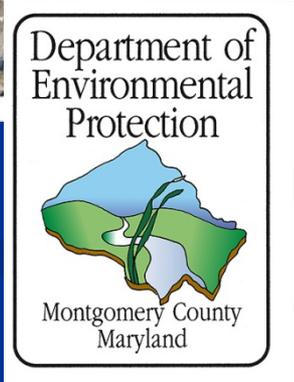


# The Dennis Avenue Green Streets Stormwater Project



Mark Wilcox, Engineer



# What is the Problem?

- Impervious (hard surfaces)  
= Increased runoff & pollutants

- Reduced groundwater recharge (infiltration)

- Increased storm flows & decreased base flows

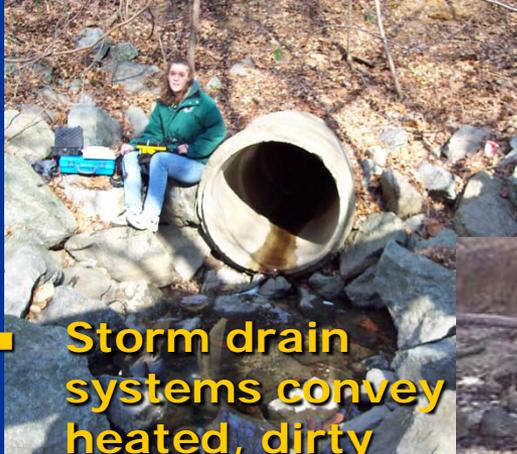
- Streams eroded, incised

08.05.2008

- Infrastructure threatened

- Storm drain systems convey heated, dirty water directly to streams

- Degraded aquatic habitat & water quality



# Montgomery County's (NPDES) Permit

## National Pollutant Discharge Elimination System

- Montgomery County's NPDES Permit (issued in 2010) Requires:
  - New stormwater management for **20% of existing impervious** area that is currently unmanaged (~ **4,300 acres**).
  - Meet goals set forth in the "Potomac River Watershed Trash Treaty"
  - Identify pollution sources and improve water quality in all county watersheds
  - Increase use of Environmental Site Design (ESD), or **Low Impact Development (LID)**
    - Variety of small-scale practices to capture stormwater runoff close to the source
    - Slows rate and reduces volume of runoff
    - Allows stormwater to soak into the ground, replenishing ground water
    - Filters out pollutants



Bioretention



Pervious Pavers



Curb Extension

# Why Right-of-Way (ROW) Stormwater Projects?

- In the spirit of LID/ESD, close to the source of runoff
- Developed urban areas, especially road runoff, are difficult to treat without ROW solutions
- Right of Way has few environmental (forest/wetland) impacts
- Curb extensions help calm traffic
- Provide an aesthetic benefit to the ROW

# Bioswales



Falls Grove Shopping Center – Shady Grove

# Curb Extension

## Examples



Portland, Oregon



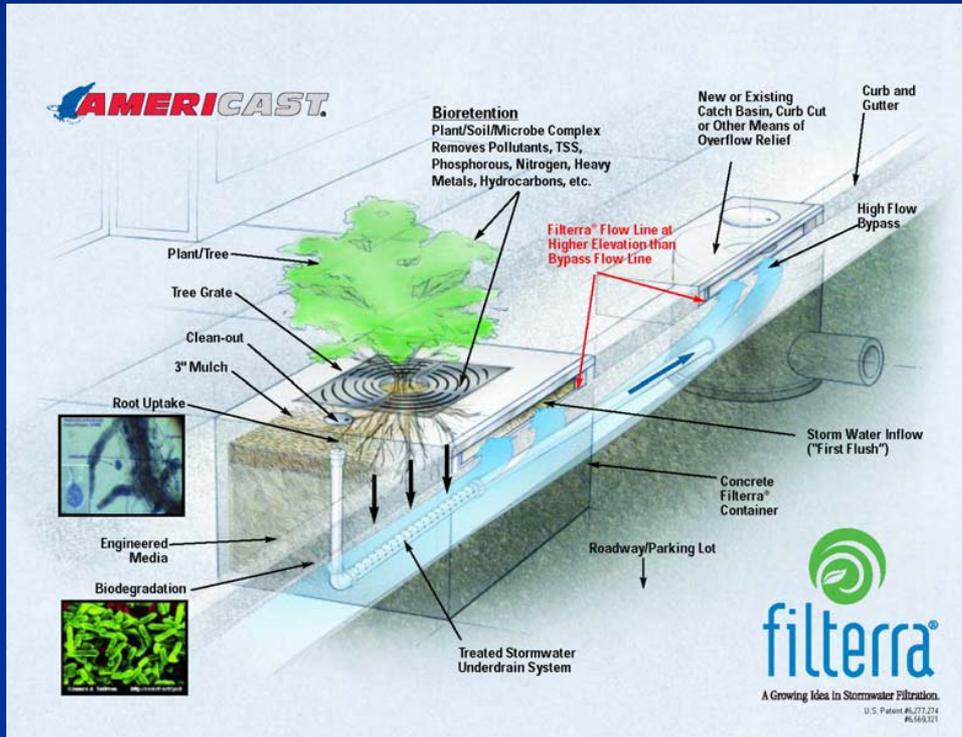
Portland, Oregon



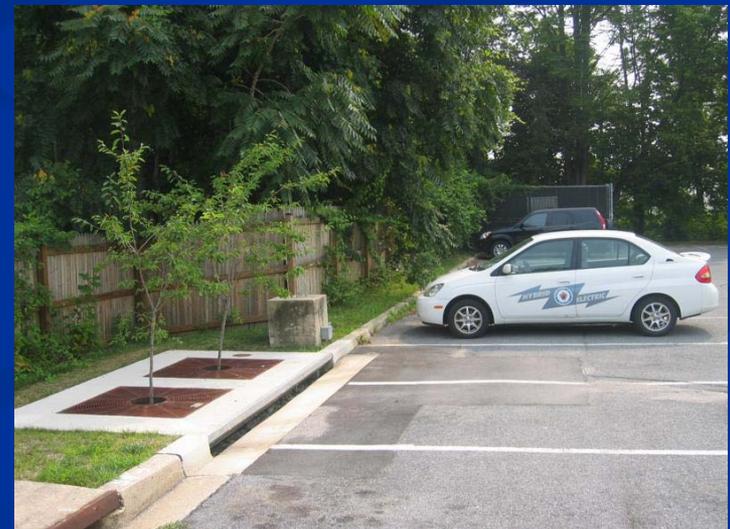
Gaithersburg, MD



# Tree Boxes



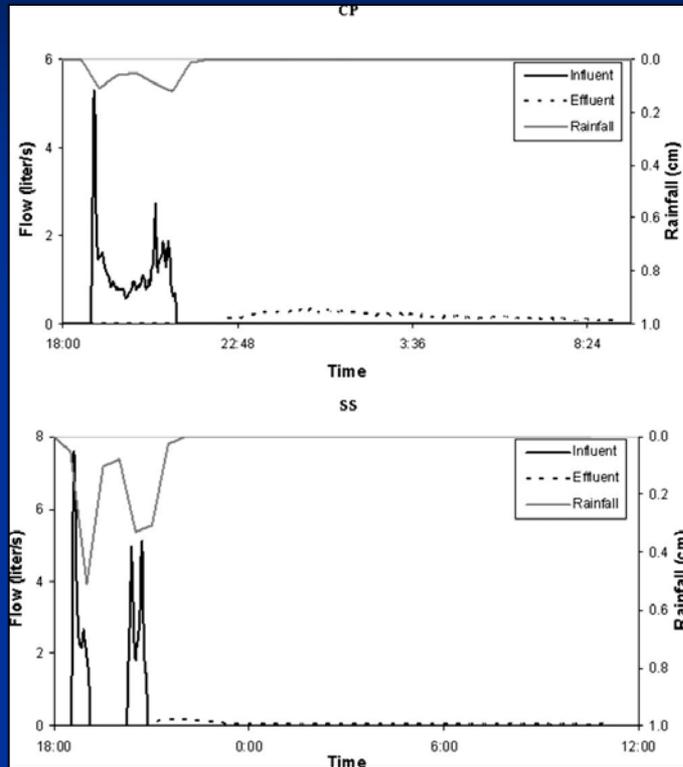
White Oak Library





# LID Retrofit at Dennis Ave. Health Center

## Bioretention



Davis, A. P., et. al. (2009) "Mitigation of Impervious Surface Hydrology Using Bioretention in North Carolina and Maryland" *J. Hydrologic Engineering*, April 2009, 407-415.

# Proposed Project Goals

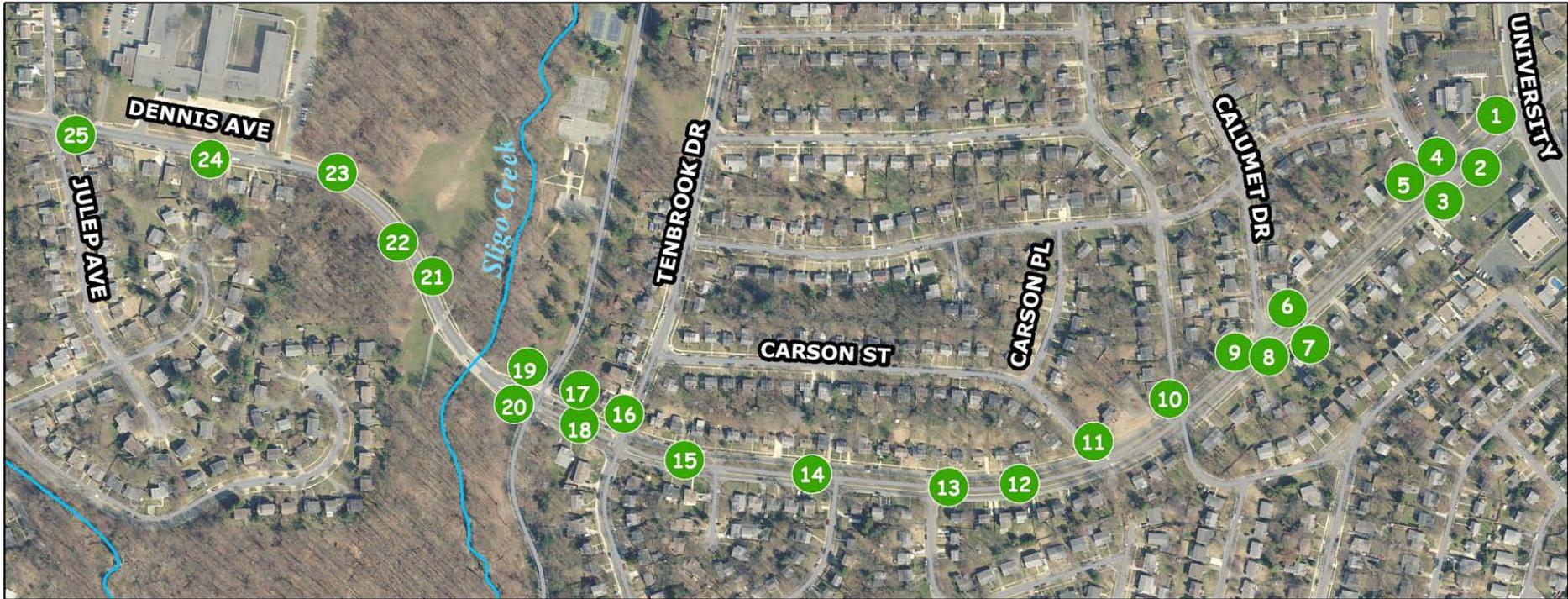
- Maximize stormwater management to improve conditions in the Sligo Creek watershed
- Improve water quality treatment
- Encourage infiltration of runoff from parking lots, roadways and other impervious surfaces, recharging groundwater and reducing quantity of erosive flows in receiving streams
- Fulfill the requirements in the County's National Pollutant Discharge Elimination System (NPDES) permit

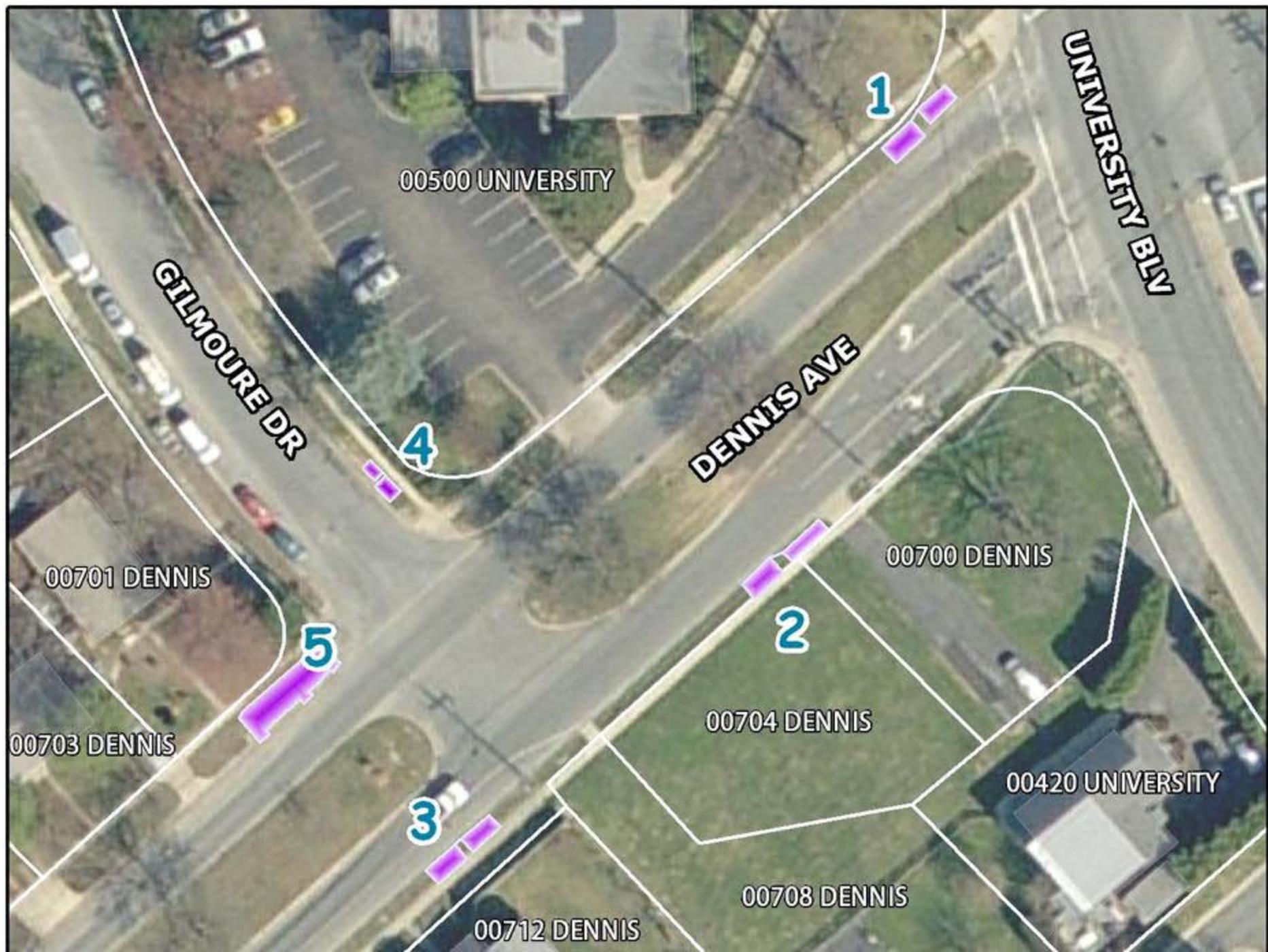
# Project Schedule

- Phase 1 Dennis West End:  
March 2012
- Phase 2 Dennis East End:  
Late Spring 2012
- Phase 3 Meurilee Lane:  
Summer 2012
- Phase 4: Arcola/University  
Summer 2012



# Phase 1 & 2





00500 UNIVERSITY

GILMOURE DR

UNIVERSITY BLVD

DENNIS AVE

1

4

00700 DENNIS

00701 DENNIS

2

00704 DENNIS

00703 DENNIS

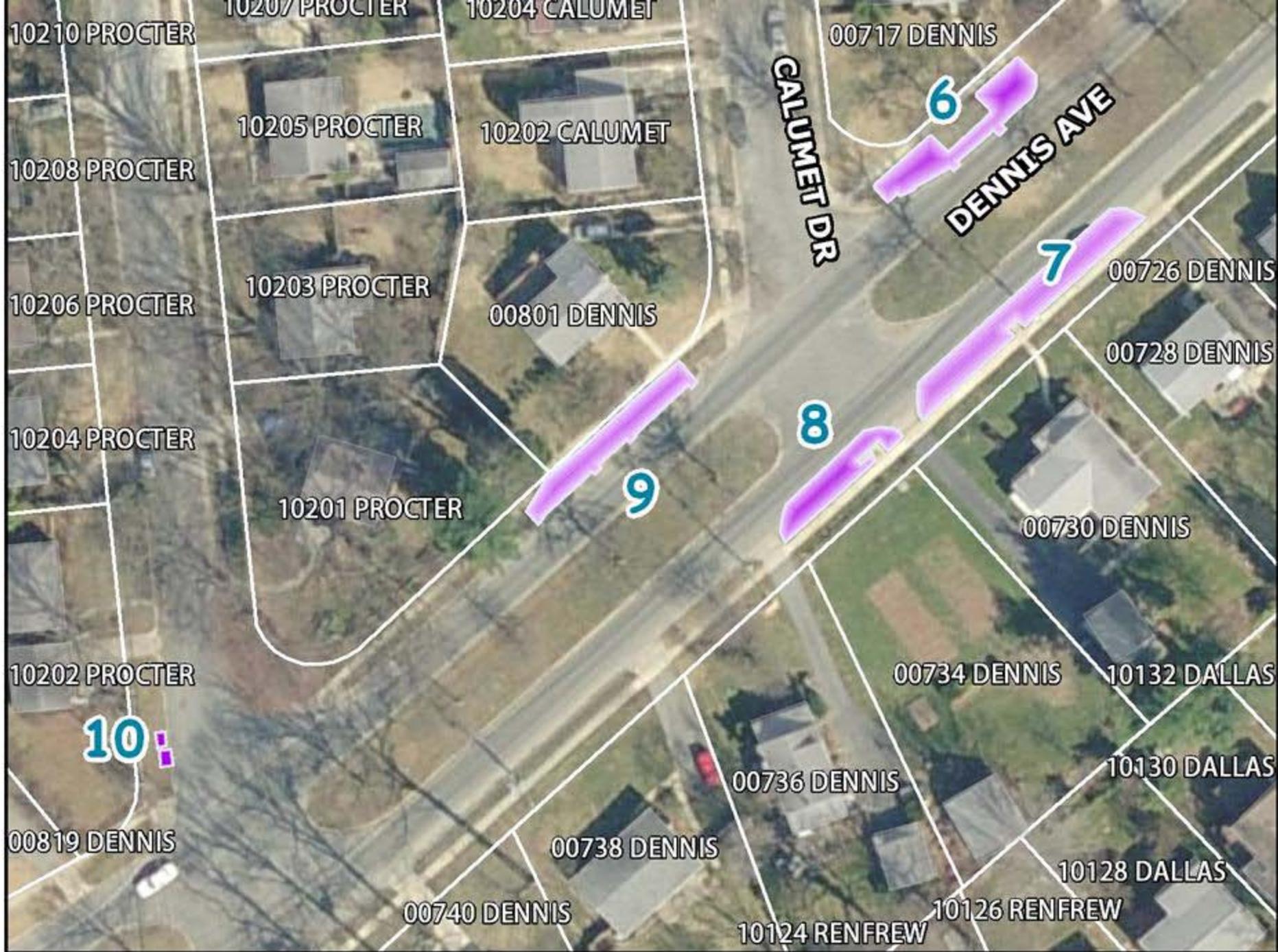
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00420 UNIVERSITY

3

00708 DENNIS

00712 DENNIS



10210 PROCTER

10207 PROCTER

10204 CALUMET

00717 DENNIS

10205 PROCTER

10202 CALUMET

CALUMET DR

DENNIS AVE

10208 PROCTER

10206 PROCTER

10203 PROCTER

00801 DENNIS

00726 DENNIS

00728 DENNIS

10204 PROCTER

10201 PROCTER

00730 DENNIS

10202 PROCTER

00734 DENNIS

10132 DALLAS

10

00819 DENNIS

00736 DENNIS

10130 DALLAS

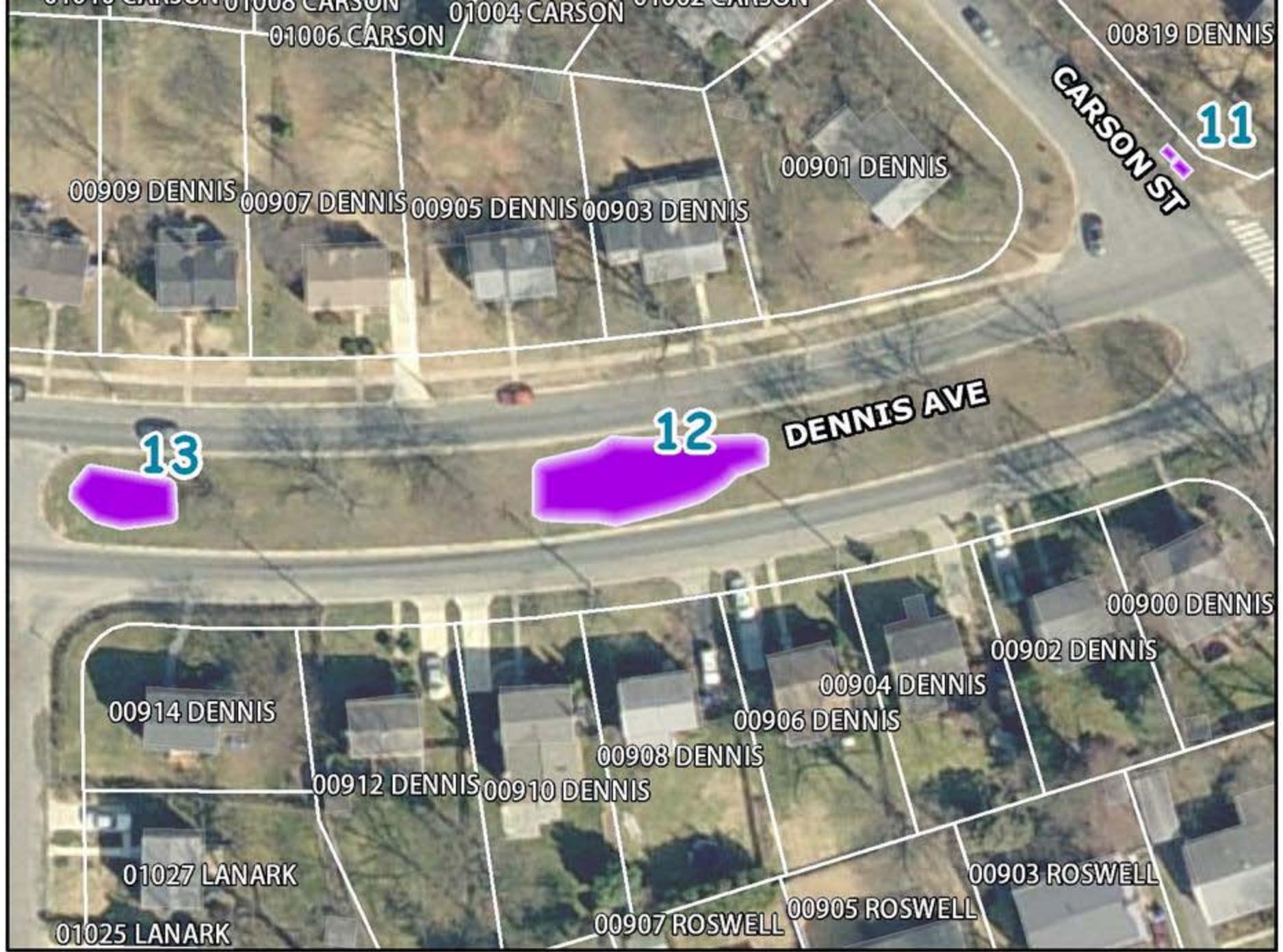
00738 DENNIS

10128 DALLAS

00740 DENNIS

10124 RENFREW

10126 RENFREW



01006 CARSON

01008 CARSON

01004 CARSON

01002 CARSON

00819 DENNIS

11

00901 DENNIS

00909 DENNIS

00907 DENNIS

00905 DENNIS

00903 DENNIS

CARSON ST

12

DENNIS AVE

13

00900 DENNIS

00902 DENNIS

00914 DENNIS

00904 DENNIS

00906 DENNIS

00908 DENNIS

00912 DENNIS

00910 DENNIS

01027 LANARK

00903 ROSWELL

01025 LANARK

00907 ROSWELL

00905 ROSWELL

01116 CARSON 01112 CARSON 01110 CARSON 01108 CARSON 01106 CARSON  
01114 CARSON 01104 CARSON 01102 CARSON

01121 DENNIS  
01119 DENNIS 01117 DENNIS 01115 DENNIS 01113 DENNIS 01111 DENNIS 01109 DENNIS  
01107 DENNIS 01105 DENNIS 01103 DENNIS

15

DENNIS AVE

14

10125 TENBROOK  
01122 DENNIS  
01120 DENNIS  
01118 DENNIS  
01108 DENNIS 01106 DENNIS 01104 DENNIS 01102 DENNIS 01100 DENNIS  
01110 DENNIS 01103 MEURILEE 01004 DENNIS  
01112 DENNIS 01105 MEURILEE 01102 MEURILEE



10206 TENBROOK

10204 TENBROOK

10202 TENBROOK

10203 TENBROOK

01203 DENNIS

01201 DENNIS

01121 DENNIS

01119 DENNIS

01202 DENNIS

10126 TENBROOK

10125 TENBROOK

19

20

17

18

16

DENNIS AVE

TENBROOK DR

01401 DENNIS

23

01310 DENNIS

DENNIS AVE

10315 FOLK

22

10313 FOLK

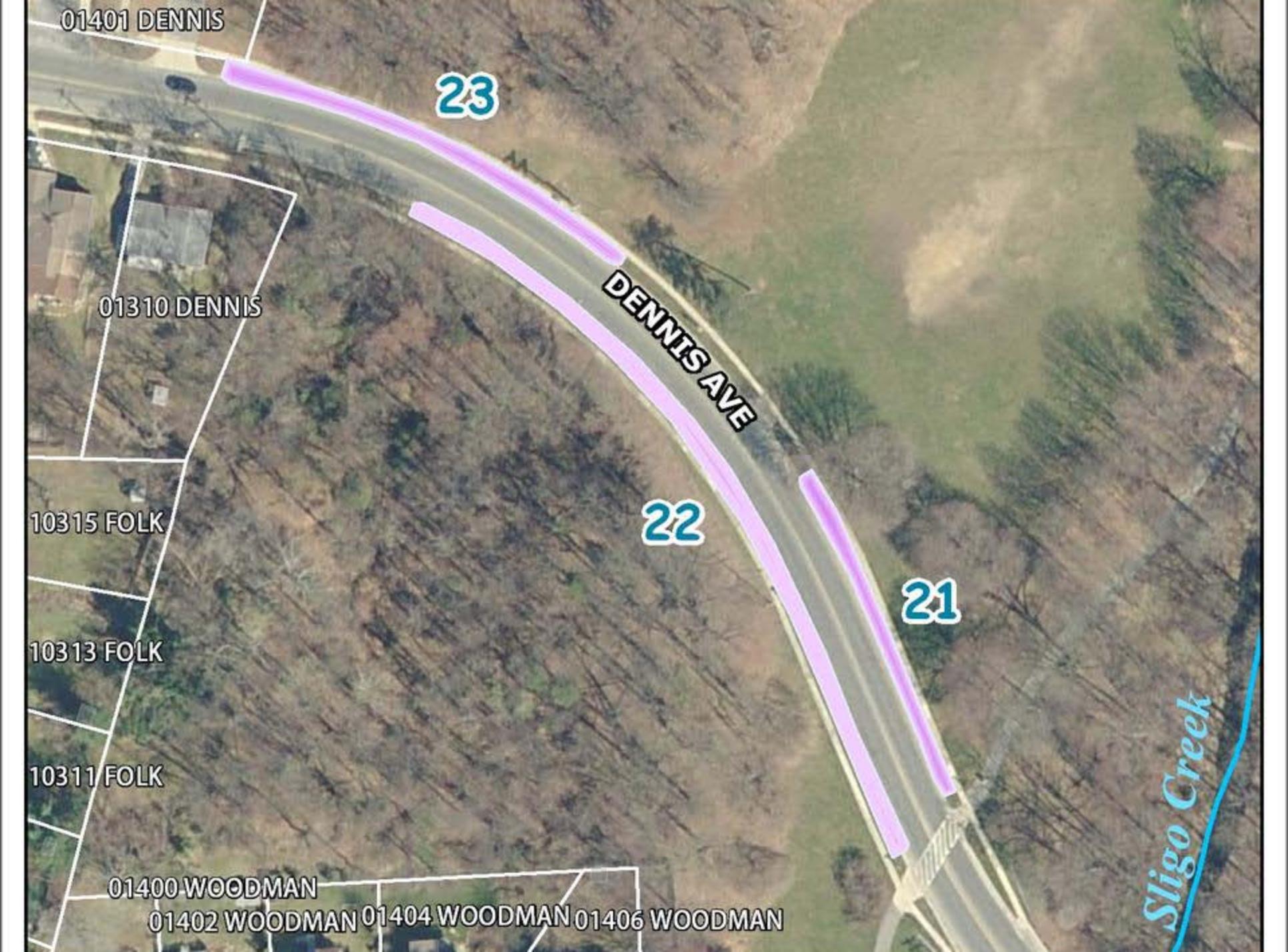
21

10311 FOLK

01400 WOODMAN

01402 WOODMAN 01404 WOODMAN 01406 WOODMAN

Sligo Creek



10404 JULEP

10402 JULEP

01501 DENNIS

01500 DENNIS

10316 JULEP

10314 JULEP

10312 JULEP

10310 JULEP

JULEP AVE

10407 JULEP

10403 JULEP

01405 DENNIS

01410 DENNIS

10315 JULEP

10313 JULEP

10311 JULEP

01408 DENNIS

01406 DENNIS

10316 FOLK

10318 FOLK

01404 DENNIS

10319 FOLK

01400 DENNIS

10317 FOLK

01401 DENNIS

DENNIS AVE

25

24

01314 DENNIS

01312 DENNIS

01310 DENNIS

**For More Information/Updates**

[www.montgomerycountymd.gov/DennisGreenStreet](http://www.montgomerycountymd.gov/DennisGreenStreet)