STAFFORD COUNTY VIRGINIA TRANSPORTATION

A GIS Review of Park and Ride Facilities in Stafford County

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Abstract:

Stafford County, Virginia is home to a large commuting population that experience significant daily traffic. Commuter buses, trains, and van pools are effective options for mass transportation that can reduce the number of vehicles using limited road space. The four multi-modal mass transit facilities in Stafford County currently serving commuters. Population growth of nearly 28,000 residents between 2010 and 2002 (datausa.io, n.d.) and a projection of nearly 200,000 residents by 2035 likely necessitates an additional multi-modal mass transit facility, or the expansion of existing multi-modal mass transit facilities. Multiple data sources and analytic tools were used to identify traffic density, commuting populations within the county, and proximity of residents to existing park and ride facilities. This paper details the data and analysis conducted to identify the optimal placement for a new park and ride facility. Expansion of current multi-modal mass transit facility or the addition of a new facility will likely improve many residents' accessibility to mass transit commuting options.

Introduction:

Stafford County, Virginia is bisected by Interstate 95, the main interstate running north and south along the east coast of the United States. The area of interstate 95 between Springfield, Virginia and Fredericksburg, Virginia has the worst traffic in the country according to a study by INRIX (Shaver, K. 2017), a traffic data firm. One area of concern for the Stafford County Transportation office is identifying methods to reduce overall traffic. Approximately 37,000 residents commute out of Stafford every day for work. Of these commuters over 71% commute alone in a vehicle with an average commute time of 39 minutes (datausa.io, n.d.). If the Virginia Department of Transportation (VDOT) implemented additional park and ride facilities it will likely improve access to mass transit options for many commuters and reduce overall traffic. These multi-modal mass transit facilities, known as park and rides, offer busses, van pools, and ride sharing. There are four park and rides in Stafford County, all located near Interstate 95 on-ramps: Staffordboro, South Commuter Lot (Mine Road), Courthouse Road/Rte 630, and Falmouth/Rt. 17. An important note is that only the Staffordboro park and ride is currently offering bus routes, the remaining three support vanpools and carpooling.

When considering mass transportation options convenience plays a significant role. A study by the International Transportation Forum highlights several factors of convenience for using mass transit including immediate accessibility, inconvenience of travel times, wait times, and crowding (Wardman, 2014). Applying this information to Stafford County, residents are much more likely to use mass transportation if it is convenient to travel to a park and ride, there are frequent departures, and they are not overcrowded. Commuters are traveling to

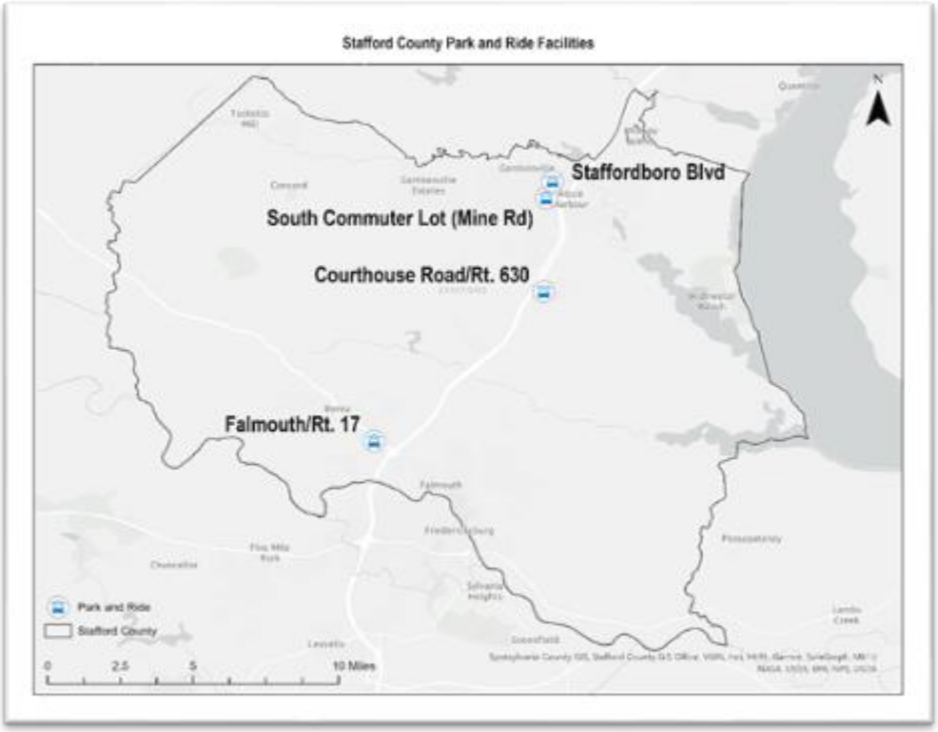
Washington, D.C., but also to surrounding counties and cities. To be used more frequently and offer effective travel for commuters, these facilities must offer transportation to all areas where commuters work. In preparation for this project, I have been in contact with the Stafford County Transportation Office. The transportation office has several areas of focus; one of the highest priorities being the traffic and improvement of public transportation options in and around Stafford County. The VDOT is also working to address the heavy traffic volume through a joint venture with the private company, Transurban, by extending the existing express lanes further south and expanding Interstate 95 in several areas. This extension will be complete in late 2023 and will offer time-saving travel along the interstate while increasing the roadway capacity by 66% (95 Fredericksburg Extension (Fred Ex), n.d.). VDOT has also identified the need to establish effective means of access to public transportation to encourage residents to participate more frequently. Using the updated Stafford County Comprehensive Plan, much of the projection for the county is to the year 2050. For this study I used a mid-term timeline for population projection, 2035. This timeline will be used to establish all recommendations for park and ride improvements and potential additions.

Discussion:

I initiated this project to help identify areas of potential traffic improvement in Stafford County. The project began by opening discussions with the Stafford County Transportation Office. The staff conformed that heavy traffic is a significant transportation concern and mitigating the traffic is identified as an objective in the Stafford County Comprehensive Plan (Comprehensive Plan 5-Year Update, 2021). Chapter four of the comprehensive plan is focused on the transportation needs of Stafford County. There are multiple stakeholders that have a role in transportation, including the public, VDOT, Stafford County and regionally the Fredericksburg Metropolitan Planning Organization (FAMPO). The development of the Transportation Master Plan began in 2020. This plan will guide transportation decisions in Stafford County and the region through 2025. The plan is reviewed annually and uses data, advanced software, and planning techniques in decision making. Within this plan, multiple key factors have been identified, including economic climate, coordination with federal, state, and regional agencies, population growth, and multi-modal facilities (Comprehensive Plan 5-Year Update, 2021). One important method of traffic reduction and commuter support is the improvement of existing park and ride facilities and the potential addition of park and ride facilities in Stafford County. As populations grow there may be more demand for commuting solutions; however, the Stafford

Figure 1. Overview of Current Park and Ride Facilities in Stafford County

County focus on establishing technology business opportunities may keep more commuters local and even bring commuters in from other counties (Stafford County Economic Development, n.d.).



There are four park and ride facilities within Stafford County operated by VDOT. The facilities are all adjacent to Interstate 95 providing ease of access to the main thoroughfare in the county. The park and ride facilities provide several commuting options including bus, vanpool, and carpooling (Stafford County, VA, n.d.). The busses and van pools are managed by private companies and are often more formalized and follow established schedules. The northernmost park and ride facility, Staffordboro park and ride, is the only facility currently offering bus routes operated by OmniRide. The facility has two established bus routes transporting commuters to the Pentagon (Route 942) and to downtown Washington, D.C. (Route 543). OmniRide services four stops in downtown Washington, D.C. serving many major employer locations (Omniride, n.d.). The Washington, D.C. route has five available departure times between 4:23 am and 7:28 am. The Pentagon route has six available departure times between 4:28 am and 7:03 am. These two routes are operated Monday through Friday every week, except for federal holidays. Monthly ridership data provided by OmniRide from November 2019 through September 2022, the data is displayed quarterly in firgure 2 and has shown two interesting trends. First, the Pentagon busses (Route 942) had a total of 113,068 riders during the review period, while the Washington, D.C. busses (Route 543) had a total of 86,209 riders during the review period. This is a difference of 26,859 riders for the study period. If Stafford County identifies a benefit in adding additional bus routes and pick up locations, they are likely best allocated to serve the commuters traveling to the Pentagon. The ridership dwindled in March of 2020 and was significantly down through February of 2021 because of the COVID-19 pandemic and an overall increase in remote work. In March 2021 ridership began to increase steadily as more commuters returned to in person work. The ridership in the month of August of 2022 was the highest in the data provided with over 6,000 riders on the Washington, D.C. route and over 7,000 riders on the Pentagon route. June through September of 2022 showed an increase in ridership over any pre-COVID date in the data provided by OmniRide. This trend indicates that commuters are becoming increasingly likely to use the OmniRide routes.

Quarter	Quarterly Ridership
Nov-Dec 2019	4784
Jan-Mar 2020	20,983
Apr-Jun 2020	589
Jul-Sep 2020	7,451
Oct-Dec 2020	7,565
Jan-Mar 2021	8,220
Apr-Jun 2021	16,713
Jul-Sep 2021	22,120
Oct-Dec 2021	21,131
Jan-Mar 2022	21,839
Apr-Jun 2022	32,219
Jul-Sep 2022	35,663

Figure 2. Quarterly OmniRide Bus Ridership from the Staffordboro park and Ride

Vanpooling is common and offers commuters routes to locations throughout Washington D.C. and the surrounding areas. This is an attractive option for many commuters because there are often several options for departure times and more direct routes to many different locations. Another notable opportunity provided by van pools is route heading south from Stafford County, this is not offered by the existing bus services (Vanpool Connections for Riders in Fredericksburg | GWRideConnect, n.d.). Vanpool riders and organized carpools are available to commuters through the George Washington Regional Commission using the GWRideConnect Program to help individuals coordinate rides. In Virginia ridership standards for vanpools do not exist, they are regulated by IRS code requiring a vehicle capable of seating at least seven people to be qualified for tax incentives (How to Vanpool in Virginia, 2021). Because of the lack of tracking the actual number of commuters using vanpools and carpools can be challenging to identify. These programs are supported in Virginia with signage near Interstate 95 on-ramps to inform commuters of the program. The GWRide website does however list the number of vanpools available daily from the current park and ride facilities in Stafford (Figure 3). There are likely additional vanpools operating independently that are not tracked by GWRide.

Park and Ride	GWRide Vanpools Daily
Staffordboro Blvd.	21
South Commuter Lot (Mine Rd)	5
Courthouse Road/Rt. 630	12
Falmouth/Rt. 17	14

Figure 3. Daily available Vanpools from the Current Stafford County Park and Rides

Carpooling is also accomplished through the GWRide Connect program. Users create accounts indicating their workplace and are connected to a car-pooling group that will meet their commuting needs. (Carpool Connections for Fredericksburg, VA Area | GWRideConnect, n.d.). Another method of carpooling in Northern Virginia is called “slugging”(More on Slugging, Virginia DOT, n.d.). Slugging involves potential riders waiting at a park and ride facility for a driver who would like to use the high occupancy vehicle (HOV) lanes on Interstate 95. In Virginia these lanes require a minimum of two to three people in each vehicle (High Occupancy Vehicle (HOV) Systems, n.d.). Drivers will notify riders of the locations they will drive, and riders will join based on their needs. According to a story from American University Radio, in northern Virginia one out of every five cars carries three people during peak travel periods (WAMU 88.5, 2021). This could be attributed to organized carpooling and slugging, but it does demonstrate commuters are willing to use these options.

Another mode of public transportation in Stafford County is the Virginia Railway Express (VRE) train. For this study it has not been included when considering park and rides. The VRE parking areas do host some carpooling, but the main intent is to host parking for the VRE riders. The number of carpools and vanpools operating out of VRE lots is unclear and not effectively tracked. Most importantly, for the purpose of the study they are highly unlikely to be good candidates for a new OmniRide bus route, vanpool, or carpooling routes because they are far from Interstate 95 and travel to and from these parking areas requires the use of secondary roads. The VRE is an option for some commuters, but according to train utilization data from VRE, the eight daily Fredericksburg line trains have a utilization rate of 44% or below (Train Utilization Trends - VRE, n.d.). Every train is currently operating with less than half of the seats occupied, which may be a result of the COVID-19 pandemic or a preference of commuters in the region.

According to the US Census Bureau, in the American Community Survey (ACS) 5-years estimate 2020, in Stafford County 71.9%, approximately 54,000, commuters drive alone to work with an average commute time of 39.7 minutes. Notably high in Stafford County is 9.61% of residents with a “super commute” of more than 90 minutes (Stafford County, VA, n.d.). The commuters who drove alone are recognized by Stafford County as a significant factor in the county traffic density. According to the same ACS data, 8.1%, approximately 6,000, Stafford County residents work from home. The change in work patterns brought on by the COVID-19 pandemic may also change commuting. Partial and full telework has grown since the start of the pandemic and some business and government entities have realized the cost saving benefits of smaller physical workplaces and encouraged teleworking where available (Dalton, M. 2022).

The population of the county may rise, but overall commuters may remain consistent or even shrink in the future due to alternate work options.

Methods:

The project is divided into several steps. First, is the current commuting population and their spatial relationship to the existing park and ride facilities. The next step is identifying the roads with the highest traffic volume in the county and areas of opportunity with lower traffic volume where traffic may be redirected as traffic patterns are changing. The third step is the identification of Stafford County residents in relation to the available bus routes at the Staffordboro park and ride. Staffordboro is the only park and ride offering bus routes, knowing the residents with difficult access will help identify new potential locations for bus routes. The fourth step of the study will focus on projecting the spatial distribution of the commuting population in Stafford County in 2035. The projection of the 2035 commuting population is based on the Weldon Cooper Center demographics estimation of the Stafford County population in 2035. There are two important notes about this method of estimation. First this assumes that age, working population, and distribution of residents rises equally in all census tracts of Stafford County. Secondly, this assumes the commuting needs of Stafford County residents has not changed and maintains consistency with population growth. The last step will provide two main recommendations for the Stafford County Transportation Office to improve the commuter experience in the future. These recommendations are based on the information from Chapter Four of the Stafford County Comprehensive Plan, covering the county and regional transportation planning through 2050.

To begin I gathered all the necessary data, including information from Stafford County, the US Census Bureau, the VDOT, The US Department of Transportation, the University of Virginia Weldon Cooper Center, and several other sources. After gathering and preparing all the data, I used ArcGIS Pro to conduct analysis and create the maps and graphics depicting the results. The analysis within ArcGIS pro consisted of multiple tools and processes to combine and refine the data. I identified the four park and ride facilities in Stafford County: Staffordboro, South Commuter Lot (Mine Road), Courthouse Road/Rte 630, and Falmouth/Rt. 17.

Knowing the capacity of each facility and the likely number of users identifies locations that are adequately supported and those that may not be adequately supported. To acquire this information, I reviewed the existing park and ride facilities and measured the overall area. I also inquired with VDOT and was provided the available spaces in each Stafford County Park and

Park and Ride Facility	Parking Spaces	Physical Size

Ride (Figure 4). The park and ride facilities in Stafford County have and average size of 46,000 square meters. The Staffordboro facility is the largest of the four with over 1,800 parking spaces. The other facilities are smaller and do not have the same amenities available. The amenities of each facility are an important factor for commuters. Each facility does offer van pools, carpooling, and slugging, but some do not have covered waiting areas, bike racks, significant lighting and other desirable features. Additionally, there may not be van pools and carpools departing from every location that will meet the needs in commuters from that area.

Staffordboro Blvd.	1863	63,200 sq meters
South Commuter Lot (Mine Rd)	750	23,700 sq meters
Courthouse Road/Rt. 630	1100	36,600 sq meters
Falmouth/Rt. 17	1034	37,500 sq meters

Figure 4. Size of the Current Park and Ride Facilities in Stafford County

The data identifying the commuting population was retrieved from the US Census Bureau, specifically commuting population by age and sex. This data is divided by census tract which is important for this study. I used the census tracts of Stafford County to subdivide the county and gain an understanding of the spatial distribution of the county's commuting population (Figure 5). I also used the census data to subdivide the types of commuters in each census tract. The commuters are identified as drove alone in a vehicle, used public transportation, carpooled, or worked from home. When reviewing the commuting population by census tract there are two tracts with the largest commuting population in the county. These are tracts 101.05 and 102.10, both have large densely populated neighborhoods and are adjacent tracts bisected by Interstate 95 just north of the Route 630/Courthouse interchange. They are also just north of the

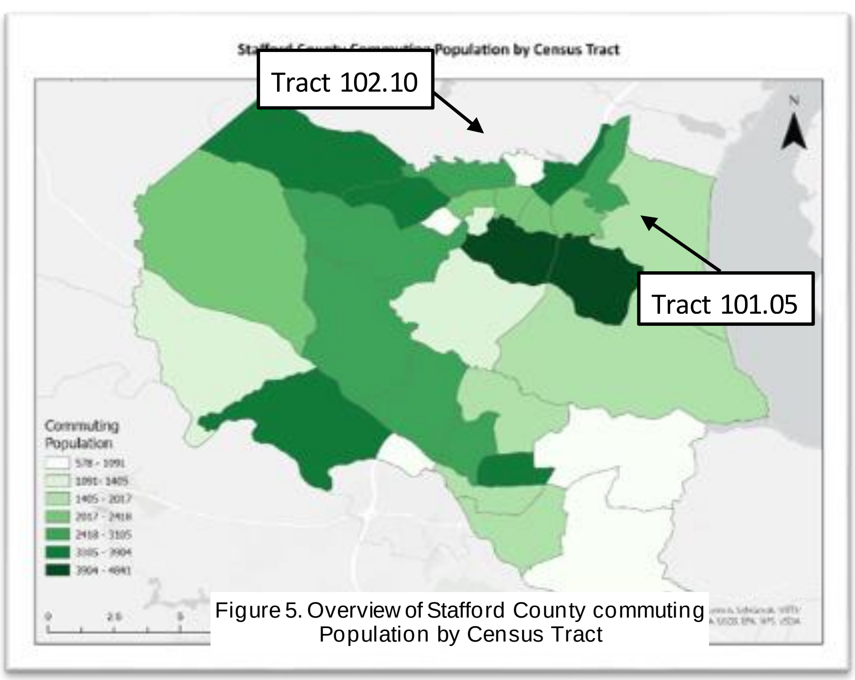


Figure 5. Overview of Stafford County commuting Population by Census Tract

Park and Ride	Number of Commuters

newly expanded Route 630/Courthouse commuter lot. After establishing the census tracts and commuting population I conducted Euclidian allocation analysis from the park and ride facilities to identify areas served by existing facilities. This allocation places a straight-line distance allocation to each facility; it does not account for travel time on roads a commuter would use to reach the park and ride facility. It does provide an approximate area of the county that each park and ride support.In Stafford County there are numerous two lane, narrow roads. A commuter cannot travel as quickly on these roads as they can on a multi-lane road. Additionally, the different commuting options, including bus routes, van pool and carpool departure times and destinations are likely to influence the park and ride facility used by a commuter; however, the convenience of a short drive from home to a park and ride facility is also likely to play a role in a commuter's selection. To ensure that the county is more realistically divided between the four park and ride facilities I used a cost allocation raster, establishing the commuting population closest to each park and ride facility by driving time (Figure 7). This analysis required the road data from Stafford County categorized as primary or secondary by identifying multi-lane and single lane roads. This data was converted to a raster and reclassified for use in the cost allocation analysis. This analysis includes the variation in the paths of the roads and the overall capabilities of those roads to support traffic. This data was then converted, and the commuting population was summarized within the four polygons to allocate the number of commuters to a park and ride facility by shortest drive time. The results concluded that the facility serving the largest commuting

Staffordboro Blvd.	12,941
South Commuter Lot (Mine Rd)	16,099
Courthouse Road/Rt. 630	33,408
Falmouth/Rt. 17	13,310

Figure 6. Stafford County Park and Ride Allocation Area Commuters

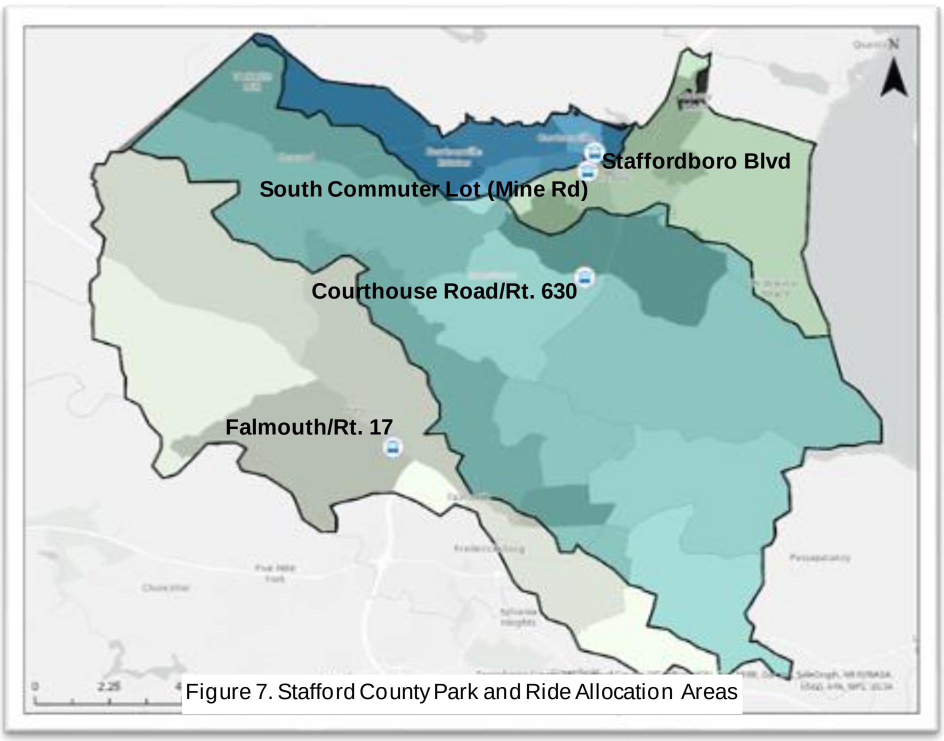


Figure 7. Stafford County Park and Ride Allocation Areas

population in the county was the South Commuter Lot (Mine Road) park and ride facility. This facility offers vanpool and carpooling options and was completed in 2020 replacing a smaller lot by doubling the available parking spaces. It is adjacent to an Interstate 95 on-ramp. The South Commuter Lot (Mine Road) park and ride is allocated the largest physical and population area by the cost allocation process. The area also spans the entire county from east to west, which creates significant drive time for some commuters. Because the South Commuter Lot (Mine Road) park and ride facility cost allocation area is the largest by geography and population, it is likely a candidate for a new park and ride facility.

The traffic volume in Stafford County is an important factor. One challenge that comes with traffic in Stafford County is commuters, commercial vehicles, and travelers on Interstate 95 pass through Stafford. To identify the highest traffic areas, I acquired traffic data from VDOT, including the average daily traffic volume in Virginia for 2018, 2019 and 2020 (Traffic Data, VDOT, n.d.). The data from 2018 and 2019 is especially important because changes in travel and commuting during the COVID-19 pandemic created a drop that is highly unusual for the region. The data from VDOT provided the total number of daily traffic volume (ADV) for all VDOT roads. The areas with the highest density of traffic were Interstate 95,the on and off ramps from Interstate 95, and the main roads leading from Interstate 95 east and west into the county. The ADV in Stafford County identified the two on and off ramps with the highest traffic volume are at Route 610/Garrisonville and Route 17. Route 610 and Garrisonville currently support two park and ride facilities near the interstate entrance, Staffordboro and South Commuter Lot (Mine Road). The Route 17/Falmouth park and ride is west of the route 17/Interstate 95 interchange. Considering potential for park and ride expansion or new park and ride facility location areas with the highest ADV may not reveal good candidates for expansion or addition because increases in lot size and capability may be counteracted by increased traffic congestion and diminished access to the facilities. The VDOT traffic volume data was also used to identify high traffic areas in counties adjacent to Stafford County. The dense traffic areas include Fredericksburg, just south of Stafford County, Quantico Marine Corps Base, and Prince William County. All the high traffic areas reside on interstate 95. Stafford County workers commute to several areas in the Northern Virginia and the Washington, D.C. metro area, and south to Fredericksburg and Spotsylvania County. According to the Weldon Cooper Center for Demographics at the University of Virginia, the top five work locations for Stafford County workers are Fairfax County, Prince William County, Fredericksburg City, District of Columbia, and Spotsylvania County (Virginia Locality-to-Locality Commuting Data | Weldon Cooper Center for Public Service, n.d.) (Figure 8). According to this data there are a significant number of commuters heading south, while most commuting resources are focused on northbound routes. Commuters are leaving for work most commonly between 6:00 am and 9:00 am, with approximately 34% of commuters departing between 6:00 am and 7:30 am (U.S. Census Bureau, n.d.). The OmniRide routes are a useful resource to many commuters in Stafford County. However, the busses only stop at the Staffordboro park and ride facility in north Stafford County. Bus ridership on the two offered routes is growing and may grow further if there are routes available to multiple locations. This does present a significant challenge. Bus routes stops must be established at work destinations to serve Stafford County commuters requiring coordination with OmniRide and adjacent cities and counties.

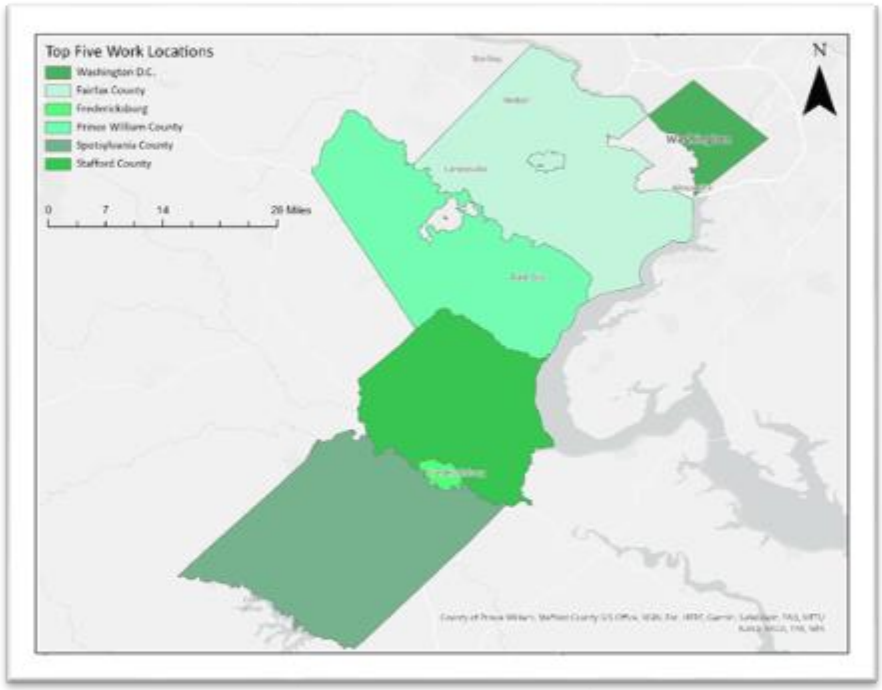


Figure 8. Top Five Work Locations for Stafford County Commuters

To identify the drive time to the Staffordboro park and ride facility I used the Generate Drive Time Trade Areas tool. This tool uses established road data within the ESRI database to approximate driving time to a given area. For this project I used minutes as the measure of the areas created. This analysis identified drive times of more than 25 minutes for some Stafford County residents to reach the Staffordboro park and ride and to use the bus routes. A long drive to the facility to wait for the bus will potentially de-incentivize many commuters. There are 3,003 commuters who reported using public transportation in their daily commutes according to the 2020 ACS commuting data (U.S. Census Bureau, n.d.). This group will also include commuters who use the VRE. This data does not identify potential commuters driving in from outside the county to access the public transportation options in Stafford County. The graphic depicts how public transportation users are distributed in Stafford County.

Using the updated Stafford County Comprehensive Plan, much of the projection for the county is to the year 2050. For this study I used a mid-term timeline for population projection, 2035. According to U.S. Census data from 2020 the current population of Stafford County is 156, 927 (Stafford County, VA, n.d.). The Cooper Center for Demographics projects the population of Stafford County in 2035 at 196, 782, approximately a 21% increase from the current population (Virginia Population Estimates | Weldon Cooper Center for Public Service, n.d.). This is significant increase in population and will potentially complicate the traffic congestion in the county. It is important to note that the Stafford County population is expected in increase by nearly 40,000 residents by 2035, but the age distribution will change. A study by the Virginia Transportation Research Council finds that Stafford County will have an increase of over 20,000 persons aged 65 and over. Considering this it is possible that the need for commuter transportation will remain constant or even be reduced as more residents are reaching retirement age (Miller et al., 2016). I used this information to estimate the population of commuters in Stafford County for 2035. I also used this information to estimate commuters by tract offering a comparison to the analysis of the current commuting population. It is a highly unlikely that all tracts in Stafford County will grow at the same rate with no new population distribution. To supplement this estimation, I used the Stafford County residential products map from the Stafford County GIS Office. This map highlights all current residential projects and the expected number of residential units to be built. Using the cost allocation areas, I identified the number of residential units to be built within each park and ride allocation area depicted in Figures 9 and 10. This has demonstrated that Courthouse Road/Rt. 630 and Falmouth/Rt.17 likely have the most significant immediate growth while Staffordboro and South Commuter Lot (Mine Rd) are experiencing a lower immediate growth rate. Projecting the potential addition of the new Centerport Parkway park and ride, I used similar steps to identify what commuters are likely to use each park and ride facility including the Euclidean allocation, the cost allocation, and the summary of commuters. The commuters are also subdivided by cost allocation area as drove alone, used public transit, carpooled, and worked from home. The projected population in

Four Available Park and Ride	Units to be Built
Staffordboro Blvd.	576
South Commuter Lot (Mine Rd)	1,098
Courthouse Road/Rt. 630	2,942
Falmouth/Rt. 17	2,544

Figure 9. Housing Units to be Built in Current Park and Ride Allocation Area

Five Available Park and Ride	Units to be Built
Staffordboro Blvd.	576
South Commuter Lot (Mine Rd)	1,098
Courthouse Road/Rt. 630	2,372
Falmouth/Rt. 17	2,079
Centerport Pkwy	1,035

Figure 10. Housing Units to be Built in Prospective Park and Ride Allocation Area

the county further crowds the existing park and ride facilities. I am suggesting Stafford County implement a new park and ride facility in the next several years. In the updated Stafford County Comprehensive Plan an area for an expanded park and ride was identified, the Interstate 95 and Centerport Parkway interchange (Comprehensive Plan 5-Year Update, 2021). The 2035 projection maps all include the addition of a Centerport Parkway park and ride facility.

Conclusions:

The cost allocation analysis helped to identify commuting areas that would likely benefit from improvements to current park and ride facilities or an additional facility. This information, in conjunction with the cost analysis tool and the traffic density, highlighted potential areas for a new facility including the new Centerport Parkway park and ride facility, the number of commuters allocated to each facility becomes more balanced. The proposed location of the facility is an approximately nine-acre area directly adjacent to Route 1 and Centerport Parkway. This area offers several important features for a park and ride. There is access to the park and ride from a multilane primary road (Route 1). The cost allocation identified an area of 14,318 commuters who are closest to the new Centerport park and ride location. The area is cleared of trees and vegetation already prepared for improvement. The location has direct access to on and off ramps from Interstate 95. Most importantly these ramps have a significantly lower ADV than the route 610/Garrisonville and the Route 17 ramps. Implementing this park and ride to use a separate on/off ramp from Interstate 95 is likely to ease the use of the other on/off ramps in the county

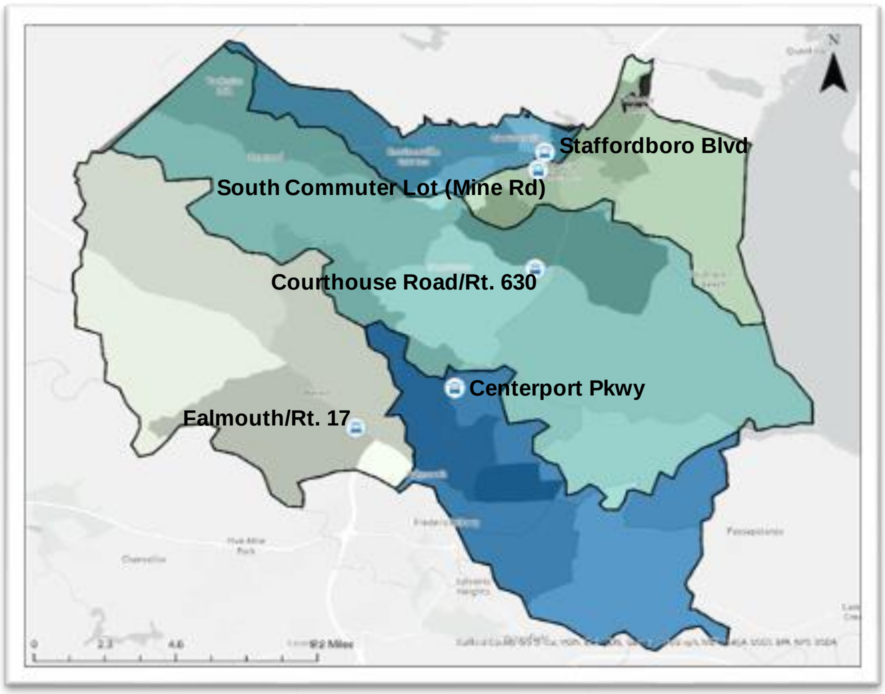


Figure 11. Prospective Park and Ride Allocation Area, including new Centerport Parkway Park and Ride

and allow high volume traffic to spread further and move more effectively through the county. The new Centerport Parkway park and ride would provide a more balanced number of commuters allocated to each park and ride in southern Stafford County. Notably, the Courthouse Road/Rt. 630 commuter lot will have 21,780 commuters allocated which is a decrease of approximately 30% (11,628 commuters). Another option for the county is to improve the current park and ride facilities. The Staffordboro Commuter Lot completed the upgrade to its current size in October 2014 (The Future of Transportation in Virginia, n.d.). The presence of homes and businesses immediately surrounding this facility will likely pose a challenge to any further expansion. The South Commuter Lot (Mine Road) features a similar problem, the areas immediately around the facility are already occupied by homes and businesses. The upgrade to the Courthouse Road/Rt. 630 park and ride was completed in 2020 (The Future of Transportation in Virginia, n.d.). The improvements were part of the overall on and off ramp improvements in the area and the roads supporting the new interchange limit availability to expand this location further. The Falmouth/Route 17 lot is the most likely option to be expanded to provide more space for commuters. This park and ride resides in a high traffic area, identified by the VDOT traffic density, and has the available space immediately adjacent to the facility.

Park and Ride	Number of Commuters
Staffordboro Blvd.	12,064
South Commuter Lot (Mine Rd)	14,156
Courthouse Road/Rt. 630	21,780
Falmouth/Rt. 17	9,890
Centerport Pkwy	14,318

Figure 12. Commuters by Prospective Park and Ride Allocation Area

This work will need to be further refined and explored by Stafford County and other regional stakeholders. There are some aspects of the project that would improve with more detailed data. The identification of population projections by census tract will help identify future commuter needs. These detailed projections will help stakeholders identify types of growth in each area to ensure land and transportation resources are implemented effectively. Future studies will also benefit from data describing the future of the working environment. As more jobs are conducted remotely and the number of residents working from home increases the commuting needs will also adjust. Using the data available, and estimating future needs it is likely that Stafford County and VDOT will need to expand the park and ride infrastructure in the future. Because of space limitation it is likely that the best method is implementing an additional park and ride with available bus, vanpool, and carpooling options. Stafford County identified the area near Centerport Parkway as a potential location for a new facility. Based on the analysis conducted during this project this has potential to be an effective facility that will benefit Stafford County and the commuting population.

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