

Extending the VRE: Transit Market Assessment for Caroline County, VA

Leda Hinkle | Spring 2024 | GIS Capstone



Planning Work in Carmel Church Village

- ❖ 2007 Carmel Church Community Plan
- ❖ GWRC Rural Work Program for FY24

Planning Work Identifies:

- ❖ Growing Population
- ❖ Growing Transportation Needs

Existing Conditions

Population Estimates for Counties & Cities in Virginia

Virginia Total Population

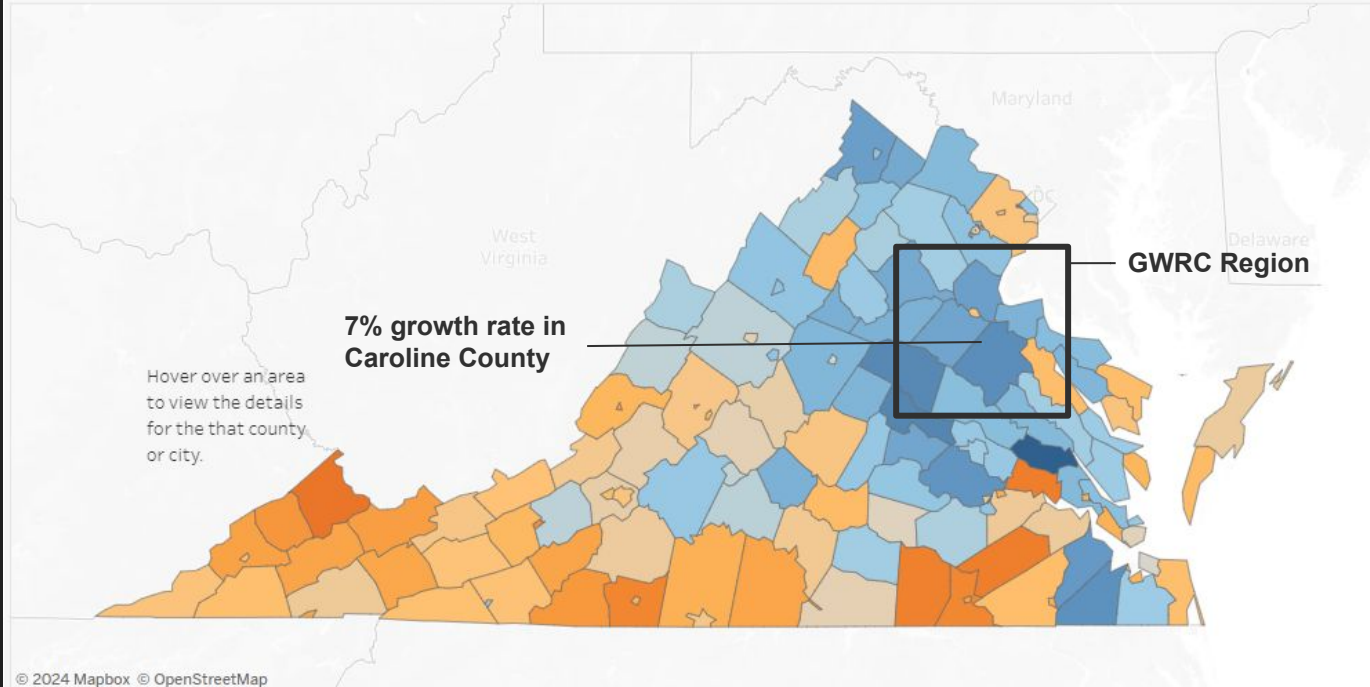
8,729,032

Population in Cities

2,599,094

Population in Counties

6,129,938



% Change

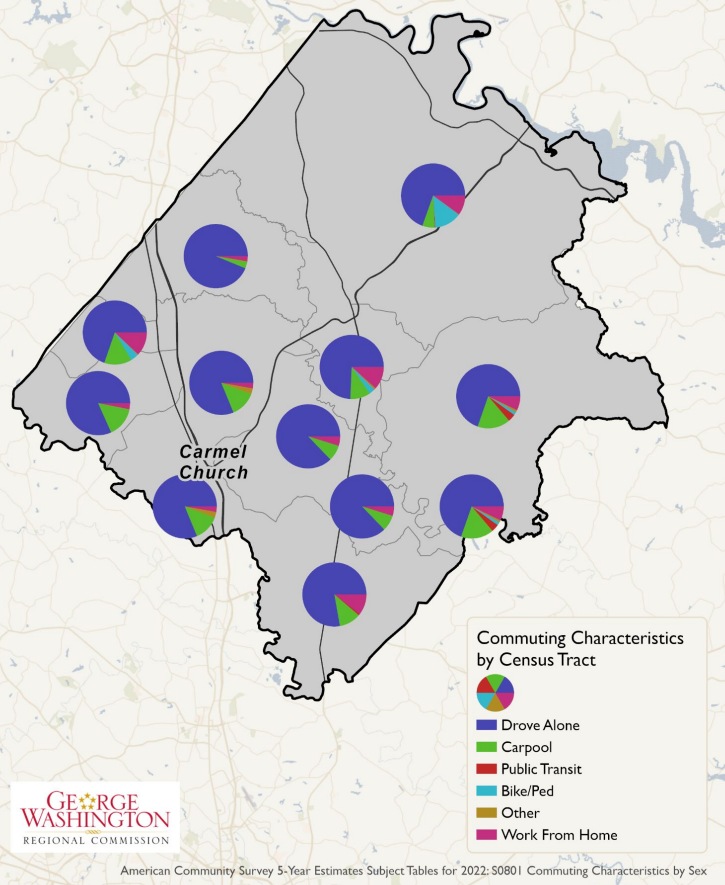
-5.7%

11.9%

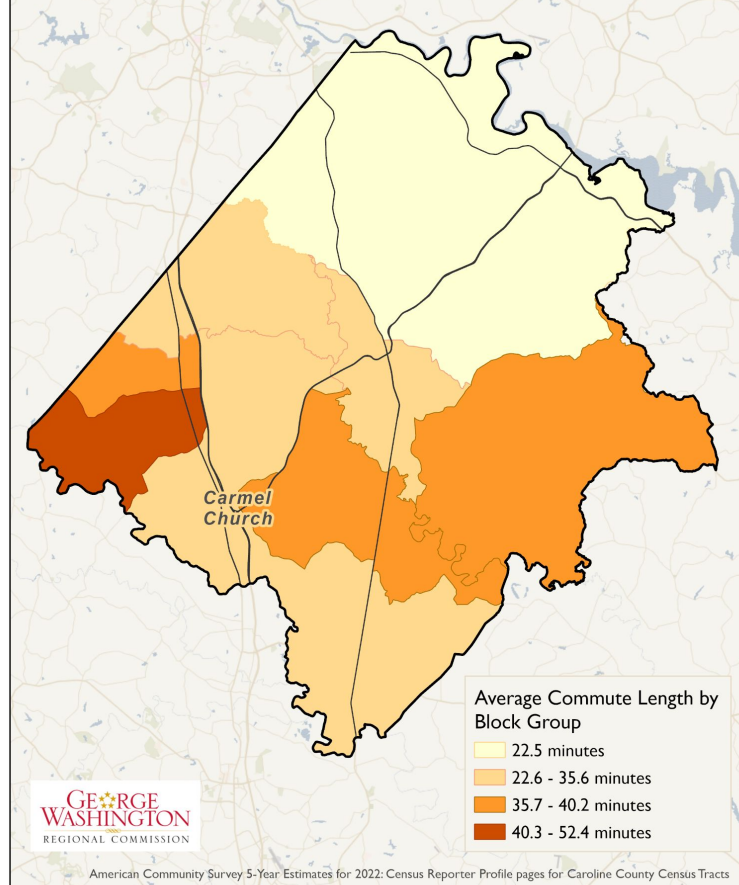
Weldon Cooper Center for Public Service Population Estimates based off growth from 2020 census to 2023 estimates

Population continues to grow,
leaving economic development to catch up...

Caroline County Commuting Characteristics



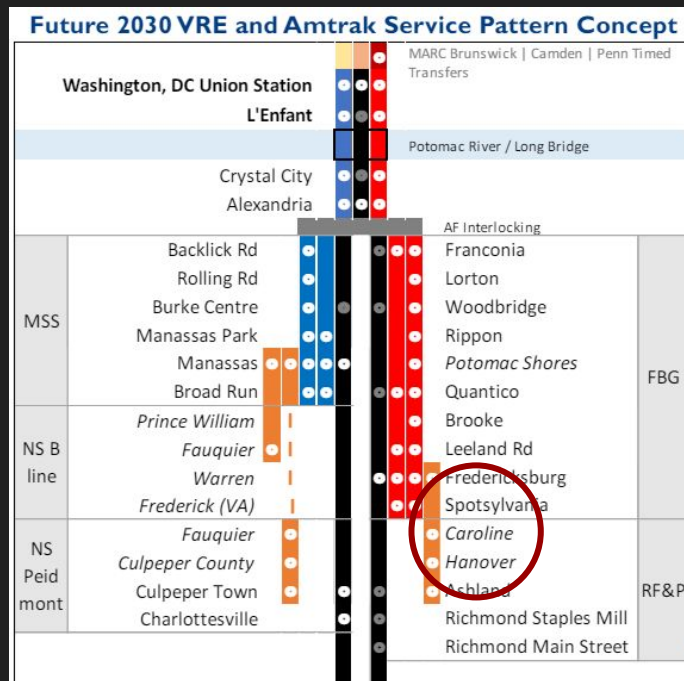
Caroline County Average Travel Time to Work



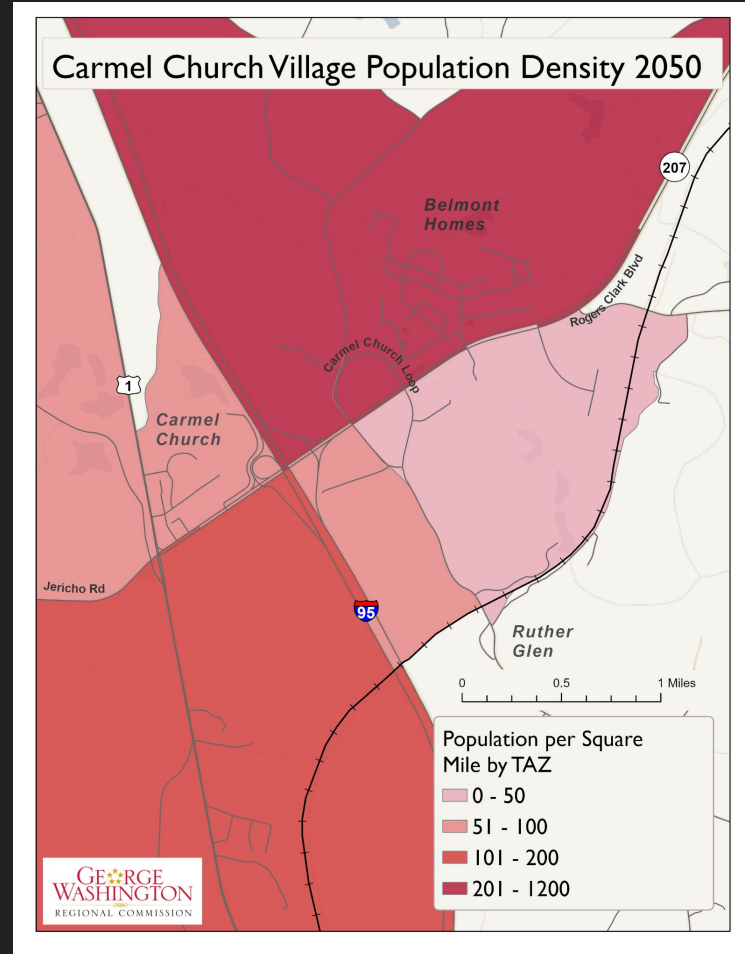
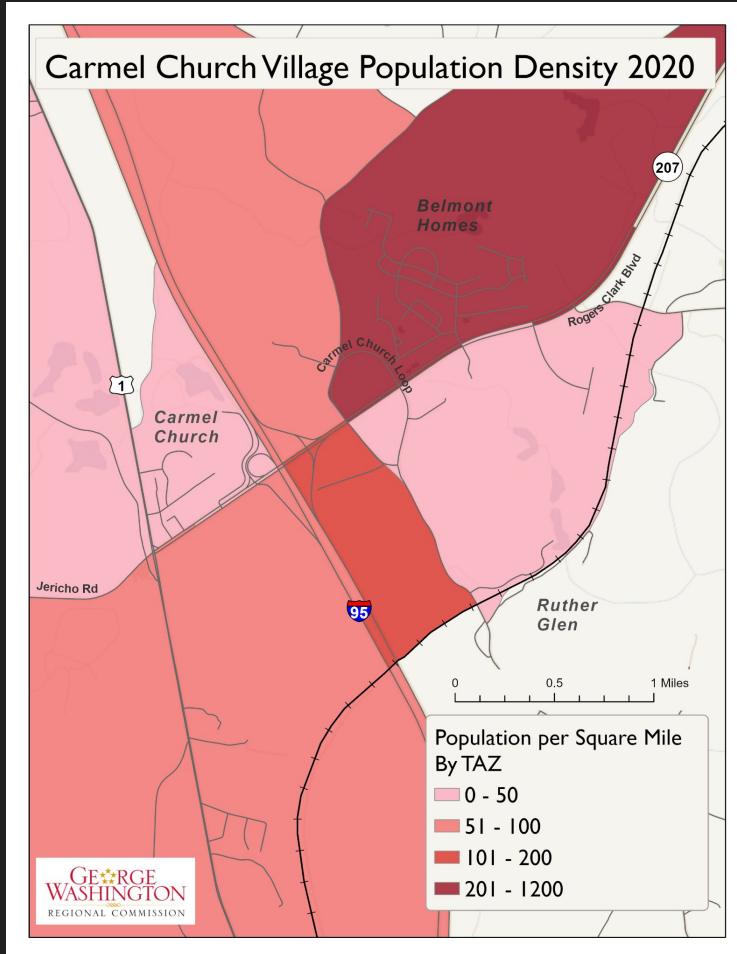
VRE System Plan 2050 Update

A VRE Travel Market Assessment identified **Caroline County**, west of I-95, and the **central Fredericksburg/south Stafford** area as one of the weekday pairs with the **highest +25-mile trip demand**.

- ❖ 800 weekday trips
- ❖ 848 Saturday trips
- ❖ 648 Sunday trips



Expanding geographic extent of analysis to match population growth estimates:



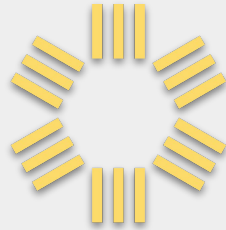
How extensive is the market for VRE ridership in
Caroline County?

What is the optimal location for a new VRE station?

Part I of Analysis: Identifying Demand in the Transit Market

Methodology

Big Data Analytics (from mobile devices) applied to Transportation



STREETLIGHT

StreetLight Origin-Destination Analysis



Origin-Destination

Use this zone set configuration to analyze traffic that travels from one group of locations to another group of locations.

Select

Mode of Travel

[Help Me Choose](#)



All Vehicles
LBS+



Truck (By
Weight)



Bicycle



Pedestrian



Bus



Rail

Time Periods

Zones

❖ Data Periods

❖ Day Types

❖ Day Parts

Origin Zones

▼ No Filters Applied - showing 0 of 0 items

Zone Name

filter

Zone Kind

Any

| ▼

Zone Vintage

Any

| ▼

Pass-through

Any

| ▼

Directional Setting

Any

| ▼

Direction Angle

filter

Actions

Selected zones display here.

Destination Zones

▼ No Filters Applied - showing 0 of 0 items

Zone Name

filter

Zone Kind

Any

| ▼

Zone Vintage

Any

| ▼

Pass-through

Any

| ▼

Directional Setting

Any

| ▼

Direction Angle

filter

Actions

Selected zones display here.

Results for Part I

▼ Time Controls

Day Types [select all](#)

Weekday (M-Th)



Day Parts [select all](#)

All Day (12am-12am)



▼ Traffic Behavior

Visualize Metrics For



Origins



Destinations



▼ Zone Selection

Origin Zones [select all](#)

19 Zones [clear](#)

Select

Destination Zones [select all](#)

107 Zones [clear](#)

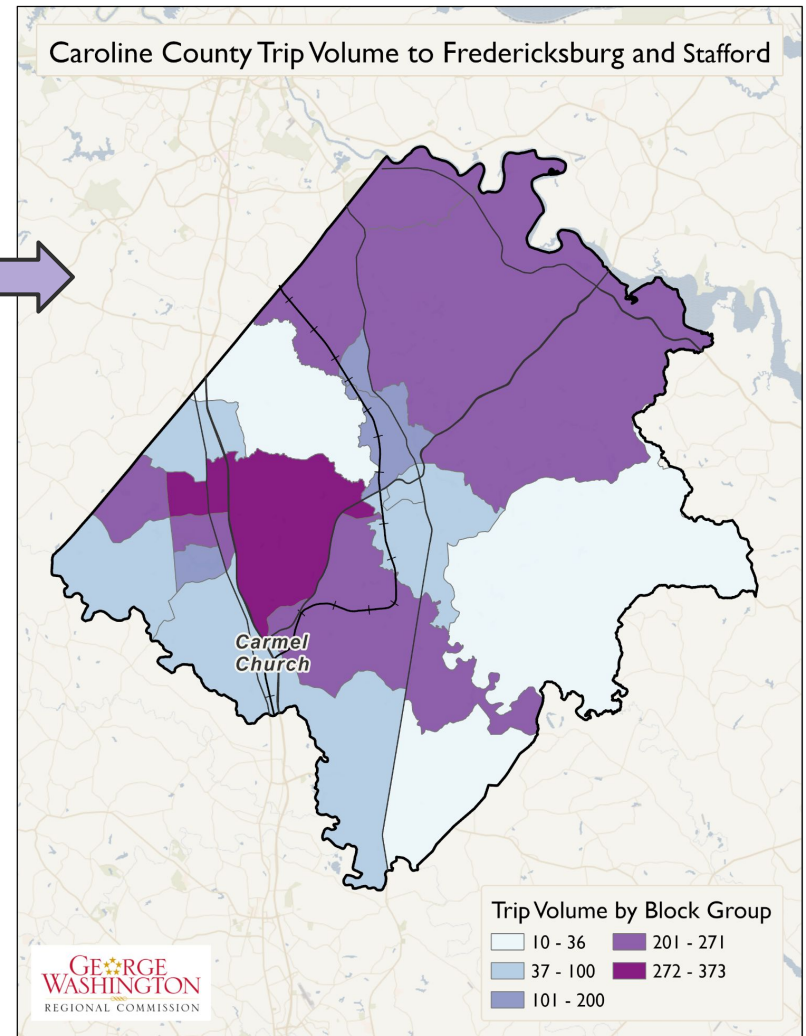
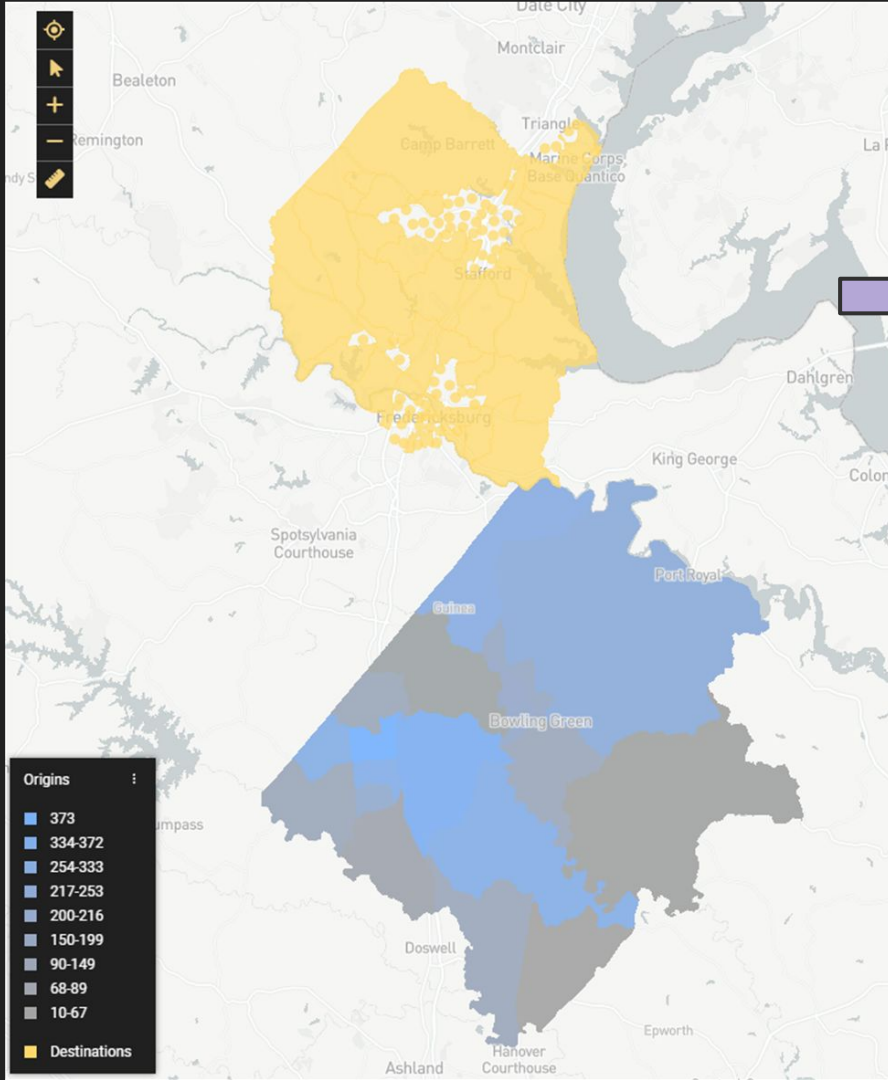
Select

► Metric Controls

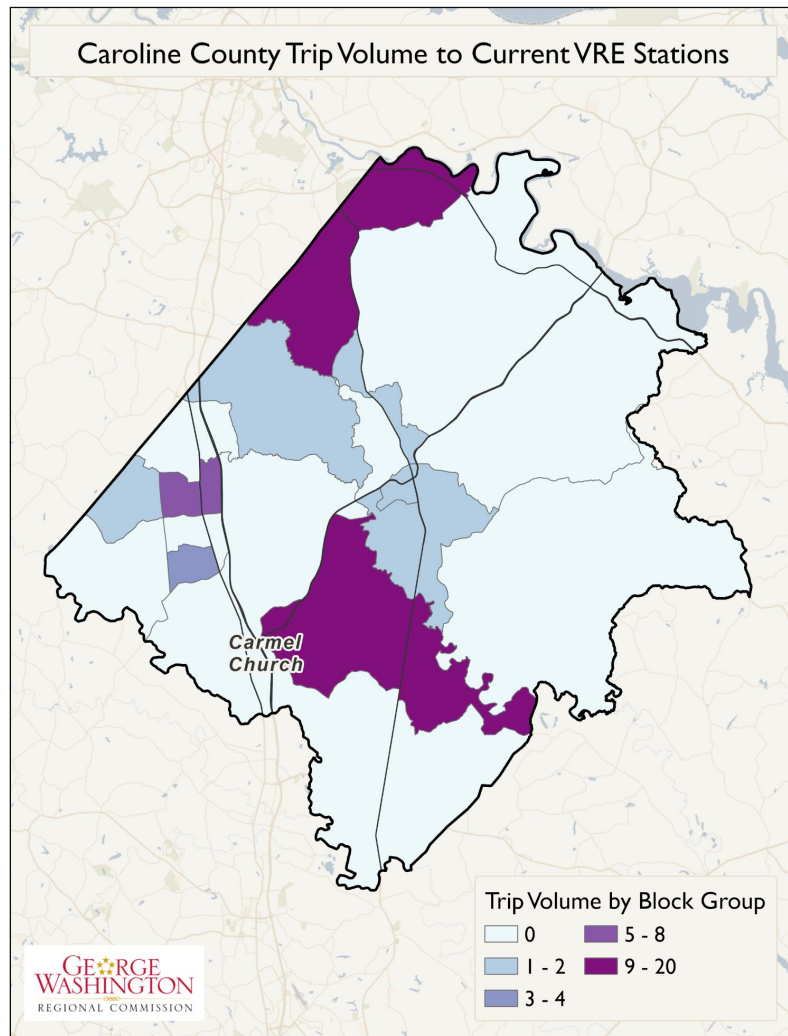
► Map Layers

► Advanced Visualization Controls

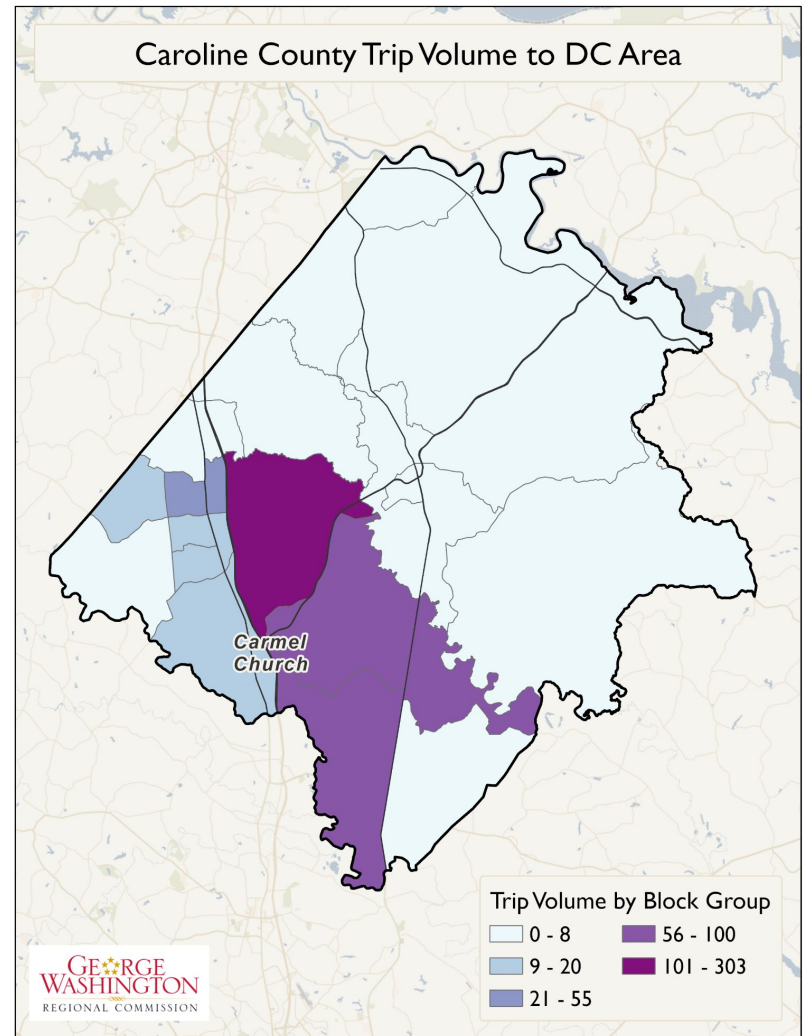




Caroline County Trip Volume to Current VRE Stations



Caroline County Trip Volume to DC Area



Total Trip Volumes:

3,087 from Caroline County → Fredericksburg/Stafford

(1,353 from VRE identified West Caroline County)

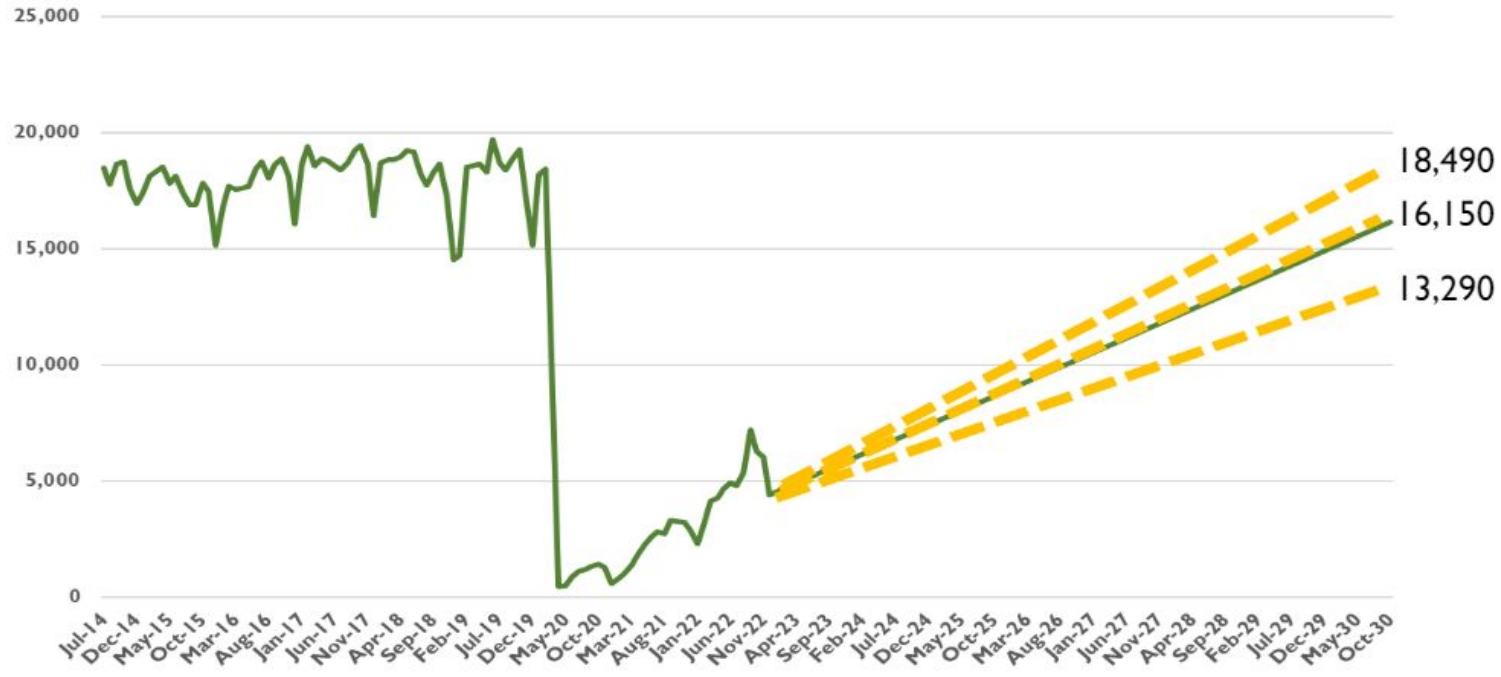
53 from Caroline County → current VRE rail stations (Spotsy/Fxbg)

646 from Caroline County → DC area

Total: **3,786**

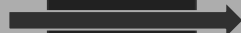
2030 Ridership Forecast: No Build (2023 Service)

2030 average daily ridership with no change to VRE service pattern

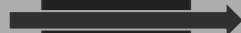


Part II of Analysis: Evaluating Future Rail Station Sites

**Service Area
Network
Analysis**

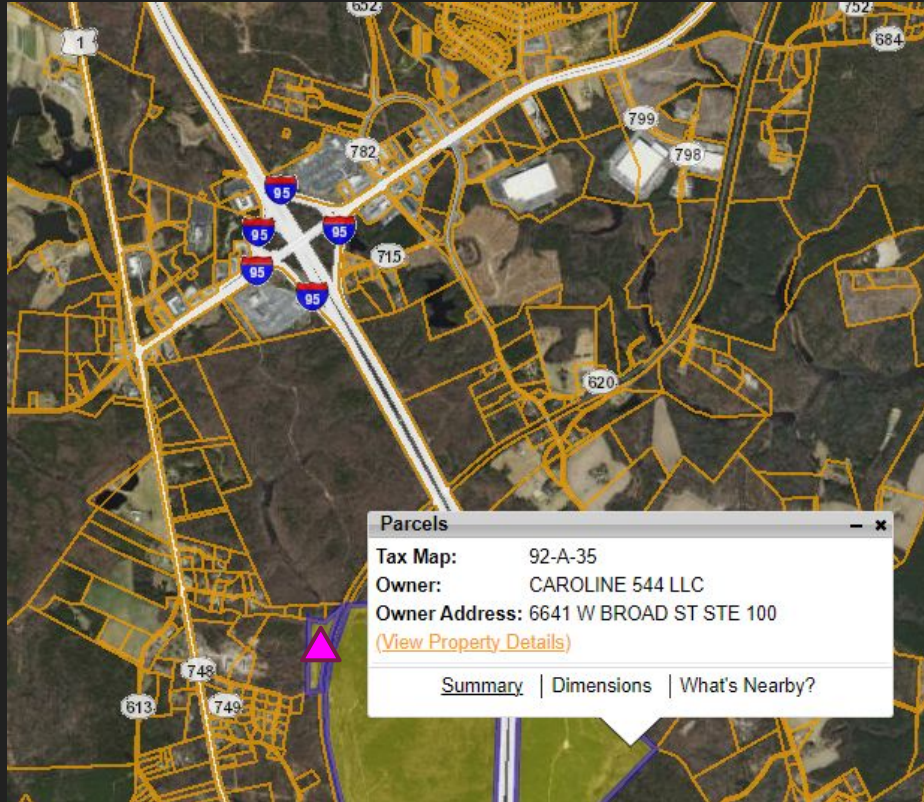


**Select Census
Blocks by
Location**

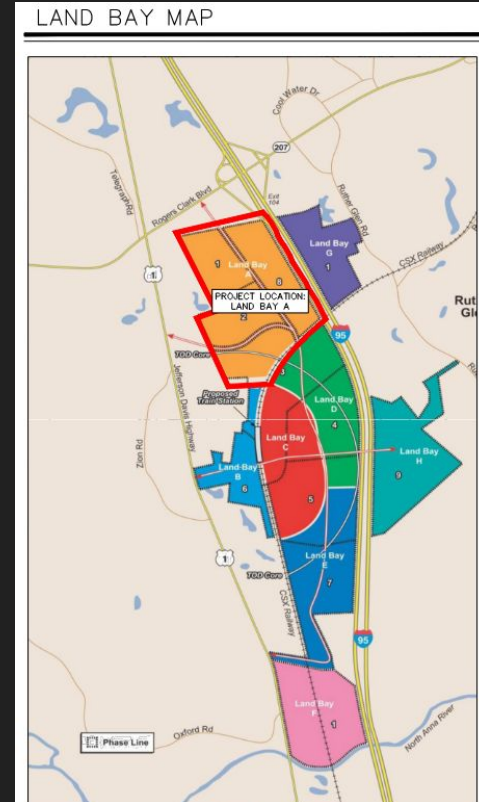


**Summary
Statistics for
Population**

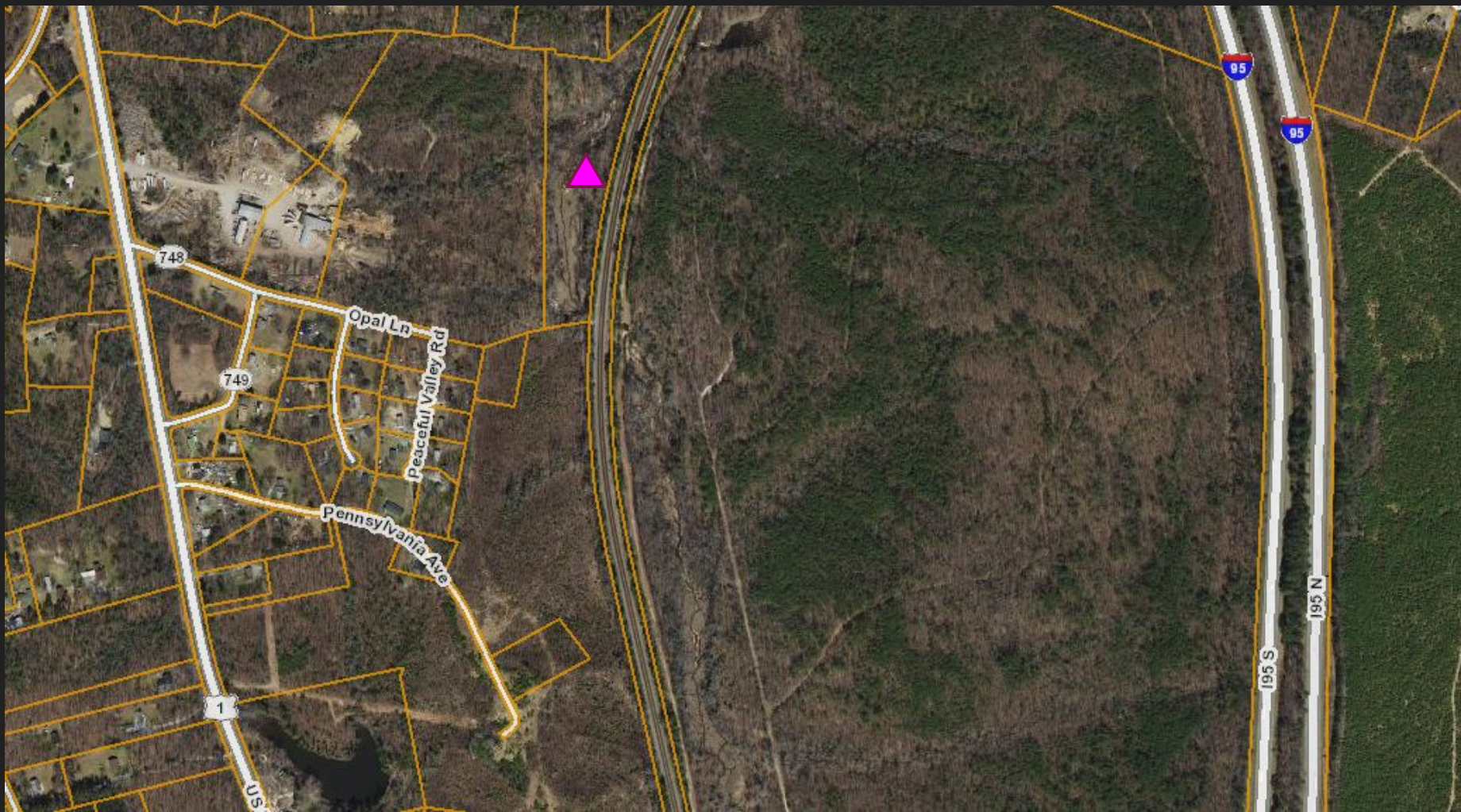
Site Selection #1: Carmel Church Village



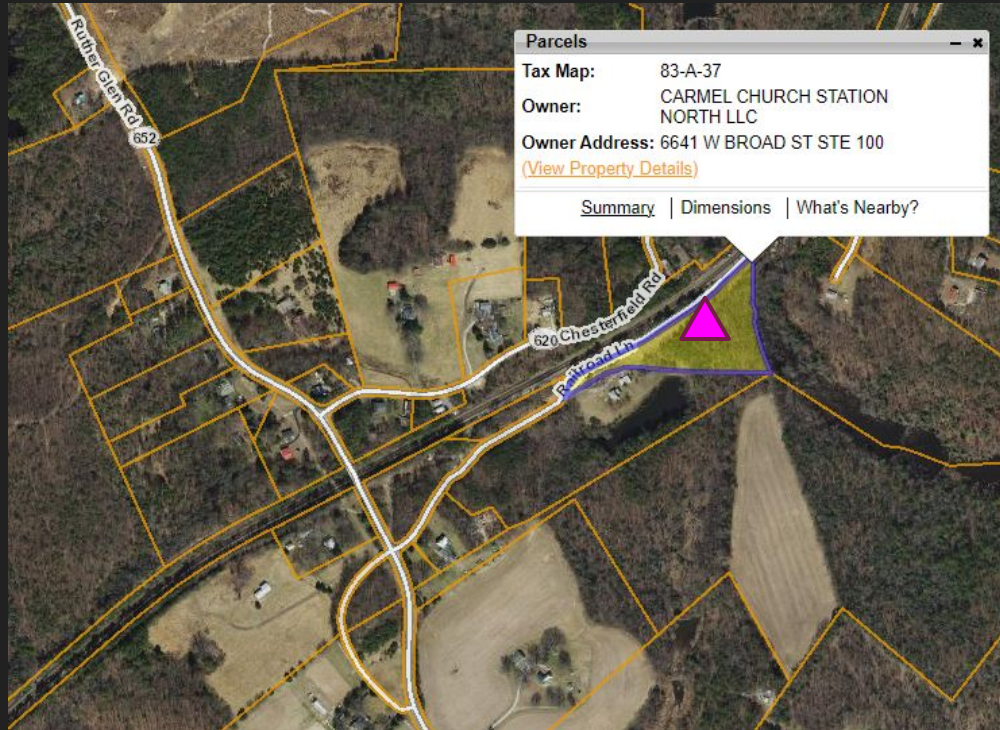
Caroline County Parcel Viewer, GeoDecisions



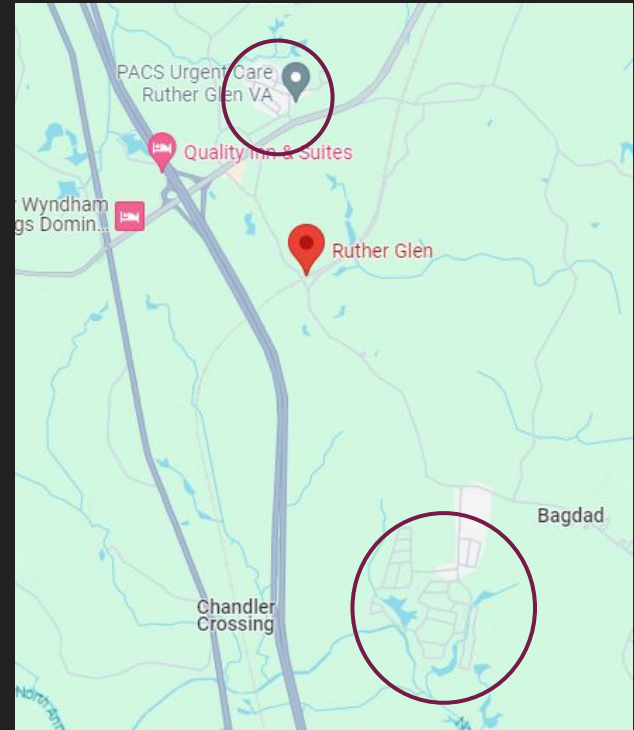
Generalized Development Plan RZ-03-2023



Site Selection #2: Ruther Glen



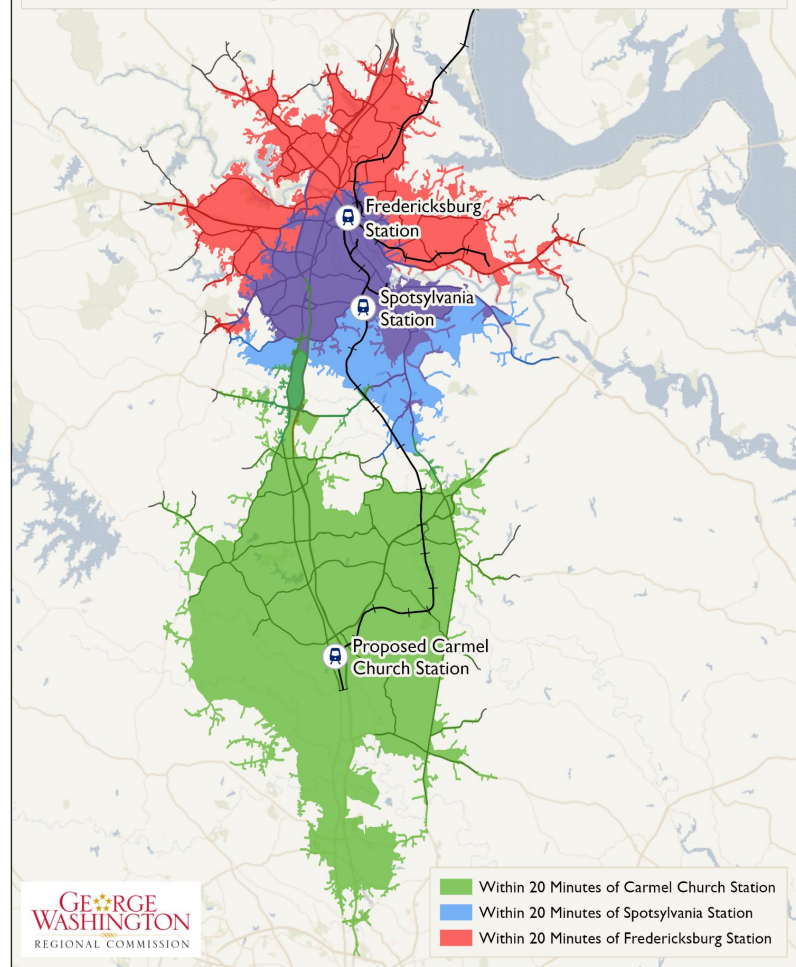
Caroline County Parcel Viewer, GeoDecisions



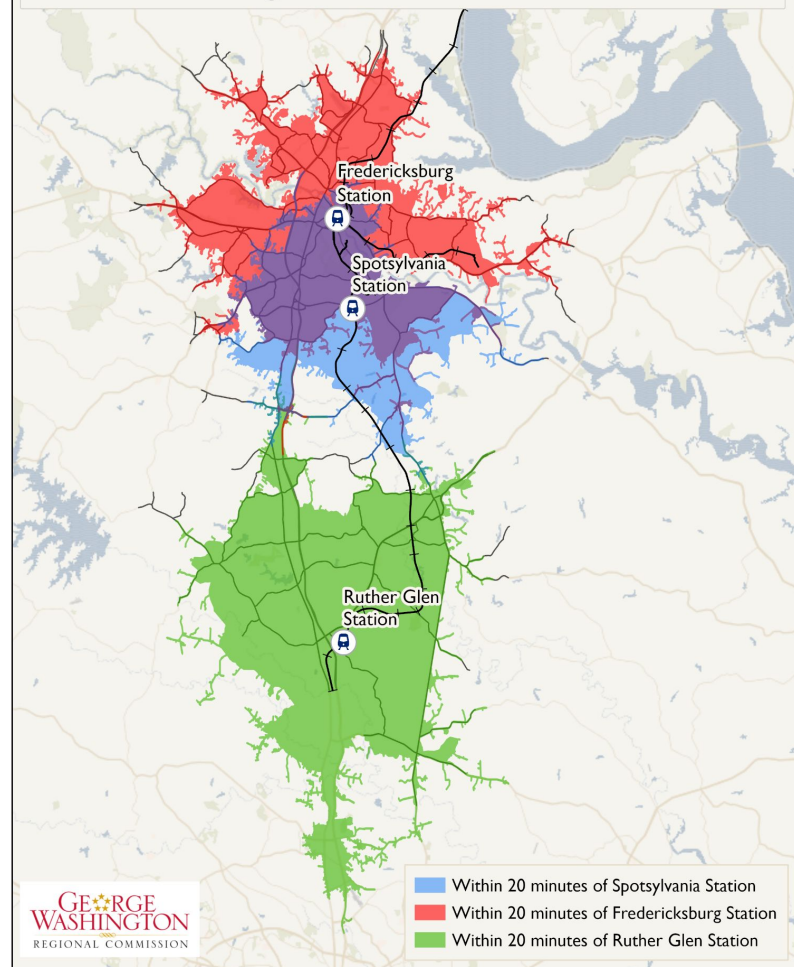
Google Maps

Results for Part II

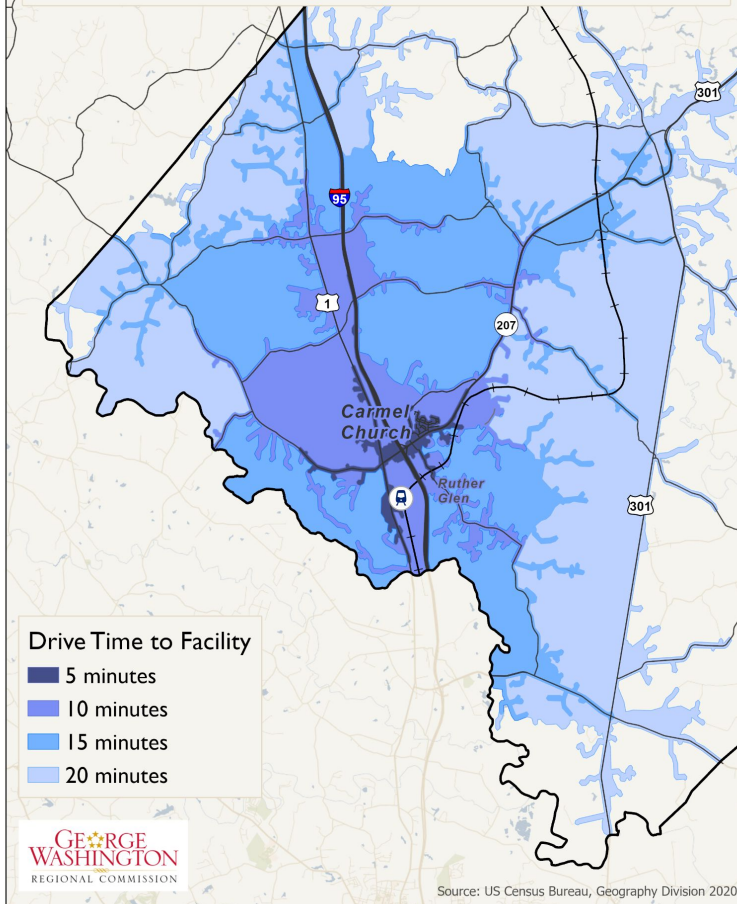
Regional VRE Service Area



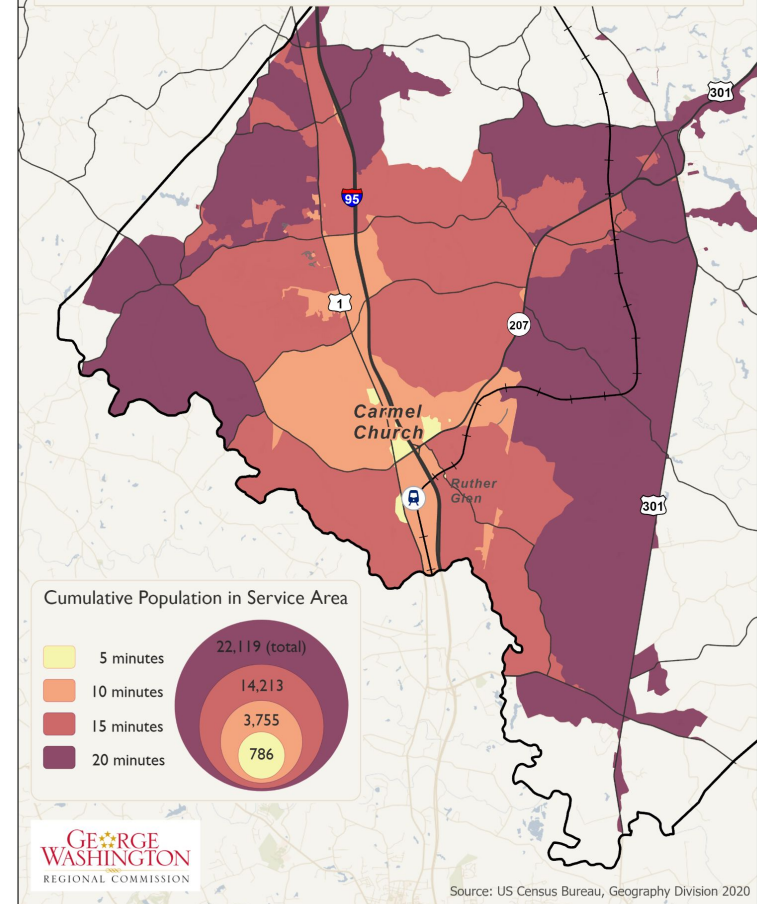
Regional VRE Service Area



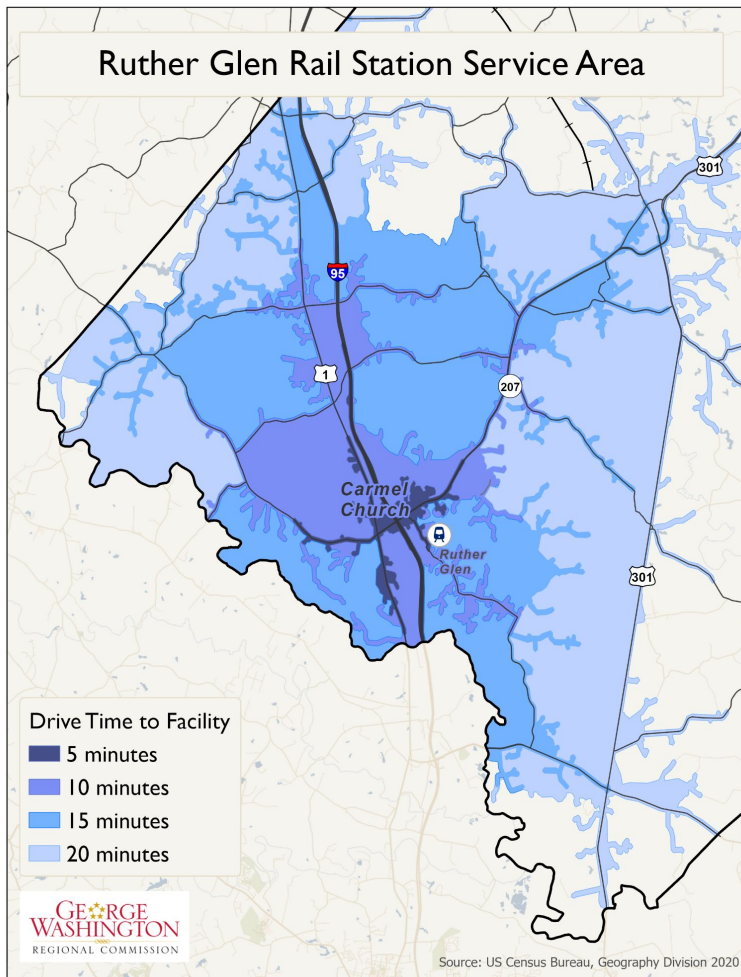
Carmel Church Rail Station Service Area



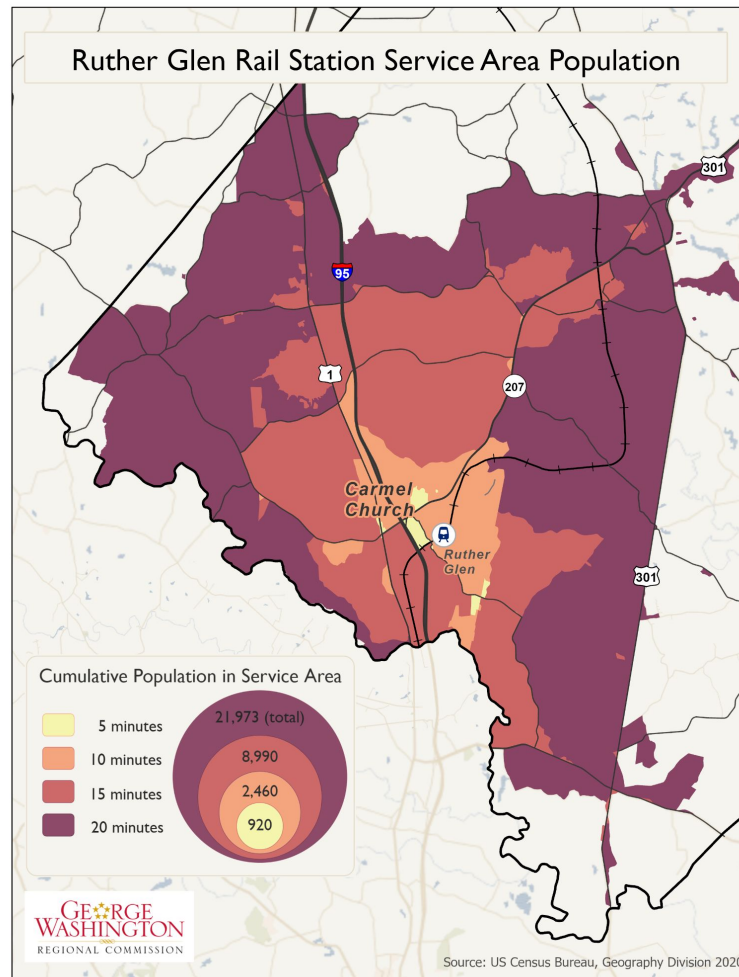
Carmel Church Rail Station Service Area Population



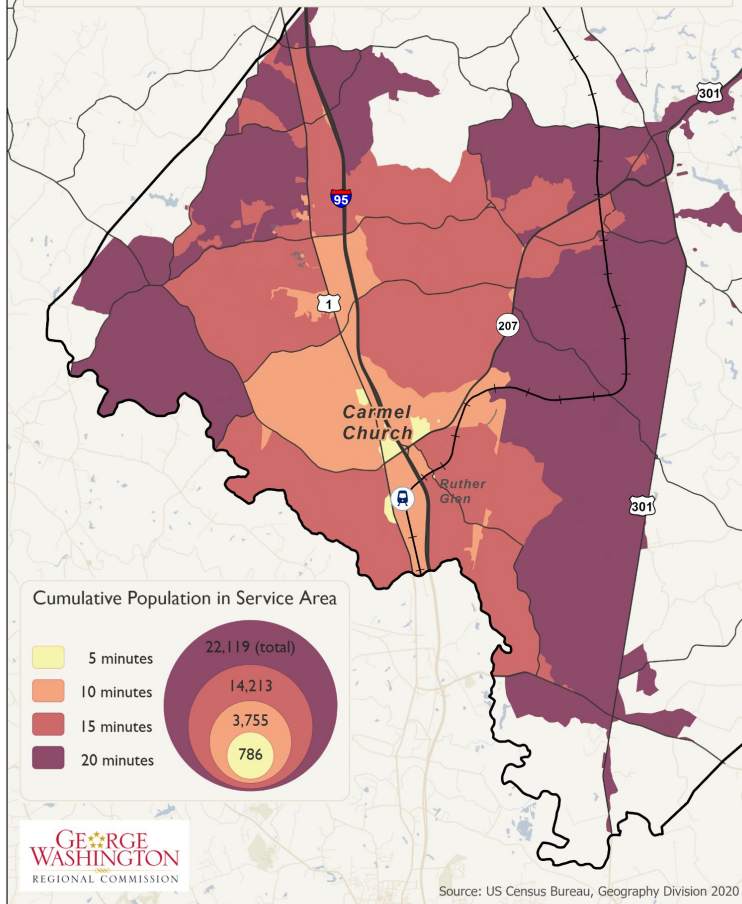
Ruther Glen Rail Station Service Area



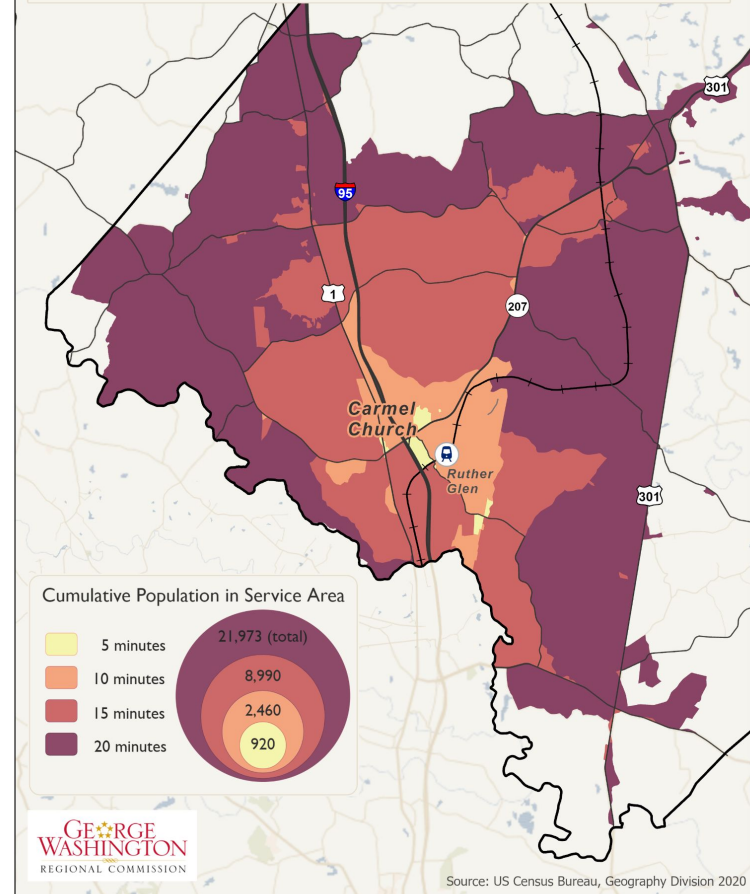
Ruther Glen Rail Station Service Area Population



Carmel Church Rail Station Service Area Population



Ruther Glen Rail Station Service Area Population



Discussion

- ❖ Trip and traveler attributes (is the VRE a suitable transportation alternative?)
- ❖ Growing population in Caroline County and Carmel Church
- ❖ Existing infrastructure, parcel size, land ownership
- ❖ Expanding beyond Caroline County: exploring service area extent into Ashland
- ❖ Steps forward to a station

Q & A