to approve the April 27, 2021 meeting minutes; seconded by John Nico. Motion carried unanimously

Staff Updates

a. **Urban Forestry Program Overview**
   Josh Nye provided the board with an update of the Urban Forestry Program and the scope of work for the division. Staff also informed the board members of Florida Statue 163.045 regarding residential permitting, which impacts the ability to enforce the tree preservation ordinance on residential property. Board members inquired on ways to inform residents on the importance of protecting the tree canopy.

b. **Tree Preservation Board Approved Ordinance Revision**
   The revision of the Tree ordinance was finalized and approved with the previous board. Planning & Zoning will vote on the ordinance revision then the revision will have two readings at the Commission Meeting. Josh gave an update on the permit denial that came before the board in March.

c. Planting Guide

Development of a supplemental guide will begin once the ordinance revision is complete. The document will provide information relevant to the public regarding standards, procedures and requirements for a range of tree related issues. As a supplemental to the ordinance, the guide may be more easily updated than a code revision. Board members suggested lignin the fee schedule in the supplemental guide. Board members suggested educating the residents, on hiring qualified contractors.

Citizen Comments

Action Items

Board Comments

Chairwoman suggested a designated house/specimen area for all things Urban Forestry. Board member Nico inquired/suggested an action plan for the board.

Adjourn Motion made by Steve Carras to adjourn the meeting seconded by Melanie Love; motion carried unanimously. Meeting adjourned at 6:44pm

Next Meeting: July 27, 2021

Tree Preservation Board

agenda item

item type Staff Updates	meeting date July 27, 2021
prepared by Kesha Thompson	approved by
board approval	
strategic objective	

subject

Tree Preservation Board Overview

item list

- Goals & Discussion

motion / recommendation

background

alternatives / other considerations

fiscal impact

Tree Preservation Board agenda item

item type Staff Updates	meeting date July 27, 2021
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strategic objective	

subject

Code Compliance Protocols

item list

- Staff trained with Code Compliance Manager.
- Developing standards of protocol.
  - Code complaint response.
  - Issuance of Code Violations.
  - Obtaining compliance.
  - Process for non-compliance.
- Code Enforcement Board vs Tree Preservation Board Roles
  - Tree Preservation Board hears appeals of denied tree removal permits.
  - Code Enforcement Board handles all other code compliance matters.

motion / recommendation

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Tree Preservation Board

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Tree Barricade Reference Material Update

motion / recommendation

background

alternatives / other considerations

fiscal impact

Tree Preservation Board

agenda item

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strategic objective	

subject

Tree Equity Score

item list

- Review https://treeequityscore.org/
- Review ongoing Urban Forestry project for increasing canopy coverage in the CRA
  - Data sources and methodology
  - Field assessment and implementation
  - Current status of the project
  - Discuss challenges related to planting space, soil quality, species selection and social acceptance of trees in historically underserved neighborhoods

motion / recommendation

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alternatives / other considerations

fiscal impact

ATTACHMENTS:
UF IFAS Site Analysis Guide.pdf

ATTACHMENTS:
20201209_11034411371_44_Suitability_for_Hand_Planting.pdf

ATTACHMENTS:
USDA Soil Map.pdf

ATTACHMENTS:
USDA Soil Reaction (pH).pdf

ATTACHMENTS:

SParks Copi21072116510.pdf

CHAPTER 7

CHOOSING SUITABLE TREES FOR URBAN AND SUBURBAN SITES: SITE EVALUATION AND SPECIES SELECTION

PUBLICATION Nº
ENH 1057

EDWARD F. GILMAN
LAURA SADOWSKI

UF UNIVERSITY of FLORIDA
IFAS Extension

Introduction

Selecting the right tree for a particular place can avoid costly disappointments later. Trees adapted to the planting site are more likely to remain standing in hurricanes. Thorough site evaluation can ensure that the chosen tree will survive conditions inherent to the location.

Proper site evaluation, planning, and execution can result in a successful urban forest that resists hurricanes. Figure 1 shows a successful canopied street. These live oak trees were chosen for their wind-resistant structure and ability to provide shade, but they were only able to thrive given the adequate open soil space and distance from above-ground structures, such as street lights and wires.

A simple way to begin a site evaluation is to drive around town to find out which species grow well in landscapes with similar site attributes. It is important to keep in mind that no two sites are exactly alike; various conditions both above and below the ground affect the success of a particular tree species. Visiting a local public garden or nursery is also a great way to learn about all the different species that are available and being grown locally. A wide variety of books and web materials can provide specific information about growing and selecting trees in the area.

Contents

Figure 1

Proper planning can produce successful canopied streets and a healthy urban forest when enough soil is available.

Site Evaluation

Site evaluation is the first step in selecting proper trees for a planting site. It is important to consider both above-ground and below-ground site attributes during this assessment. Many people skip the site evaluation process, which explains why trees planted in urban areas are so often short-lived.

Hardiness

Tree adaptations to regions of the country are designated by their hardiness zones. The hardiness zone map, developed by the United States Department of Agriculture, specifies the average lowest winter temperature expected for regions in North America. When choosing trees for a planting site, first note the hardiness zone number of the planting site on the hardiness map. Trees with a hardiness zone range that includes this number are best suited for the site.

Above-Ground Site Analysis

In the above-ground evaluation, many elements should be taken into account. Environmental factors such as light and slope exposure, wind, salt and existing tree presence should be considered, as well as urban conditions such as overhead wires, street and security lights, buildings, signs, vandalism and regulations.

Light Exposure

Note how many hours of direct sun the planting site receives in the summer. Remember to account for the seasonal change in the sun angle when evaluating sites in other seasons. Trees such as crape myrtle that require full sun need at least six hours of direct sun, though all-day sun produces the best form and growth. Trees suited for full sun to partial sun/partial shade will adapt to a site receiving three to six hours of direct sun. Trees that require some shade are adapted to sites receiving less than three hours of direct sun. Most large trees grow best in full sun.

Sunlight reflected from glass or a wall on buildings can increase the heat load on a tree planted near a building. Drought-tolerant trees that grow in full sun are best suited for this kind of site. In addition, providing a large area of soil for roots to explore often helps trees withstand reflected light because the trees have access to more soil from which to absorb water. Irrigation helps these trees as well.

Slope Exposure

Trees with thin bark (i.e., cherries, plums, maples) can transplant poorly on southern and western slopes. Transpiration and evaporation from the soil are enhanced on south and west slopes, making it more difficult to maintain adequate soil moisture. Because of this, plan on providing more irrigation to southern and western exposures to help prevent desiccation; drought-tolerant trees are best adapted to these exposures. Northern slopes are more protected from direct sun exposure, and the soil here stays moist longer.

Wind

Wind increases the amount of water lost from a tree to the atmosphere. Therefore, in areas exposed to higher winds (i.e., near the beach), consider choosing only drought-tolerant trees. Otherwise, special provisions should be made to increase the availability of irrigation or to protect the site from direct wind. If the site has poorly drained soil, trees will need to be both wet and drought-tolerant.

Salt

Airborne salt affects trees by burning back twigs and foliage, or through roots after it is deposited on the ground and penetrates into the soil. Salt-tolerant trees are often deformed by direct exposure to salty air, but they survive and grow just fine. Foliage on salt-sensitive trees burns, and trees become deformed and grow poorly when exposed to salty air. Trees with one-sided canopies near the coast can be very susceptible to hurricane-force winds that impact the canopy from the heavy side, but this is unavoidable.

Other Trees

Young trees that tend to develop broad canopies and that require full or at least partial sun (oaks, mahoganies, etc.) often bend toward the sunlight and develop a one-sided canopy when they are planted under a canopy of established trees. Trees planted between existing established trees may grow slowly or not at all due to root competition and lack of water and shade.

Overhead Wires and Street/Security Lights

Look up before you plant. Trees are often planted too close to power lines and security lights. When branches reach wires, the utility company must prune them to ensure uninterrupted utility service. Unfortunately, this costs utility companies (and ultimately the customers) billions of dollars each year in the United States. We could greatly lower costs and minimize damage in

hurricanes by planting only properly sized trees near wires (Table 1). It is best to plant trees as far away from wires as possible (Figure 2).

Table 1. These are suggestions for planting trees within 40 feet of wires or street lights.

DISTANCE FROM WIRES OR LIGHT	TREE SIZE AT MATURITY
0–6 feet	Planting is not recommended unless trees remain under 25 feet tall
6–40 feet	Height should be 10 feet or shorter than wire/light or canopy diameter should be less than twice the distance to wire/light
more than 40 feet	Any tree can be planted

Trees are often located in the same parking lot island as overhead security lights. Eventually the tree canopy will grow into the structure, blocking the desired light. This requires regular pruning to clear the light, which results in a deformed canopy. Good planning locates trees and security lights away from each other, positions lights about 12 feet from the ground so the tree canopy can grow over the light, or selects trees that remain small at maturity so that they remain under the light.

Buildings

Trees are most stable in the ground when they develop a uniform root system with straight roots distributed more or less evenly around the tree. If a tree is close to a building, the root system can become one-sided and unbalanced. Unbalanced root systems result in tree failure in strong winds. A tree with a narrow canopy may be a good choice within 10 feet of a building, although tree canopies can adapt by growing more on the side away from the building. If shade is desired, consider planting several small-stature trees to create a closed canopy (Figure 3).

Figure 2

Planting trees far from overhead wires (top) reduces costly maintenance and service outages in storms. Trees located under wires (bottom) are costly to maintain and can bring down the wires in strong winds. Some communities plant large trees under wires and prune to keep them clear of wires.

Figure 3

Plant small-stature trees in groups if shade is desired near buildings. Canopies catch the wind, and trees can blow over when they grow substantially above the roof line.

Signs

Signs and trees frequently conflict with each other due to poor planning. To help prevent this, plant large trees near low signs and small trees near tall signs. Large-maturing trees could be in the way of a low sign for several years after planting, but if the tree is grown with a single trunk, lower limbs can be reduced and eventually removed so the sign remains visible. Many communities have implemented a landscape code requiring signs be no more than 8–10 feet from the ground, eliminating this potentially costly problem. The best ordinances place signs 3–4 feet from the ground.

Vandalism

People sometimes intentionally destroy or injure trees, or they may be unintentionally injured if they are planted in vulnerable sites such as sidewalk cutouts, where people walk close to the trees. If vandalism is a concern, consider not planting trees with thin bark (e.g. red maple), or choose trees at least 4 inches in trunk diameter.

Below-Ground Site Analysis

Important soil attributes that affect tree selection are pH, drainage, depth, salinity, distance to the water table, and obstacles to root growth such as curbs. Many plantings fail because these factors are improperly evaluated or ignored. Early evaluation will allow you to identify good soil and make provisions to remove and stockpile it. Good soil is precious and should not be wasted. It can be brought back to the site once the job is complete to promote tree growth. Pre-construction planning also gives you the opportunity to work with your contractors to prevent excessive soil compaction in areas where trees will be preserved and planted. Isolate these areas from heavy equipment and other vehicles using sturdy fences, and levy fines on contractors for violations.

Rooting Space Restrictions

Match ultimate tree size to the soil volume available for root growth. This strategy helps keep trees healthy and stable in storms. It also prevents damage to surrounding sidewalks, curbs and pavement (Figure 4). Soil under pavement is typically poorly aerated and compacted, a situation that is considered inhospitable for roots, unless soil is coarse sand and well drained. Roots will be mostly confined to the soil space not covered by pavement or the space between the soil and bottom of the pavement. This will inhibit development of a strong root system and can result in the tree becoming unstable in hurricanes. Some wet-site-tolerant trees (e.g. baldcypress) are adapted to produce roots under pavement, and they can remain upright in strong winds.

Figure 4

Small-maturing trees should be planted where soil space is limited to keep them healthy and stable in winds, and to prevent damage to surrounding structures.

Soil pH

Soil pH governs availability of nutrients to plants and also affects activity of soil microorganisms. A pH test should be conducted in several areas of the site, wherever soil color or texture appear different. Site pH may vary too much to plant the same species across the entire job.

To collect samples for testing from an open area such as a lawn where soil may be fairly uniform, dig about 10 small holes five to ten feet apart with a trowel or shovel. Remove a slice of soil from the side of each hole from the surface down to 12 inches deep. You might choose to use a portable soil coring device to collect the samples if one is available. Mix soil together in a clean plastic bag or clean bucket or jar and take or mail a sub-sample (about a pint) to a lab to be tested.

Most trees can grow in soils with a pH between 4.8 and 7.2. If the soil is less than 4.8, select trees tolerant of acidic soils. If the soil is greater than 7.2, select trees tolerant of alkaline soils. Few trees grow well in soils with a pH above 9.0.

Compacted Soil, Poor Drainage, and Low Oxygen

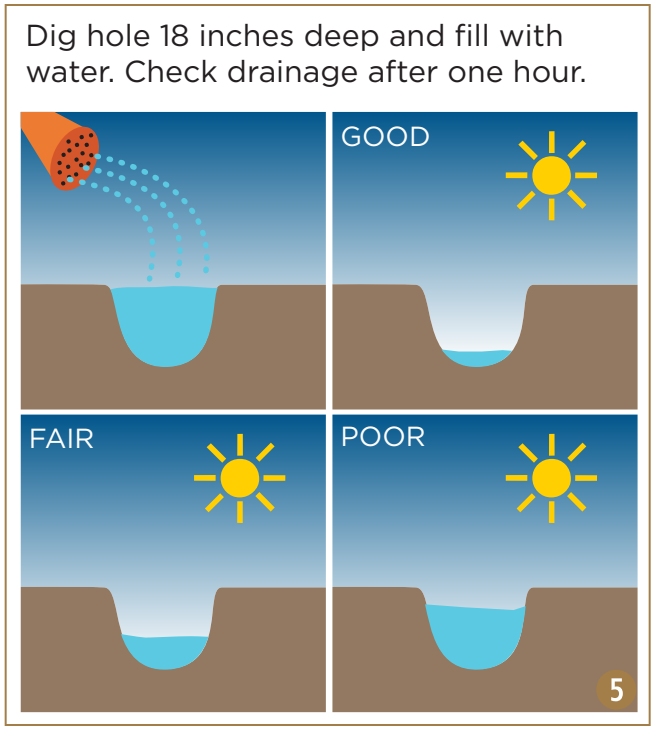
Urban soils are often compacted and poorly drained; even sandy soil can compact. These soils contain little oxygen—a gas that tree roots need to survive and grow. Only species and cultivars tolerant of wet sites can survive in the difficult soils (e.g. baldcypress, sweetbay, pond apple, etc.). Use of trees with aggressive root systems (e.g. ficus and oak) should be considered carefully because large surface roots often form. These can disrupt lawn mowing operations and can damage curbs, sidewalks, pavement, and other nearby structures. Large shade trees often fall over in hurricane-force winds because inhospitable soil prevented their establishing deep, stabilizing root systems. Plant small- to medium-sized trees (under 40 feet tall at maturity), for a more hurricane-resistant landscape.

To check for compaction and drainage, dig several holes at least 18 inches deep around the site. If soil is very difficult to dig with a shovel, it may be compacted. If soil is fairly easy to dig into with a shovel, it is probably not compacted. Drainage can be determined by filling these holes with water (Figure 5).

If soil is very compacted and hard all the way down to the bottom of the planting hole, then wet-site-tolerant trees are most appropriate. Expect many roots to develop at the surface. Occasionally, soil is loose underneath and compacted only on the surface. If you can break up the compacted layer on the surface for 15 feet or more around the tree before planting, drainage and tree growth may improve. In this case, trees can be chosen regardless of their wet-site tolerance.

Subsurface Compacted Layers

Soil loosely spread over compacted subsoil creates special challenges. Roots often grow only in the loose soil and will not penetrate the compacted subsoil (Figure 6). Small to medium-sized trees are recommended if less than 2 feet of loose soil will be spread over a compacted subsoil. This is because large-maturing trees could become unstable and hazardous due to shallow root systems (Figure 7).



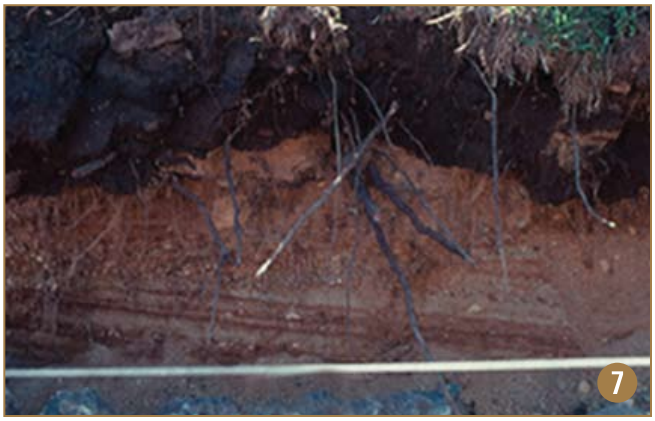


Figure 5
Checking soil drainage is important to determine species selection for a site.

Figure 6
Note how the roots of this tree grew only in the top layer of soil.

Figure 7
Large-maturing trees are not suitable for shallow soils because they lack deep roots and blow over easily in hurricanes.

Soil Depth and Distance to the Water Table

If bedrock comes close to the surface or if there is little soil, plant only small to medium-sized trees. Large-maturing trees in soil less than two feet deep could topple over in storms as they grow older because they lack deep roots. Roots on some trees can grow in solution holes in oolitic limestone to secure the tree firmly.

Dig several holes two to three feet deep and wait two to four hours if necessary. Any tree can be planted if no water appears in the hole. If water appears in the hole, select trees that tolerate wet sites. If the distance to the water table is less than 2 feet, plant small- to medium-sized trees. Possible exceptions are baldcypress and tupelos, especially if they are planted in groups.

Distance to the water table often varies during the year. It might be several inches below the surface in the cooler season and drop several feet in the growing season because transpiration pulls it from the soil. Special weather events can influence water table depth also. Sites with varying conditions should be considered poorly drained. To help avoid making erroneous conclusions about depth to the water table, determine depth during the coolest or wettest season. Consult local soil experts for this.

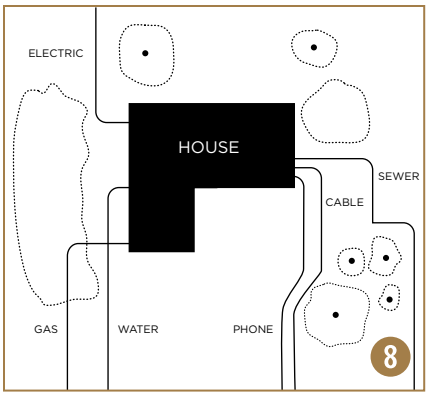


Figure 8

Locate underground utility lines before digging planting holes.

Figure 9

Low security lights are a modification that allows tree canopies to develop above.

Underground Utilities

Do not plant a tree before determining where underground utilities are located (Figure 8). Consult local cable companies, water/sewer departments, electric utilities, and telephone and gas companies before digging. Many states have a hotline to call before digging, such as the Sunshine State One Call of Florida (1-800-432-4770). Roots of large-maturing trees planted within ten feet of underground utility lines could be damaged when the utility is serviced. For this reason, some communities restrict planting near these utilities. Roots usually will not penetrate well-designed, properly installed utilities that do not leak water. Roots sometimes grow in the trench dug to hold the utility because it may be less compacted than surrounding soil.

Potential Site Modifications

Modifications made to the site can help accommodate a wider variety of tree species. When made before planting, site modifications such as moving wires or street lights, grading, improving drainage, and incorporating soil amendments over broad areas can have an impact on soil conditions that will affect tree growth and species selection.

Moving Lights and Wires

Street lights and overhead power lines can be moved or modified to make room for trees. Though this is not commonplace, it is surprising how often it's done once the suggestion is made. In many instances, it is a more permanent solution to a design problem, allowing trees to be planted along a street in an area where they should not be planted without moving or modifying fixtures (Figure 9). Some communities design utility corridors which contain utilities within a specific area and allow trees to be planted away from the corridor without interference.

Changing Soil pH

It is better to plant trees adapted to the existing soil pH than to change soil pH. Applications of sulfur or limestone to soil usually provide only a temporary pH change. Regular applications must be maintained to adjust the pH levels. It is best to plant species that are tolerant of the pH at the site, or replace the soil.

Improving Drainage and Reducing Runoff

Water running off a site can carry soil, pesticides, and fertilizers that contribute to environmental degradation. Soil is often graded (shaped) to keep as much water on the site as possible. To reduce runoff and sedimentation, redirected water should stay on site, rather than being channeled into streets or streams. Highway and other linear spaces surrounded by curbing can be designed to retain water if drainage is adequate.

Use a trencher to dig four or more trenches out from the planting hole, then loosely backfill with the soil from the trench (Figure 10). This provides channels for root growth in a compacted site, improves drainage a little, increases water percolation, and reduces runoff.

Other Soil Improvements

Some soil modification techniques can improve soil conditions for root growth. These include adding fill soil, replacing soil, and adding inorganic or organic matter over a large area. Modifying the small area in backfill soil adjacent to the root ball does not benefit trees. Site design and modification is covered in much detail in *Chapter 6—Urban Design for a Wind Resistant Urban Forest*.

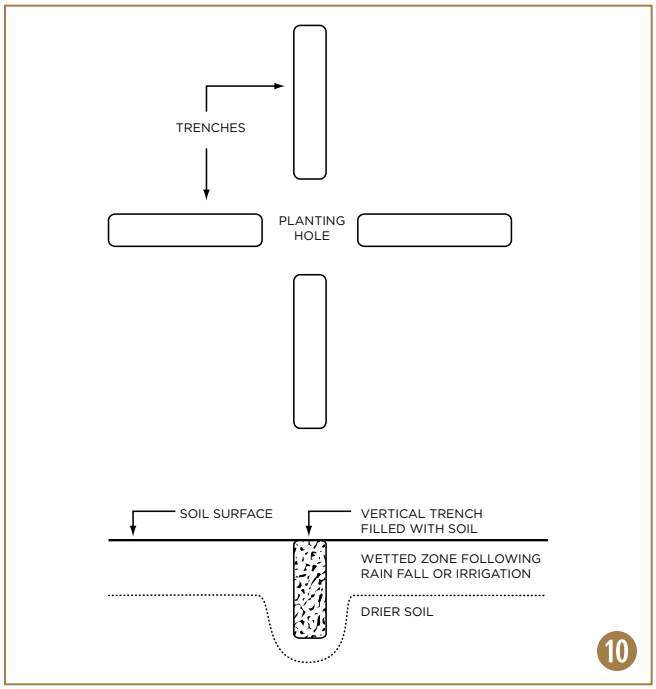


Figure 10

Trenching is a simple site modification that could improve tree growth and reduce drainage issues.

Evaluate Maintenance Practices

Understanding how the site will be managed after planting is a critical factor in tree selection. Maintenance issues such as irrigation, pruning, fertilization, and pest control can affect whether a tree is able to thrive. For example, if the planner knows that trees will not receive any pruning once they are in the landscape, then a tree with a naturally good structure (e.g. excurrent growth habit) is preferred.

Irrigation

The ability to deliver irrigation determines which species and nursery stock sizes are best suited for the site. If trees can be irrigated regularly only until they are established, drought-tolerant trees should be chosen, and nursery stock of any size can be planted. If trees receive irrigation during establishment and then regularly during the life of the tree, or if you are planting in the plant's native range and soil type, any tree regardless of drought tolerance can be planted (Table 2). If irrigation cannot be supplied for the period of time shown in Table 2, then plant smaller-sized nursery stock.

Table 2. Irrigation schedules depend on size of nursery stock and desired objective. Establishment takes approximately 3 to 5 months per inch of trunk caliper.

SIZE OF NURSERY STOCK	IRRIGATION SCHEDULE FOR VIGOR	IRRIGATION SCHEDULE FOR SURVIVAL
<2 inch caliper	**Daily:** 2 weeks **Every other day:** 2 months **Weekly:** until established	Twice weekly for 2-3 months
2-4 inch caliper	**Daily:** 1 month **Every other day:** 3 months **Weekly:** until established	Twice weekly for 3-4 months
>4 inch caliper	**Daily:** 6 weeks **Every other day:** 5 months **Weekly:** until established	Twice weekly for 4-5 months

Note: Some irrigation is needed in extended droughts to keep trees alive in the first 2–3 years after planting even after establishment.

Pruning

Trees should be pruned regularly to maintain good health and longevity. An effective pruning program helps trees resist hurricane-force winds. An effective urban forestry program makes this necessary pruning an integral part of the budget. These programs budget for structural pruning for the first 25 years after planting (see *Chapter 12—Designing a Preventive Pruning Program in Your Community: Young Trees* for detail). Unfortunately, tree pruning budgets are often too low to allow pruning every 3 to 5 years following planting. If this is the case, consider planting those species that require only a moderate amount of pruning to develop and maintain good structure. This list can be found on the website listed at the end of the document. It is a short list!

If there will be infrequent or no pruning, or if no one knows when or how trees will be pruned, then do not plant large-maturing trees if there is a structure (i.e., streetlight) that may conflict with tree growth. For maximum wind firmness in hurricanes, it is best to plant hurricane-resistant trees (see *Chapter 8—Selecting Southeastern Coastal Tree Species for Wind Resistance* and *Chapter 9—Selecting Tropical and Subtropical Tree Species for Wind Resistance*), including those with a naturally good structure, such as magnolia or baldcypress.

Fertilization

Fertilization is mostly an issue in alkaline soils that cause micronutrient deficiencies. If a tree that is not tolerant of alkaline soil (e.g. queen palm) must be planted in a soil with alkaline pH for historic or other special reasons, then be prepared to conduct a regular monitoring and treatment program designed to prevent micronutrient deficiencies. See the Florida Trees website listed at the end of this document for a list of trees tolerant of alkaline soils.

Cleanup

Trees with large fruit (royal poinciana), hard fruit (hickory or mahogany) or very fleshy fruit (fig, seagrape, cocoplum, or queen palm) can create a mess or hazard on sidewalks and pavement beneath the canopy. Pedestrians can slip and fall on the fruit, and it can be unsightly. If cleanup budgets are low, consider planting trees without this type of messy fruit, such as the fruitless `Rotundiloba' cultivar of sweetgum, in areas with high pedestrian traffic. Ethephon sprays can be used on some species to halt fruit production, but proper timing is crucial.

Choose Desirable Tree Attributes

Up to this point in the evaluation process, trees have been chosen primarily for their ability to grow at the site. While this is the most crucial criterion for tree selection, desired tree attributes such as function, size, form, and longevity are also important when choosing a species.

Function

Healthy trees provide us with many benefits. They give shade, produce oxygen, control erosion, protect our water resources, increase asphalt durability, support wildlife, and stabilize stream banks. The function we would like a tree to provide may dictate its size, shape (form), life span, canopy density, color, growth rate, fruit characteristics and other attributes.

Mature Size

Large trees (>50 ft at mature height) are the obvious choice for providing shade to large open spaces and for planting along streets if there is proper space above and below ground. Medium or large trees will cast the most shade onto a building, which can reduce air conditioning bills when the trees are placed properly. Keep in mind, however, that larger trees are more likely to be damaged and cause damage than small trees. Prudent managers weigh the advantages and disadvantages of planting large-sized shade trees.

Small trees (<30 ft at mature height) are often suggested for planting in downtown areas where soil space is limited, but they provide little shade. Small or medium-sized trees may be good choices for planting near a deck or patio, or in areas exposed to potential hurricane-force winds. Bear in mind, however, that the benefits small trees provide are small compared to large trees.

Form

Tree form can have a big impact on tree maintenance requirements. There are many urban landscape situations that call for trees near pavement. Small, spreading trees that are multi-trunked require regular pruning if they are planted too close to a sidewalk, whereas a small, upright tree or a larger tree can be trained to grow over the walk or street (Figure 11). Trees with a pyramidal form usually require less pruning to develop strong, wind-resistant branch structure than

those with other forms. Trees with rounded, oval or spreading canopies often need periodic pruning in the first 25 years after planting to ensure good structure and to provide clearance.

Longevity

It would appear that large, long-lived trees might be the logical choice for planting in most landscape situations, since they would provide for a lasting effect. However, with reasonable placement and care, long-lived trees will probably outlast many of today's streets, homes and buildings. Many structures are renovated or expanded 30 to 50 years after construction. The renovation is often so extensive that it becomes difficult to provide the needed protection for a large, long-lived tree's extensive root system in order to keep the tree alive. For this reason, concern about tree longevity may be less important in highly urbanized landscapes unless special provisions are undertaken to protect the tree.

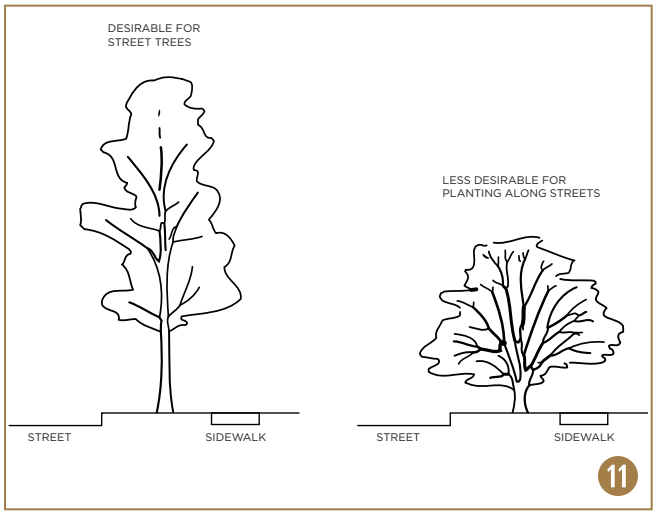


Figure 11

Upright trees usually require less pruning to keep branches clear of traffic, but they typically need regular pruning to develop wind-resistant structure. See *Chapter 12—Developing a Preventive Pruning Program in Your Community: Young Trees* for details on pruning young trees.

Tree Selection

It is important to plant and maintain a diversity of tree species throughout the community. This helps spread the risk of damage in storms. It may require more work and creativity to find a variety of trees that can withstand urban conditions, but it is well worth the effort. Species diversity allows a landscape to withstand devastation by insect or disease outbreaks, and if executed appropriately can provide a more aesthetic appeal. However, species selection alone will not prevent danger in storms. Trees must be positioned and maintained appropriately in order to create hurricane resistant urban forests.

Additional Resources:

For Final Selection of Northern Trees

http://orb.at.ufl.edu/TREES/index.html

For Final Selection of Florida Trees

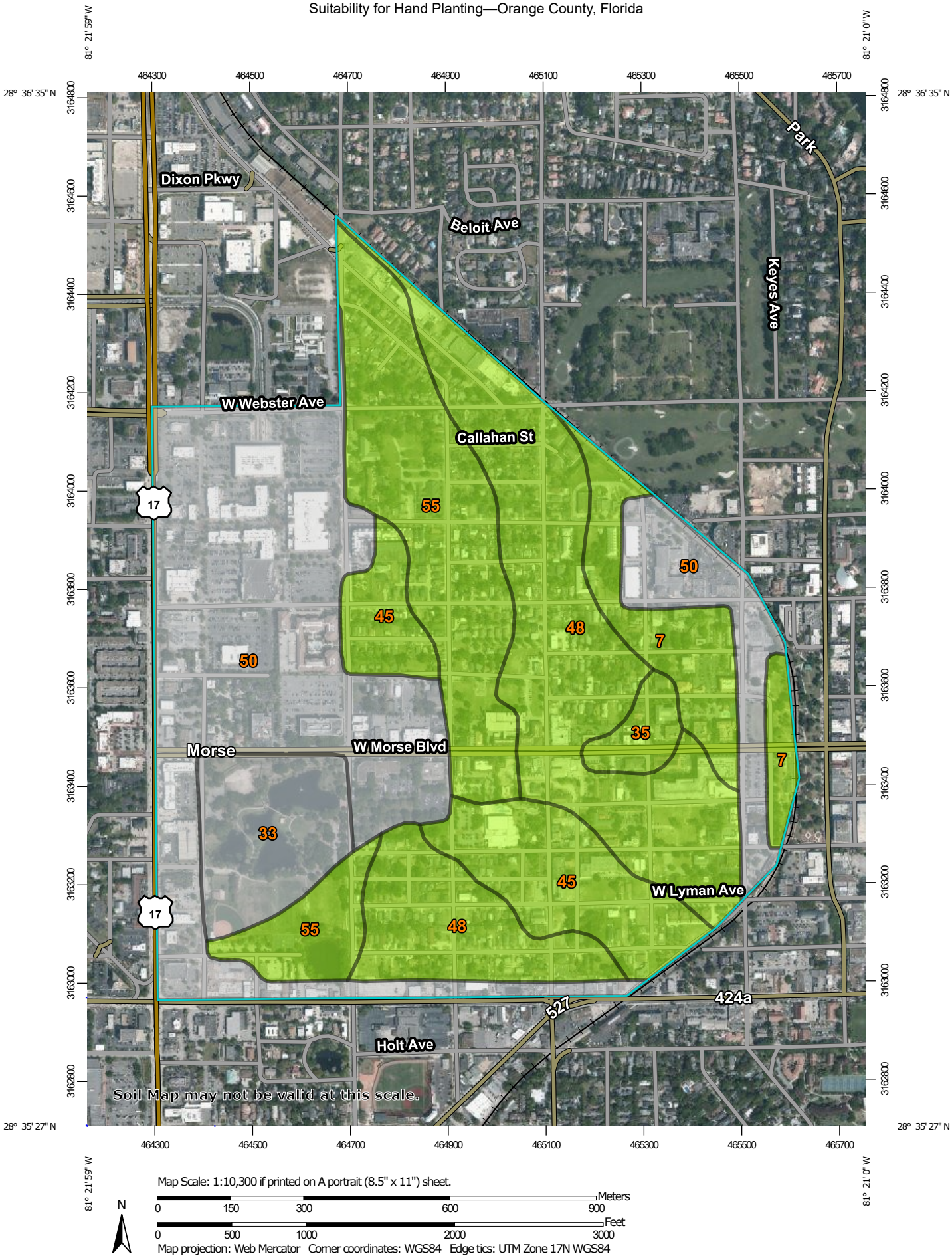
http://orb.at.ufl.edu/FloridaTrees/index.html

These links will take you to two sites with extensive information on trees. Using the conclusions from your site evaluation, you will be able to specify the characteristics of the planting site (i.e. poor drainage, dry soil, alkaline soil, etc.), and create a list of appropriate trees for your site conditions.

This document is ENH 1057, one of the Urban Forest Hurricane Recovery series of the School of Forest Resources and Conservation and the Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date September 2007. Visit the EDIS Web Site at http://edis.ifas.ufl.edu/ and http://treesandhurricanes.ifas.ufl.edu.

Edward F. Gilman, Professor and Laura Sadowski, Horticultural Information Specialist, Department of Environmental Horticulture; University of Florida, Institute of Food and Agricultural Sciences, Gainesville, FL 32611.

Design and layout: Mariana Wallig & Julie Walters.



Map Scale: 1:10,300 if printed on A portrait (8.5" x 11") sheet.

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Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Unsuited
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Lines
- Unsuited
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Soil Rating Points
- Unsuited
- Poorly suited
- Moderately suited
- Well suited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 17, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 22, 2019—Mar 11, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Suitability for Hand Planting

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
7	Candler-Urban land complex, 0 to 5 percent slopes	Moderately suited	Candler (53%)	Sandiness (0.50)	24.0	6.5%
			Millhopper (4%)	Sandiness (0.50)		
			Tavares (3%)	Sandiness (0.50)		
33	Pits	Not rated	Pits (70%)		23.8	6.4%
			Aquents (30%)			
35	Pomello-Urban land complex, 0 to 5 percent slopes	Moderately suited	Pomello (53%)	Sandiness (0.50)	6.2	1.7%
			Archbold (3%)	Sandiness (0.50)		
			Smyrna, non-hydric (2%)	Sandiness (0.50)		
			Pompano (2%)	Sandiness (0.50)		
45	Smyrna fine sand-Urban land complex, 0 to 2 percent slopes	Moderately suited	Smyrna (45%)	Sandiness (0.50)	35.9	9.7%
			EauGallie (5%)	Sandiness (0.50)		
			Basinger (4%)	Sandiness (0.50)		
			Immokalee (4%)	Sandiness (0.50)		
			Smyrna (2%)	Sandiness (0.50)		
			Placid (2%)	Sandiness (0.50)		
48	Tavares fine sand-Urban land complex, 0 to 5 percent slopes	Moderately suited	Tavares (43%)	Sandiness (0.50)	91.5	24.7%
			Pomello (6%)	Sandiness (0.50)		
			Cassia (5%)	Sandiness (0.50)		
			Apopka (4%)	Sandiness (0.50)		
			Astatula (3%)	Sandiness (0.50)		
			Adamsville (2%)	Sandiness (0.50)		
50	Urban land, 0 to 2 percent slopes	Not rated	Urban land (85%)		127.1	34.3%
55	Zolfo-Urban land complex	Moderately suited	Zolfo (50%)	Sandiness (0.50)	62.1	16.7%
			Millhopper (3%)	Sandiness (0.50)		
			Lochloosa (3%)	Sandiness (0.50)		
			Smyrna, non-hydric (2%)	Sandiness (0.50)		
			Pomello (2%)	Sandiness (0.50)		
Totals for Area of Interest					**370.7**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Moderately suited	219.7	59.3%

Rating	Acres in AOI	Percent of AOI
Null or Not Rated	150.9	40.7%
Totals for Area of Interest	**370.7**	**100.0%**

Description

Ratings for this interpretation indicate the expected difficulty of hand planting of forestland plants. The ratings are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. It is assumed that necessary site preparation is completed before seedlings are planted.

The ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. "Well suited" indicates that the soil has features that are favorable for the specified management aspect and has no limitations. Good performance can be expected, and little or no maintenance is needed. "Moderately suited" indicates that the soil has features that are moderately favorable for the specified management aspect. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. "Poorly suited" indicates that the soil has one or more properties that are unfavorable for the specified management aspect. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. "Unsuited" indicates that the expected performance of the soil is unacceptable for the specified management aspect or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

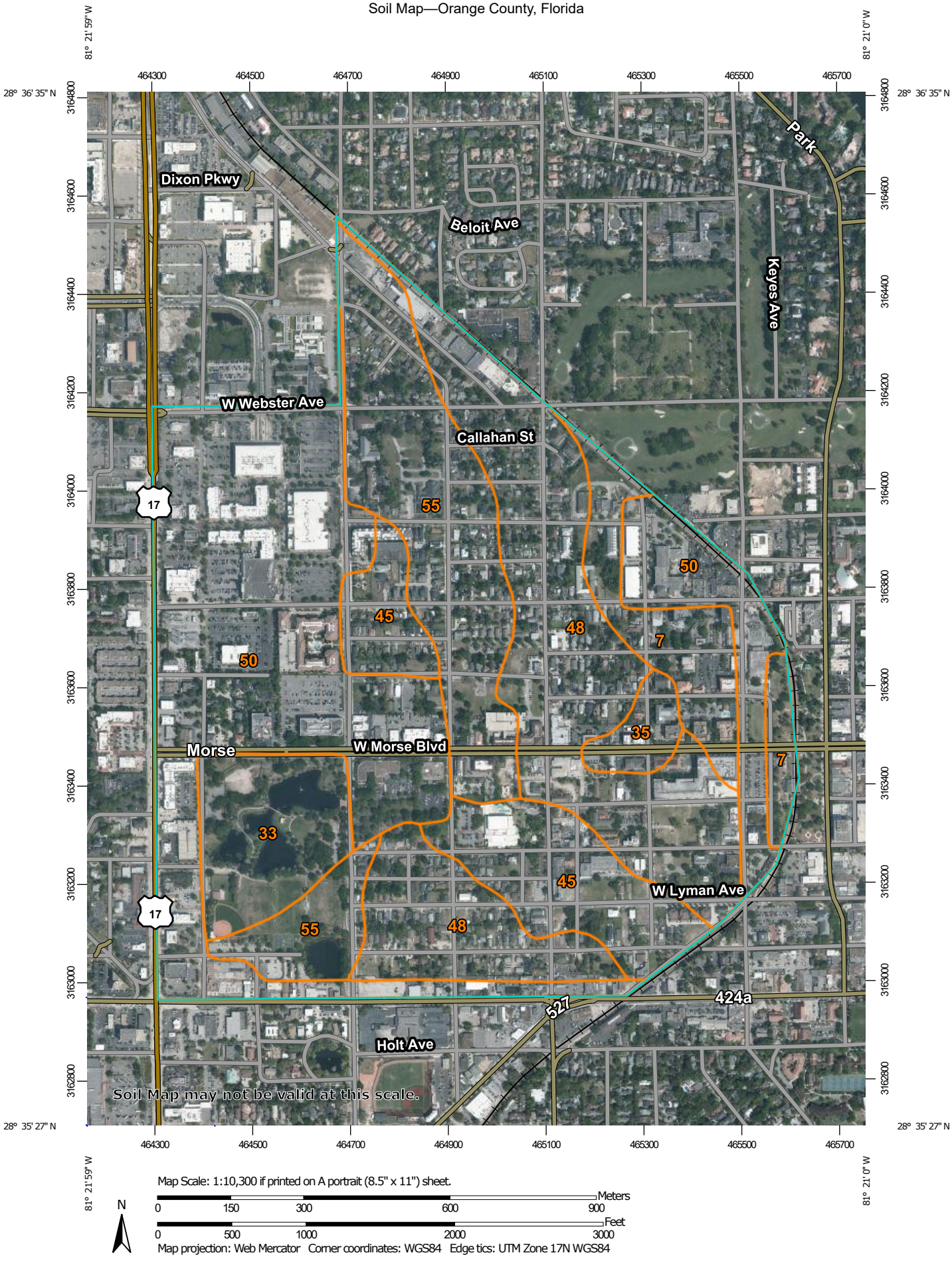
Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher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81° 21' 0" W
28° 36' 35" N
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3163200
3163000
3162800
Dixon Pkwy
Beloit Ave
Park
Keyes Ave
W Webster Ave
Callahan St
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55
50
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Morse
W Morse Blvd
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W Lyman Ave
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527
Holt Ave
Soil Map may not be valid at this scale.
Map Scale: 1:10,300 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Orange County, Florida
Survey Area Data: Version 17, Jun 8, 2020

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Date(s) aerial images were photographed: Jan 22, 2019—Mar 11, 2019

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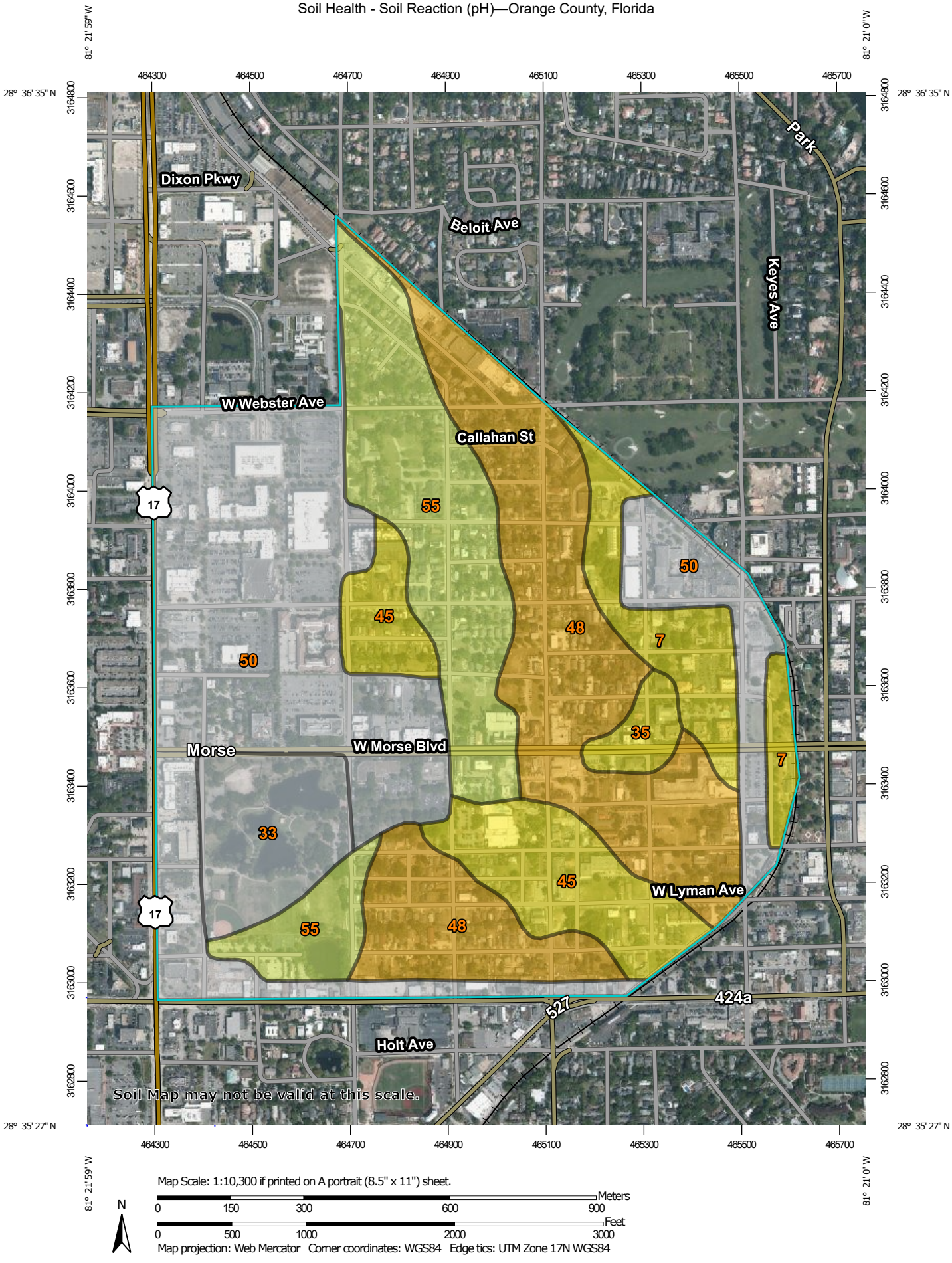
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7	Candler-Urban land complex, 0 to 5 percent slopes	24.0	6.5%
33	Pits	23.8	6.4%
35	Pomello-Urban land complex, 0 to 5 percent slopes	6.2	1.7%
45	Smyrna fine sand-Urban land complex, 0 to 2 percent slopes	35.9	9.7%
48	Tavares fine sand-Urban land complex, 0 to 5 percent slopes	91.5	24.7%
50	Urban land, 0 to 2 percent slopes	127.1	34.3%
55	Zolfo-Urban land complex	62.1	16.7%
Totals for Area of Interest		**370.7**	**100.0%**


81° 21' 59" W
81° 21' 0" W
28° 36' 35" N
28° 35' 27" N
464300
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465500
465700
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3164600
3164400
3164200
3164000
3163800
3163600
3163400
3163200
3163000
3162800
Dixon Pkwy
Beloit Ave
Park
Keyes Ave
W Webster Ave
Callahan St
17
55
50
45
48
7
35
Morse
W Morse Blvd
33
W Lyman Ave
424a
527
Holt Ave
Soil Map may not be valid at this scale.
Map Scale: 1:10,300 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Soil Rating Lines

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Soil Rating Points

- Ultra acid (pH < 3.5)
- Extremely acid (pH 3.5 - 4.4)
- Very strongly acid (pH 4.5 - 5.0)
- Strongly acid (pH 5.1 - 5.5)
- Moderately acid (pH 5.6 - 6.0)
- Slightly acid (pH 6.1 - 6.5)
- Neutral (pH 6.6 - 7.3)
- Slightly alkaline (pH 7.4 - 7.8)
- Moderately alkaline (pH 7.9 - 8.4)
- Strongly alkaline (pH 8.5 - 9.0)
- Very strongly alkaline (pH > 9.0)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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Please rely on the bar scale on each map sheet for map measurements.

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 17, Jun 8, 2020

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Date(s) aerial images were photographed: Jan 22, 2019—Mar 11, 2019

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Soil Health - Soil Reaction (pH)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
7	Candler-Urban land complex, 0 to 5 percent slopes	5.3	24.0	6.5%
33	Pits		23.8	6.4%
35	Pomello-Urban land complex, 0 to 5 percent slopes	5.2	6.2	1.7%
45	Smyrna fine sand-Urban land complex, 0 to 2 percent slopes	5.5	35.9	9.7%
48	Tavares fine sand-Urban land complex, 0 to 5 percent slopes	5.0	91.5	24.7%
50	Urban land, 0 to 2 percent slopes		127.1	34.3%
55	Zolfo-Urban land complex	5.9	62.1	16.7%
Totals for Area of Interest			**370.7**	**100.0%**

Description

Soil reaction (pH) is a measure of acidity or alkalinity. Chemically, it is a measurement of the hydrogen ion activity [H+] in the soil solution. The pH scale ranges from 0 to 14; a pH of 7 is considered neutral. If pH values are greater than 7, the solution is considered basic or alkaline; if they are below 7, the solution is acidic.

Significance:

The acidity or alkalinity of a soil affects the availability of plant nutrients, the activity of microorganisms, and the solubility of soil minerals (Brady, 1990). In general, pH values between 6 and 7.5 are optimum for general crop growth. Site-specific interpretations for soil health will depend on specific land uses and crop tolerances. In acid soils, calcium and magnesium, nitrate-nitrogen, phosphorus, boron, and molybdenum are deficient but aluminum and manganese are abundant, in some cases at levels toxic to some plants (USDA-NRCS, 2008). Phosphorus, iron, copper, zinc, and boron are frequently deficient in very alkaline soils. Bacterial populations and activity decline at low pH levels, whereas fungi adapt to a large range of pH (acidic and alkaline). Nitrification and nitrogen fixation are also inhibited by low pH (USDA-NRCS, 2008). To increase pH, liming, adding organic residues rich in basic cations, and rotating crops to interrupt the acidifying effect of leguminous crops are effective. Applying ammonium-based fertilizers, urea, sulfur, or ferrous sulfate; irrigating with acidifying fertilizers; or using acidifying residues (acid moss, pine needles, sawdust) decrease soil pH (USDA-NRCS, 2008).

Factors Affecting Soil Reaction:

Inherent factors.—The natural soil pH reflects the combined effects of climate, vegetation, topography, parent material, and time. Temperature and rainfall are two major factors that control the intensity of leaching and soil mineral weathering. Acidity is generally associated with leached soils, and alkalinity is generally associated with soils in drier regions. In arid climates, soil weathering and leaching are less intense, cations accumulate, and the soil becomes neutral or alkaline. In soils where the pH is less than 5, aluminum becomes soluble and reacts with water to produce hydrogen ions. Sandy soils may acidify more easily compared to clay soils because they have a low buffering capacity and tend to leach more readily. Vegetation has an effect on soil pH through the type of organic matter that is added; certain types of vegetation are soil acidifying (USDA-NRCS, 2008).

Dynamic factors.—The conversion of uncultivated land into cropland can result in drastic pH changes after a few years. These changes are caused by the removal of cations by crops, the acceleration of leaching, the effect of fertilizers and amendments, and the variations in organic matter content and soil buffering capacity (USDA-NRCS, 2008). Inorganic amendments (lime and gypsum) and organic amendments rich in cations increase soil pH. Ammonium from organic matter mineralization (nitrification), ammonium-based fertilizers, and sulfur compounds lower the pH. High rates of water percolation and infiltration can increase the leaching of cations and accelerate soil acidification.

Measurement:

The pH reported here is measured using the 1:1 soil to water ratio method (Soil Survey Staff, 2014). A crushed soil sample is mixed with an equal amount of water, and the pH of the suspension is measured.

References:

Brady, N.C. 1990. The nature and properties of soils. 10th ed. Macmillan Publishers, NY.

Smith, J.L., and J.W. Doran. 1996. Measurement and use of pH and electrical conductivity for soil quality analysis. In: J.W. Doran and A.J. Jones (eds.) Methods for Assessing Soil Quality. Soil Science Society of America Special Publication 49:169-185.

Soil Survey Staff. 2014. Kellogg Soil Survey Laboratory methods manual. Soil Survey Investigations Report No. 42, Version 5.0. R. Burt and Soil Survey Staff (eds.). U.S. Department of Agriculture, Natural Resources Conservation Service.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2008. Soil quality indicators—Soil pH.

Rating Options

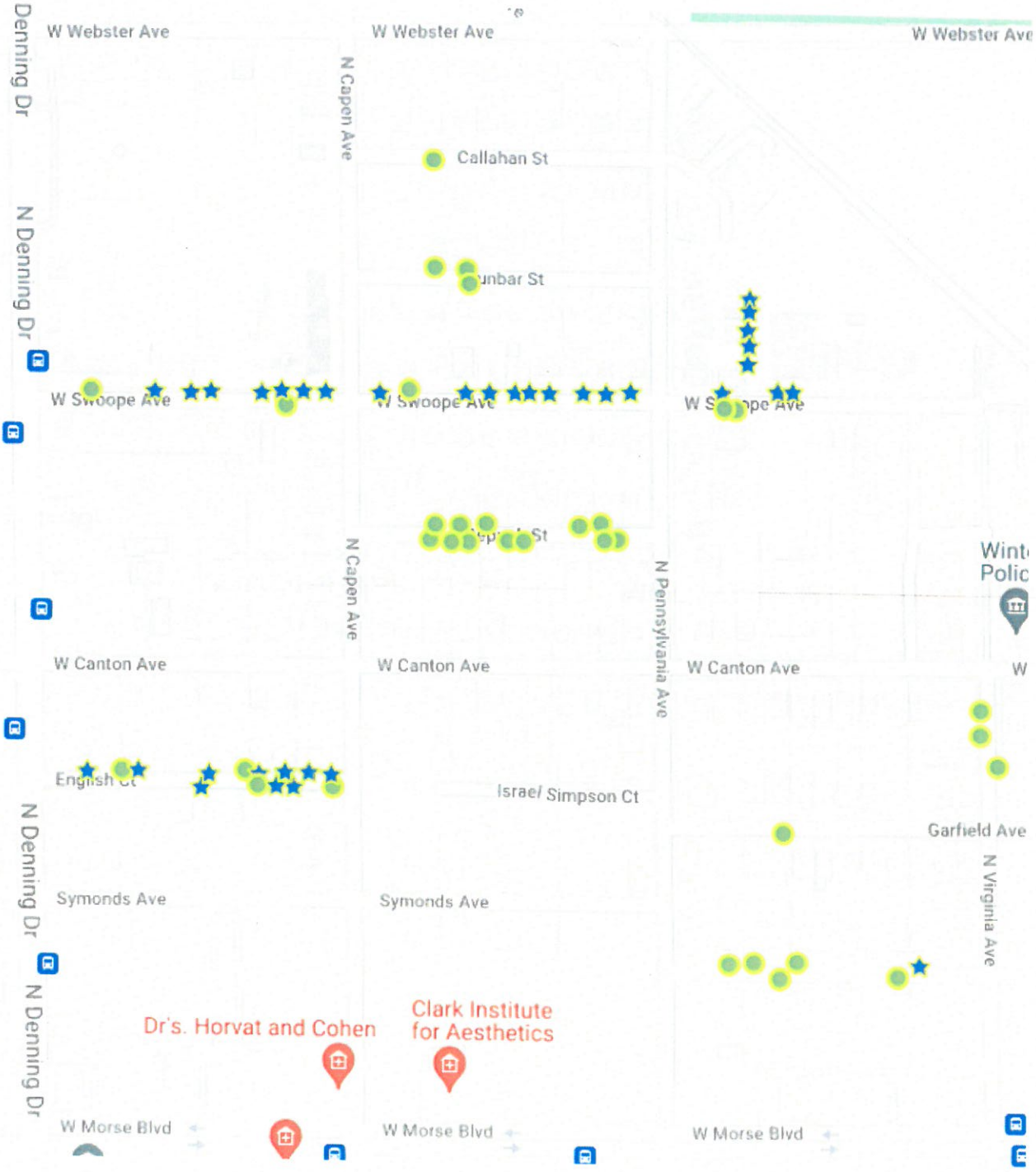
Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)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Israel Simpson Ct
Garfield Ave
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Symonds Ave
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Dr's. Horvat and Cohen
Clark Institute for Aesthetics
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