



TRANSIT ALTERNATIVES ANALYSIS OF THE ROUTE 7 CORRIDOR

Purpose and Need and Evaluation Methodology Report

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INTRODUCTION

This report summarizes the Purpose and Need for premium transit in the Route 7 study area and provides an overall framework and measures for evaluating the mode and alignment alternatives and selecting the Locally Preferred Alternative (LPA). The framework developed for this project and presented in the following pages was prepared following FTA guidance in *Procedures and Technical Methods for Transit Project Planning*. The report includes:

- Project background,
- Purpose and Need,
- Evaluation framework including the alternative screening methodology, and
- Goals, objectives and evaluation measures to be used for alternative screening

The project study area is generally the 13-mile Route 7 corridor, connecting Tysons and the City of Alexandria with alignment alternatives. Alignment options to be assessed include

- the alignment through the City of Falls Church, and whether it should divert from the Route 7 corridor to provide access to East Falls Church Metro Station
- connections to Metro Stations in the City of Alexandria, along Braddock Road, King Street or the Van Dorn/Beauregard corridor

One important issue to be resolved is the termini of the alignment and how it may tie into ongoing premium transit service in the City of Alexandria. This issue will be resolved in later project phases. The alignment options, mode options, and termini will be evaluated by applying the identified evaluation methodology individually, consistent with guidance from FTA.

BACKGROUND

The Route 7 Alternatives Analysis will conclude with local decisions on the preferred transit mode, preferred alignment and appropriate termini for the project. Mode refers to the transit technology to be advanced for implementation. Alignment refers to the streets and/or other rights of way to be utilized to provide for premium transit service.

The Route 7 Alternative Analysis will also document local decisions on:

- Technical transit concepts and the place in the regional transit context
- Optimal operating strategy for the corridor
- Locations along the alignment where transit would operate in exclusive guideways or dedicated rights of way during all or portions of the day
- Transit vehicles
- Station/stop amenities
- Traffic signal prioritization
- Approximate location of stations

The goal for the study is to reach decisions, based primarily on FTA criteria, which will ensure the project is sustainable as it advances into later project development processes. The study will not resolve all of the project details but will address, through community involvement and the input provided by the technical advisory committee (TAC), many of those that are key to identifying the most viable alternative.

The decision-making process to be applied on this project has three steps, as outlined in the Evaluation Methodology section. First, an initial pre-screen will be applied which assesses the universe of project alternatives and refines that list based on community master planning efforts and input from TAC members to remove any alternatives identified as not viable to carry forward. Second, a screening based on general quantitative and qualitative evaluation measures will be performed to refine the list further to identify the most promising set of alternatives to carry forward to more detailed study. Third, a final evaluation will be performed on the smaller set of alternatives to identify and select a single mode and alignment. The project that remains and defines the mode, alignment and termini will be referred to as the Locally Preferred Alternative (LPA).

The evaluation process has been organized to present technical information to decision-makers to help them make decisions at key points. Recommendations for key decisions are expected to be made through the TAC with input provided during the public outreach process.

PURPOSE AND NEED

The discussion on purpose and need is based on information analyzed and presented in the following project documents:

- Background Information Report , March 2013 (updated July 2013)
- Background Information Report – Appendix , March 2013
- Market Overview, June 2013
- Residential Survey Report, June 2013

Defining the Purpose and Need for a project is a critical step in that it guides the development and evaluation of alternatives. The statement of Purpose and Need, based on local input, lays the foundation for federal review of the project as part of the National Environmental Policy Act (NEPA) and entry into FTA project development process (New Starts/Small Starts). The purpose and need to be developed for the NEPA process will be based on information provided here.

Purpose of the Project

The purpose of transit improvements in the Route 7 study area is to provide high-quality transit solutions to transportation issues noted in the corridor. Implementable improvements would work toward improving mobility through the corridor and region and could reduce highway and transit congestion. Transit solutions would help increase accessibility to existing and planned activity centers for residents both inside and outside of the study area.

The purposes of transit improvements in the Route 7 study area are as follows:

- Provide faster, more direct and more reliable attractive transit service connecting the major activity centers within the study area at Tysons, Falls Church, Seven Corners, and Bailey's Crossroads/Skyline, and the City of Alexandria
- Provide transit linkages for residents and businesses within the study area to four Metro lines, the Columbia Pike Streetcar, and future transitways in Alexandria
- Increase connectivity and accessibility for the communities and transit dependent populations to activity centers located between the Metrorail lines
- Accommodate future growth and support economic and community development in the study area with higher capacity transit

Project Setting

The project study area between Tysons and Alexandria (shown in Figure 1) contains Route 7, the central corridor in this area. It is a primary arterial that has evolved over the years from a low-density suburban environment to a more densely developed corridor with several activity centers in Tysons, Seven Corners, Falls Church, Bailey's Crossroads/Skyline, and along the Beaugard/Van Dorn alignment in the City of Alexandria (see Figure 1 below). Route 7 and other corridor alignment options have a range of cross-sections and configurations, with approximately 13 different section types between Tysons and Alexandria. Regular and express bus service is provided, and Seven Corners Shopping Center has a bus transfer facility.

The Route 7 corridor serves both local and through trips as it provides connections to the Metrorail system, and will connect to the future Columbia Pike Streetcar and Beaugard/Van Dorn high capacity transit lines. It also connects three designated Corridors of Statewide Significance: I-66, I-495 and I-395 between Tysons and Alexandria.

CORRIDOR DESCRIPTION

Existing Conditions

The Route 7 study area includes established inner-ring communities that contain areas of higher-density development in Tysons, Falls Church, Seven Corners, Bailey's Crossroads/Skyline, and Alexandria. Many commercial areas in the corridor are primarily retail, (e.g., strip shopping centers) and are often older in design and function. These areas have substantial deficiencies in transit access and pedestrian circulation. The residential communities are of varying income levels.

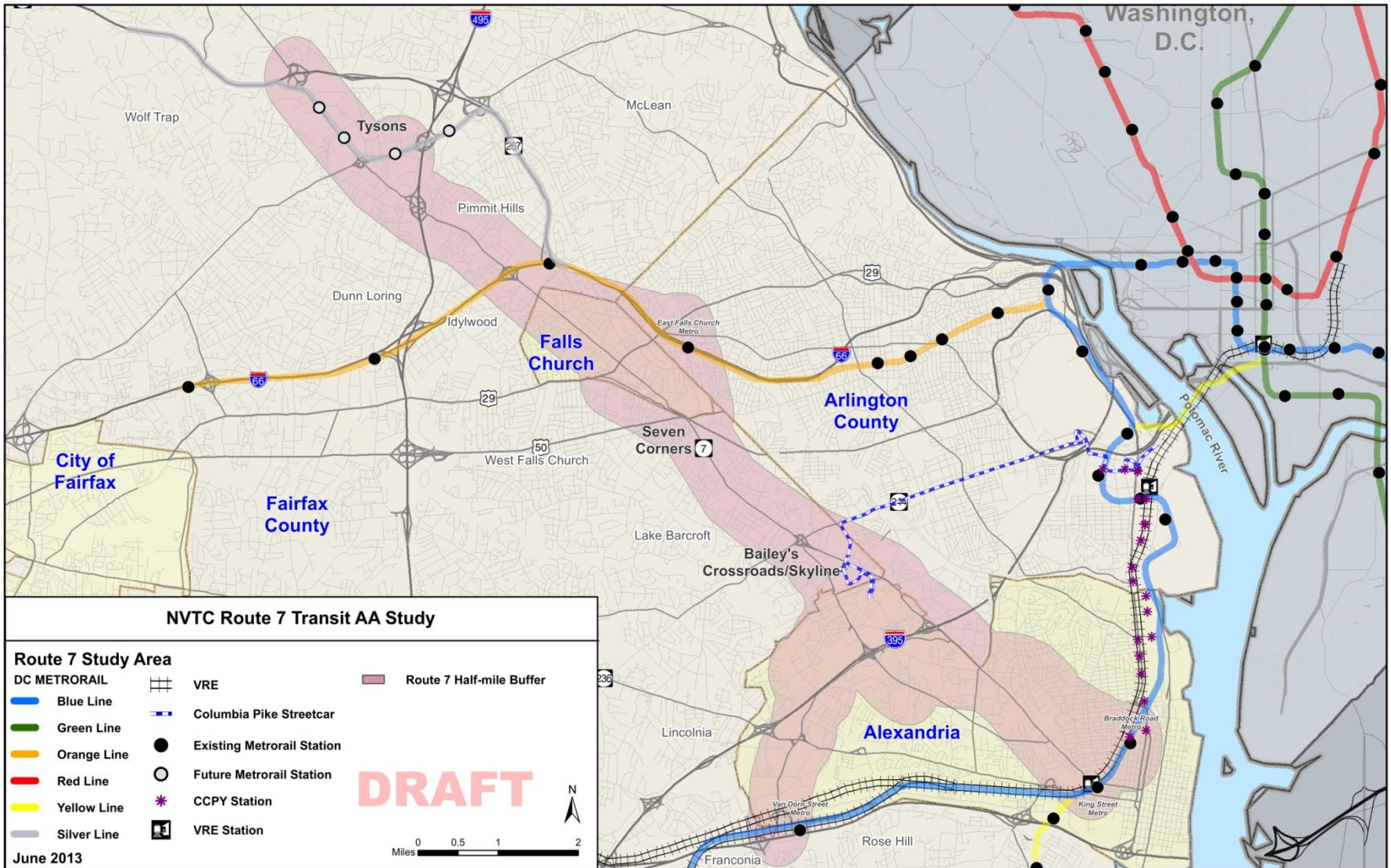
Land use in the Fairfax portion of the Route 7 study area is primarily commercial, with large concentrations of office and retail development in Tysons, Seven Corners, and Bailey's Crossroads/Skyline. There are communities adjacent to the corridor that include a mix of housing types and densities but are mostly single-family residential. Much of the newer development is mixed-use that is more compatible with transit-oriented development (TOD) principles. Existing concentrations of mixed-use development are in locations such as the King Street and Braddock Road Metrorail station areas, Skyline, Beaugard corridor/Mark Center and Tysons. Land uses in the City of Alexandria portion

of the Route 7 study area include both residential and commercial uses. Much of the residential development there is single-family homes and garden apartments. The retail uses are primarily strip shopping centers. The more recent development in Alexandria includes institutional and office uses.

Land Use Plans

Table 1 highlights the land use assumptions within the study area. Most of the plans identify areas of higher density along Route 7 and call for focusing higher density development in areas around existing or proposed transit stations. Some call for maintaining suburban single-family home developments as a means of maintain the existing character of the neighborhoods.

Figure 1: Route 7 Study Area



Source: Arlington County, City of Alexandria, ESRI, MWCOG, Parsons Brinckerhoff

Table 1: Land Use Assumptions for Study Area Activity Centers

Planning Area	Study/Agency	Land Use Assumptions
Bailey's Crossroads/ Seven Corners	Bailey's Planning District – Fairfax County	The Concept for Future Development envisions that the Baileys Planning District will develop primarily as Suburban Neighborhoods with commercial development focused in the Seven Corners and Baileys Crossroads Community Business Centers
Beauregard Neighborhood	Beauregard Small Area Plan – City of Alexandria	The greatest level of development is generally located adjacent to planned transit stops, with lesser intensity farther from the stops; the blocks adjacent to the transit stops are generally a mix of retail, residential, hotel and office, while other blocks are predominantly residential.
Braddock Neighborhood	Braddock Neighborhood Plan – City of Alexandria	The Braddock Neighborhood plan recommends an active plaza space at the site of the existing Metro station. The plan suggests that there is unmet potential for a total of 75,000 square feet based on anticipated growth of other land uses.
Jefferson Planning District	Jefferson Planning District – Fairfax County	Parcels along Route 7 west of Idylwood Road are planned for residential development. These parcels are only suitable for low-density residential development due to their small size and access constraints to Route 7.
Tysons Urban Center	Tysons Urban Center District	The phasing of planned development with necessary public facility, transportation and infrastructure improvements and appropriate mitigation measures, consistent with the guidance in the <i>Vision and Areawide Recommendations</i>
Falls Church	Falls Church Comprehensive Plan / Small Area Plans	The Comprehensive Plan encourages a walkable urban environment along Broad Street, with buildings close to the street and parking in rear. The urban design guidelines call for safe and convenient bicycle and pedestrian access between West Broad Street, the West Falls Church Metro and the W&OD trail. In addition, the City adopted two small area plans and is working on a third for its Washington Street (Route 29) Corridor that begins just south of the East Falls Church Metro Station and intersects Route 7. Collectively, the small area plans establish a vision of dense, walking, mixed-used development.

TRANSPORTATION CONDITIONS

Setting the Context – Population and Employment Growth

The four jurisdictions in the project study area are projected to experience between 20 and nearly 60% growth in population and employment between 2010 and 2040. This generally reflects the trend of higher growth moving outward from the regional center of Washington, D.C. Within the Route 7 study area, population is expected to increase 32.7 percent and employment 46.1 percent, out pacing the growth overall in the jurisdictions that make up the study area.

Figures 2 through 5 show the existing (2010) and estimated future (2035) household and population densities in the corridor, with research values on density and appropriate associated transit service¹. Figure 3 displays 2035 population density, illustrating that by 2035 the Route 7 study area will continue to be mostly comprised of areas with low to medium population densities. However, there will continue to be projected increases in areas that have higher population densities. These areas include the Tysons area, the area southeast of Bailey's Crossroads/Skyline, west Alexandria, the Landmark area, and the Old Town West area of Alexandria. Falls Church is also projected to have an increase in higher population density areas.

The projected employment growth shown on Figure 5 closely matches the projected household growth by location, reflecting the continued strategy of mixed-use development around transit hubs in the region. The locations with the greatest projected employment growth are located in Tysons, the Beauregard area, the Van Dorn Corridor, and the areas of Alexandria surrounding Metrorail stations. Overall, the Tysons area shows the highest levels of projected employment growth. Employment centers will generally be found in the same locations as under existing conditions. The most significant increases in employment are projected to occur in the Tysons area and along the Van Dorn Corridor.

Access for Transit-Dependent Populations

Several socio-economic indicators are used to identify transit dependent populations including income, age, and car ownership. Of the 282,000 residents within the study area (based on ACS 5-Year Estimate for the study area's census tracts), about 20,000 are considered to live below the poverty level. The communities surrounding Bailey's Crossroads/Skyline, the Seven Corners area, the Braddock Road Metrorail station, and the Van Dorn corridor all have higher densities of populations with lower levels of income. Out of 124,000 households living in the census tracts within the study area, about 9,600 of them owned no vehicles. Specific areas with higher percentages of zero-car households include Seven Corners, Bailey's Crossroads/Skyline, Landmark, Braddock Road Metrorail station area, and the area west of Tysons and south of VA 267.

¹ Pushkarev, Boris S and Zupan, Jeffrey M. *Public Transportation and Land Use Policy* 1977

Figure 2: 2010 Household Density per Acre in the Study Area

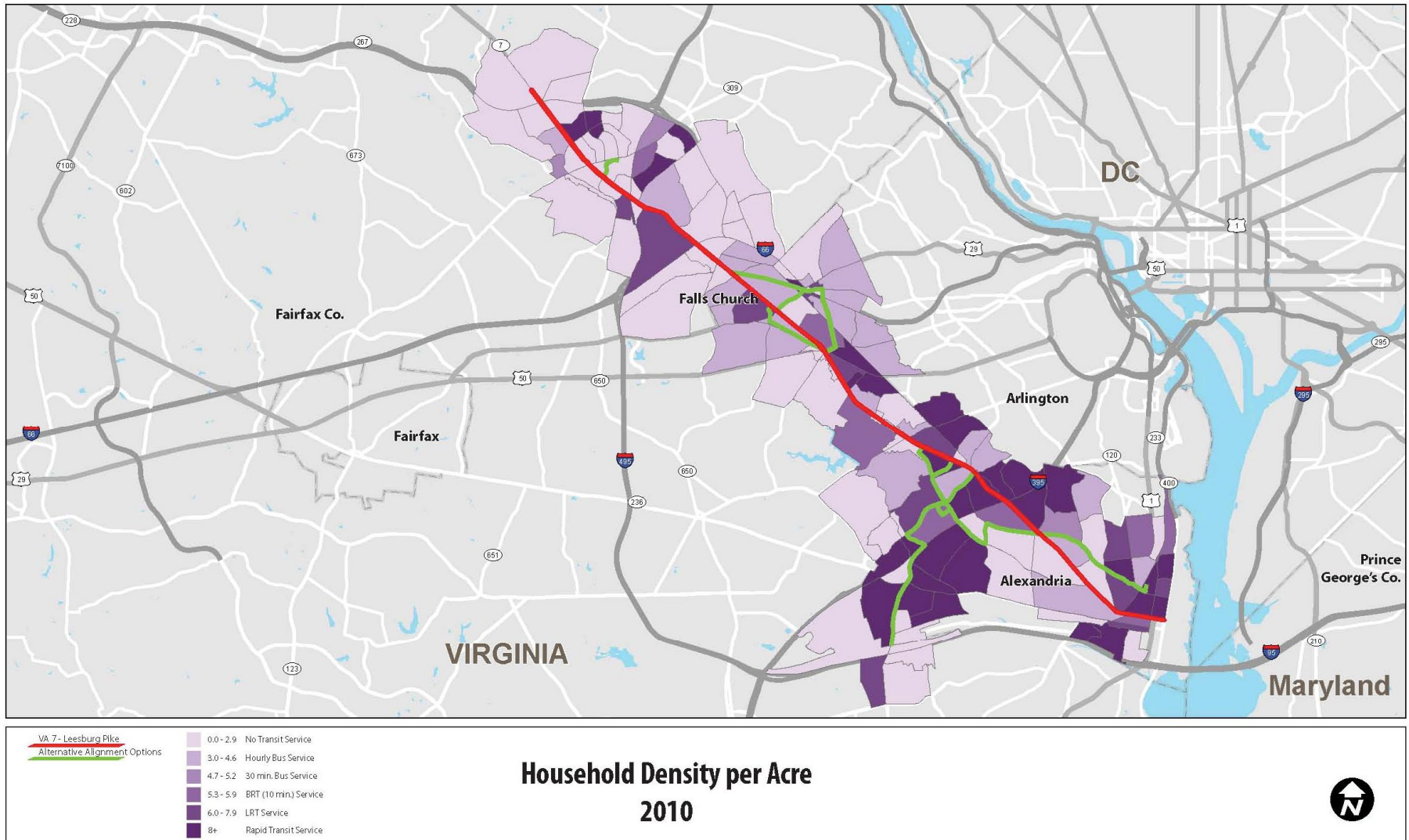


Figure 3: 2035 Household Density per Acre in the Study Area

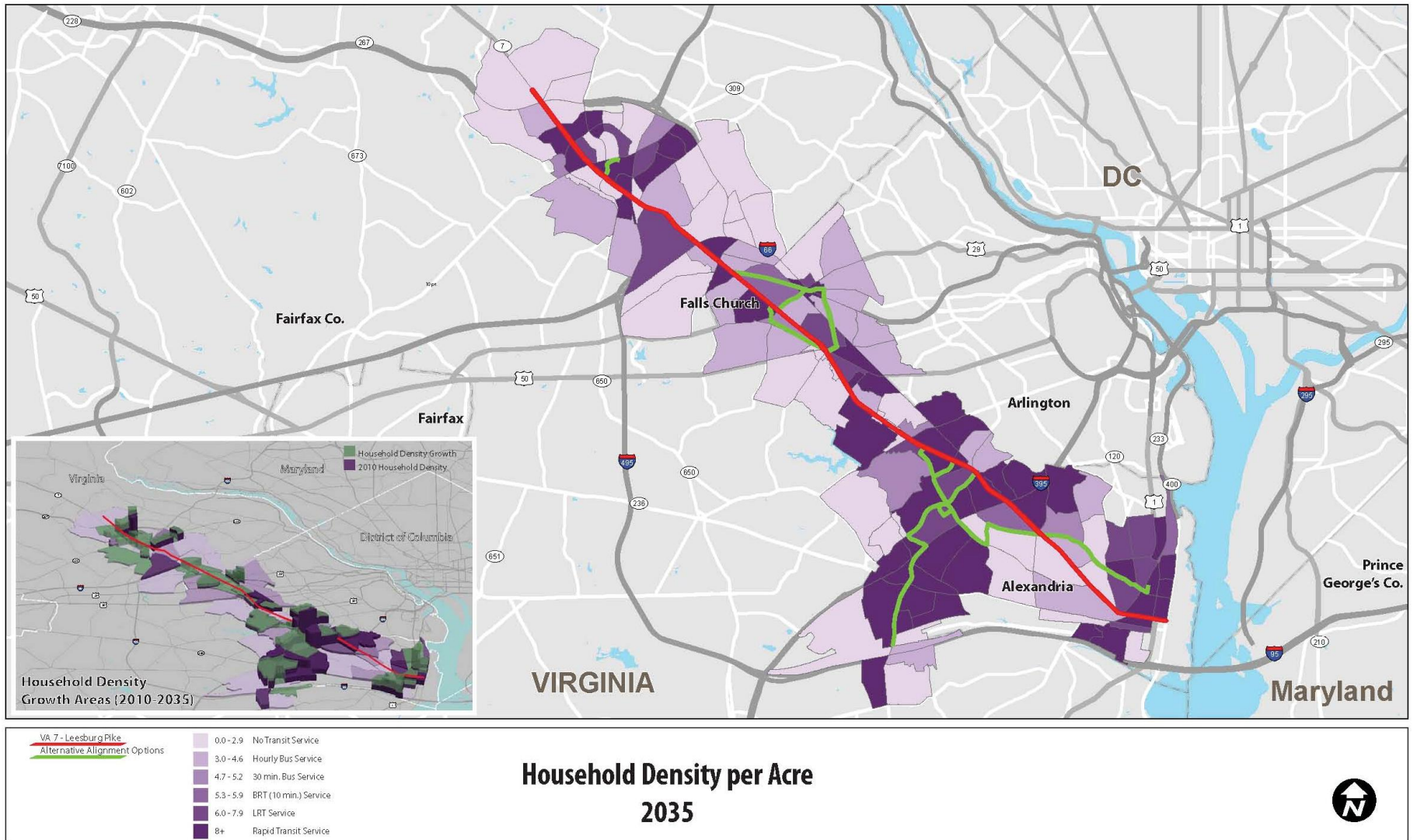


Figure 4: 2010 Employment Density per Acre in the Study Area

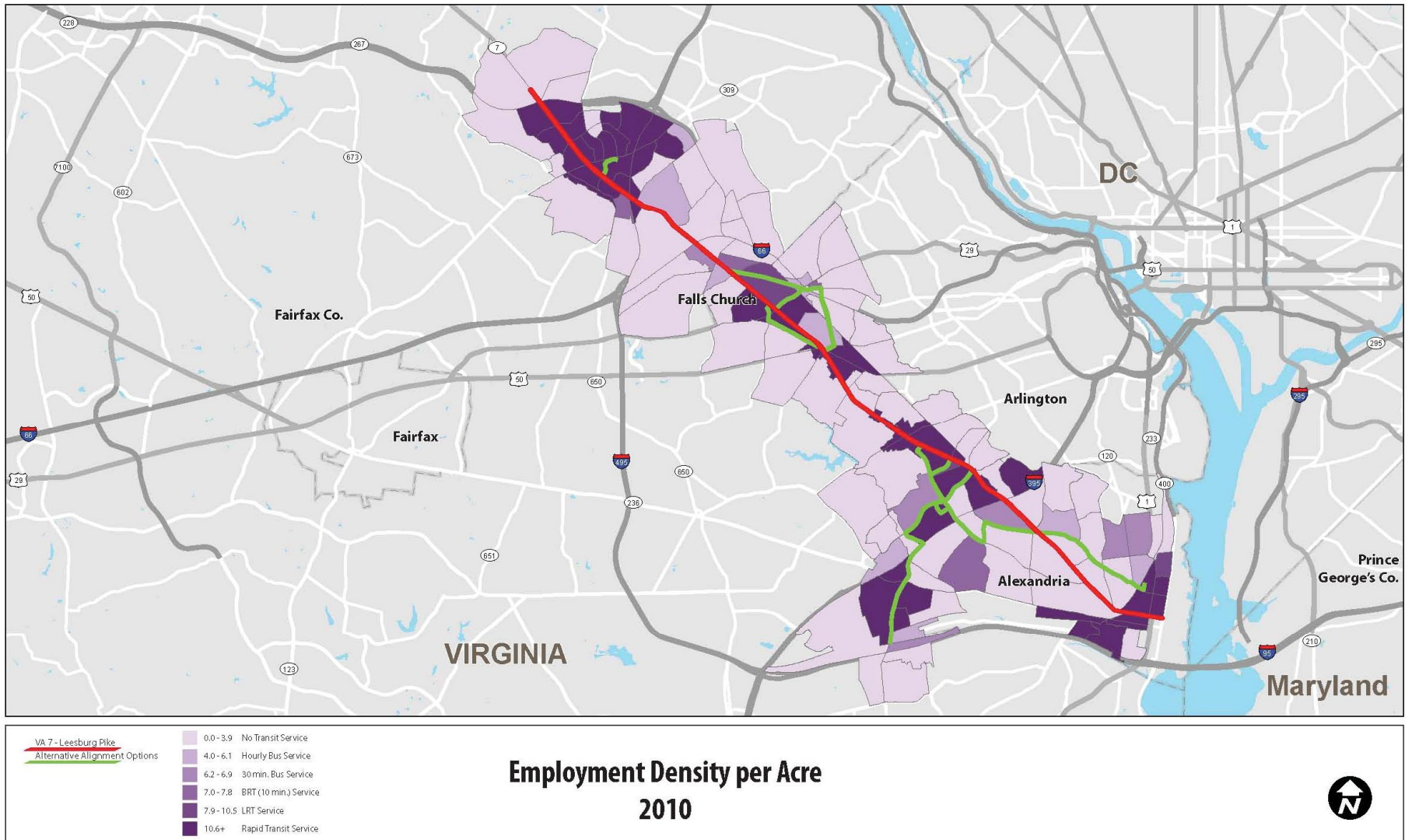
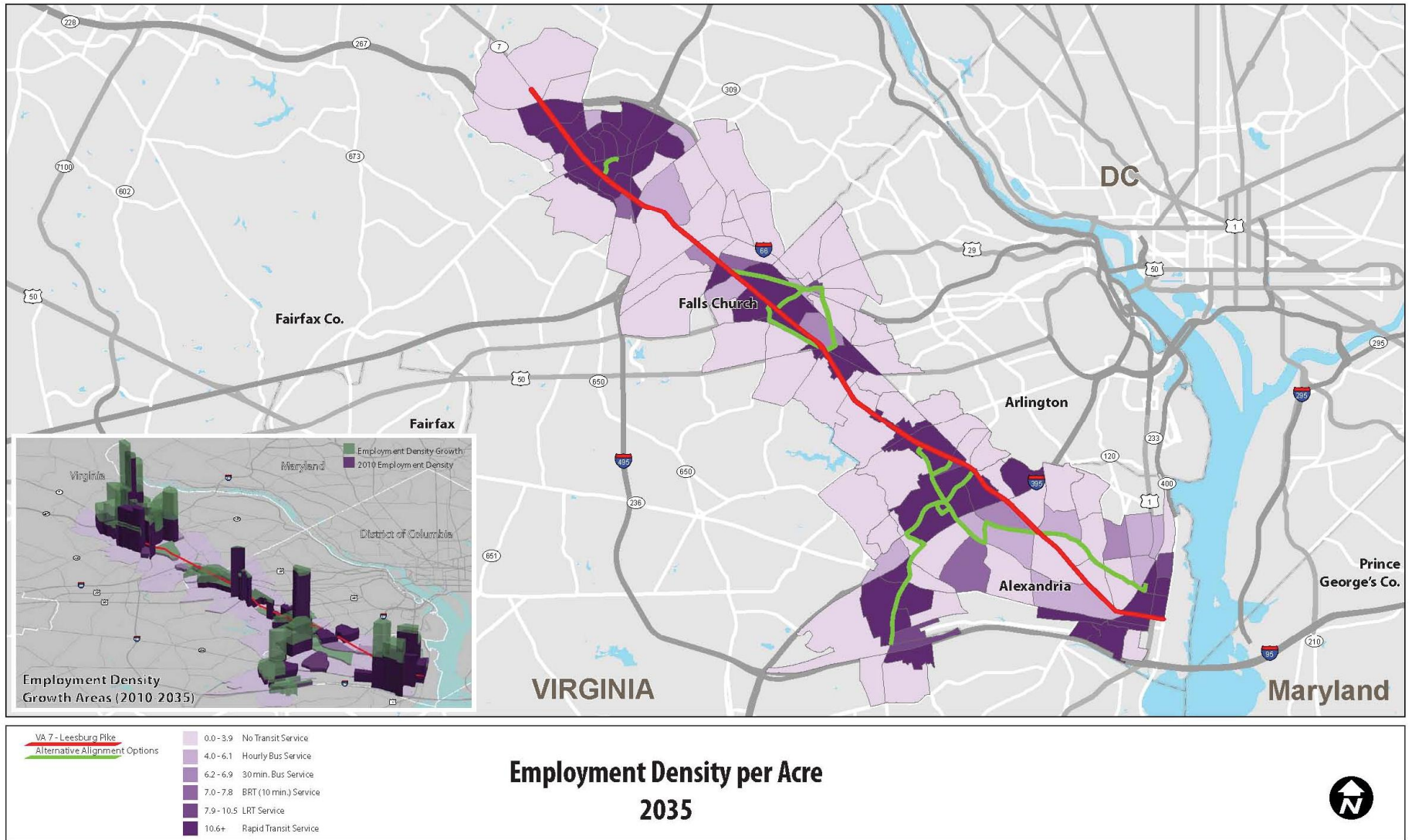


Figure 5: 2035 Employment Density per Acre in the Study Area



Transit System Connectivity

The City of Alexandria currently has direct Metrorail service. Falls Church and Seven Corners however are relatively close to the West and East Falls Church Metrorail stations, and Tysons will have access to four stations with the opening of the Silver Line in 2014. The area of Bailey's Crossroads/Skyline, and the corridor from that point to the King Street and Van Dorn Metrorail stations, are connected to Metrorail only through buses operating in mixed traffic.

Several communities along Route 7 lack access to fast and reliable transit service. The communities are primarily in the middle of the corridor and are farthest away from either the Metrorail Orange, Yellow, or Blue lines. The only transit service along the corridor is bus transit service that it is often slow and unreliable because it operates in traffic on a congested roadway network. The bus service is provided by multiple operators and often requires that patrons transfer between routes and providers. Only one route traverses the entire corridor.

Nevertheless there is a great deal of existing transit service on the corridor that should not be overlooked, some of which is express and limited stop service. This includes the 28A (express between King Street Metrorail station and TC Williams High School), 28X (limited stop between Tysons Corner and the Mark Center), AT2 (10-minute peak period service), AT2X (express between King Street Metrorail station and Mark Center), and AT6 (15-minute service between King Street Metrorail station and NVCC). Combined these services represent a significant level of existing transit service in the corridor.

Currently, transit riders can travel between West Falls Church and Alexandria on existing Metrorail lines. However, travel between these stations requires either riding into Arlington County and transferring onto a different radial line, or traveling on one slow bus route that travels end to end in the corridor.

Beyond Route 7 itself, bus services between Tysons and Alexandria are limited and require transfers between existing bus routes. This necessity further slows travel times and decreases travel convenience and dependability.

In most cases, bus travel times are slower than individual auto trips, since buses typically make frequent stops. These slow speeds do not provide an incentive for those with autos to use transit.

Existing Traffic Conditions

The Route 7 corridor faces numerous transportation challenges as a result of high volumes and variable roadway cross sections. Roadway segment Level of Service (LOS) along the corridor ranges between LOS C and LOS E and intersection LOS ranges from A to F.

Table 2: Weekday Peak Hour Roadway Segment Speed and Level of Service

Route 7 Location	Peak Period	2008	
		Average Arterial Speed (NB/SB)	Average LOS (NB/SB)
Dulles Toll Road and Old Gallows Road	AM	17.2 / 16.8	D/D
Ramada Road/Lisle Avenue and Shreve Road/Haycock Road	AM	13.0 / 18.8	E/C
Birch Street and Roosevelt Street	AM	18.3 / 19.8	C/C
Dulles Toll Road and Old Gallows Road	PM	18.3 / 17.3	C/D
Ramada Road/Lisle Avenue and Shreve Road/Haycock Road	PM	14.6 / 17.9	F/F
Birch Street and Roosevelt Street	PM	16.9 / 18.0	F/F

Source: 2008 Synchro analysis

Because the Route 7 corridor is largely developed, expanding roadways to address the congested conditions on the existing roadway system would be difficult. The projected increases in employment and population will exacerbate the existing situation. The impacts of these traffic conditions on bus service are already substantial; and future conditions will be worse. The congested roadways mean that buses cannot consistently operate on schedule and travel times are not predictable. Travel times for buses in this corridor are long and average speeds are low (see Table 7 on page 24). Not only does this inconvenience riders, it also means that it is very difficult to operate the network of services reliably and in a manner that optimizes interconnectivity and mobility.

Traffic Volumes

Figure 1-2 illustrates the range of average daily traffic volumes along primary roadways within the Route 7 study area, based on 2011 data made available by VDOT's Traffic Engineering Division.² Volume data for other roadways within the study area was not readily available as of the writing of this report. Some of the heaviest daily volumes are observed along Route 7 between Dulles Toll Road and I-66, the segment that traverses Tysons. Moderate volumes occur through the center portion of the Route 7 corridor between I-66 and Bailey's Crossroads. Between Bailey's Crossroads and I-395, volumes begin increasing once again before decreasing significantly through Alexandria toward King Street Metrorail station.

Traffic Levels of Service

Intersection and arterial levels of service (LOS) based on Synchro modeling conducted in 2008³ was available for weekday AM and PM peak hours along a limited number of corridor segments within the study area. Table 3 summarizes existing conditions at specific intersections within specific corridor

² VDOT (2011), <http://www.virginiadot.org/info/ct-TrafficCounts.asp>, accessed on February 11, 2013

³ 2012 Synchro data was provided after analysis was initiated on 2008 Synchro data.

segments with intersections operating at LOS E and F highlighted in orange and red respectively. Additionally, seven intersections are shown to operate at LOS D in either the AM peak, PM peak, or both.

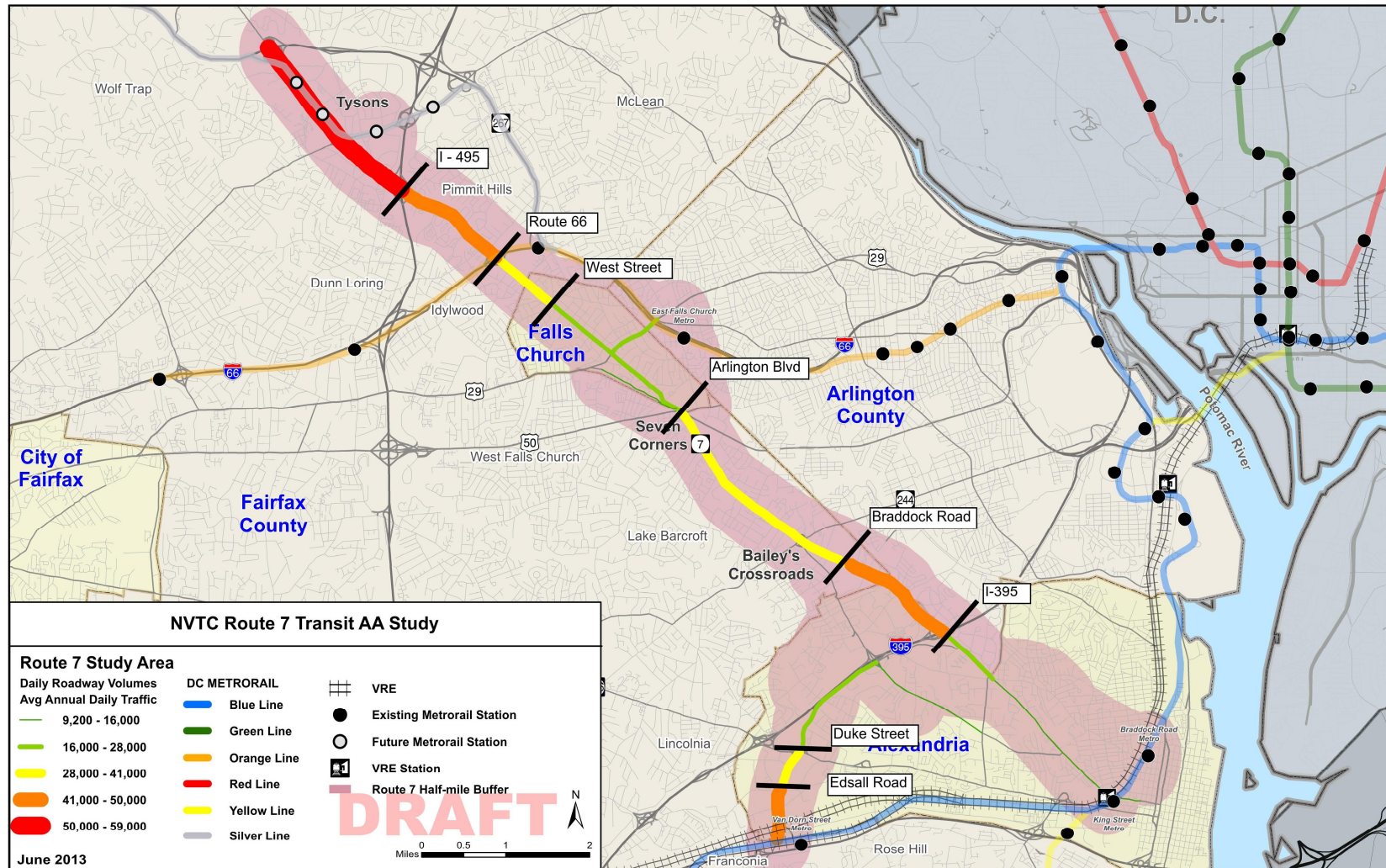
Higher LOS values along intermediate corridor segments or at signalized intersections could indicate challenges to implementing some types of transit priority, such as dedicated curb lanes or signal priority, while lower LOS values may facilitate transit's use of roadway conditions as is. Updated corridor analysis would be needed to better understand the impacts of the existing and proposed surrounding environment on potential transit service along the Route 7 corridor and other corridor options.

Table 3: Weekday Peak Hour Intersection Level of Service

Cross Street	Intersection LOS (AM Peak Hour)	Intersection LOS (PM Peak Hour)
Route 7 between Dulles Toll Road and Old Gallows Road		
Dulles Toll Rd. W	C	---
Dulles Toll Rd. E	A	A
Tyco Rd.	F	F
Spring Hill Rd.	D	D
Gosnell Rd./Westpark Dr.	D	E
Marshall Entr./Service Rd.	B	C
Chain Bridge Rd. W.	A	A
Chain Bridge E	B	B
Gallows Rd./International Dr.	D	D
Fashion Blvd	E	C
Old Gallows Rd.	F	F
Route 7 between Ramada Road/Lisle Avenue and Shreve Road/Haycock Road		
Ramada Rd/Lisle Ave	E	---
George C. Marshall Dr.	D	A
Service Rd/Patterson Rd	B	A
Pimmit Road	D	A
Idylwood Rd	F	A
I-66 off-ramp	A	A
Shreve Rd/Haycock Rd	D	A
Route 7 between Birch Street and Roosevelt Street		
Birch St.	A	C
West St.	D	D
Spring St.	B	A
Lee St.	A	A
Virginia Ave.	B	B
Annandale Rd.	B	A
Little Falls St.	A	B
Maple St.	B	C
US 29	D	D
Cherry St.	A	A
Roosevelt St.	A	B

Source: 2008 Synchro analysis

Figure 6: Roadway Volumes within Route 7 Study Area



Existing Transit Conditions

The Washington, DC region has a well-developed transit network, which extends into and through the Route 7 corridor. However, as described below, the transit service in the corridor is primarily radial in nature, serving demand from points across northern Virginia towards Arlington and DC. Transit service exists in the Route 7 corridor, but is served by a limited number of routes, with only one end to end route, with many routes operating on the corridor for only short segments. Transit on Route 7 does not have any priority treatments such as HOV or bus only lanes and end to end travel times are not competitive with auto trips.

The Route 7 corridor is directly served by five Metrorail stations along three lines, the Orange, Blue, and Yellow line. In early 2014 the corridor will also be served by the Silver Line via East Falls Church station. These connections are depicted in Figure 7. These Metrorail lines are all radial lines into and out of Washington, DC serving densely populated areas and employment centers. The rail stations in the corridor are all important intermodal transfer points. Table 5 shows the daily Metrorail boardings at the five existing stations in the study area.

The Route 7 corridor contains a significant transit dependent population that relies on transit to reach employment and activity centers. However, new transit services in this corridor has been limited to bus service on local roads that are subject to the same roadway congestion as auto and truck traffic. To

Table 4: Metrorail Station Daily (Weekday) Person Trips Originating in the Study Area

Metrorail Station	Number of Daily Person Trips
West Falls Church	10,891
King Street	9,060
East Falls Church	4,287
Braddock Road	4,484
Van Dorn Street	3,587

Source: Metrorail Passenger Surveys Average Weekday Passenger Boardings, 2012

date, there has been no investment in fixed guideway transit systems to facilitate travel and enhance links between the employment and residential centers in the corridor. The built-up character of the corridor limits the opportunities to widen existing roads or build new ones.

Transit in the Route 7 corridor is faced with increasing travel times which limit accessibility, particularly for those without access to an automobile, and can negatively affect the local economy and residents' quality of life⁴. Table 7 lists the existing estimated transit travel times between Route 7 corridor activity centers based on published schedules. While bus schedules take congestion into account it still results in inconsistent travel times for transit users.

⁴The value of travel time savings and reliability both in terms of economic costs quality of life is discussed in *Economic Impact of Public Transportation Investments*, Glen Weisbrod and Arlee Reno, prepared for APTA, October 2009.

The Route 7 study area consists of four different local and express bus operators within 1/2-mile of the corridor. Between the different operators, there are close to 120 different routes that operate within the Route 7 study area.

In addition to providing mobility within their respective jurisdictions, many of the services within the Route 7 corridor offer service into the District of Columbia. These services, along with others, provide connections to Metrorail by way of the Orange, Blue and Yellow Lines. Metrobus, which is operated by WMATA, provides transit connections between the various locally operated bus services in the area. In particular, Metrobus connects local bus service in Tysons with local bus service in the City of Alexandria.

Table 6 lists the various operators who provide service within the study area, while Figure 8 displays the various local and commuter bus services within the corridor. The table includes the total number of routes in their respective systems along with their respective average headways and average weekday ridership.

Bus Operation Changes Due to Silver Line

When the Silver Line opens, local transit agencies will reorganize many bus lines to serve the five new Metrorail stations, change routes that will become redundant, and ensure an integrated approach to the overall bus and rail network.

Table 5: Existing Bus Operations within the Study Area

Local and Commuter Bus Services	Number of Routes	Average Weekday Ridership
Arlington County Bus (ART Bus)	4	1,900
City of Alexandria (DASH)	9	12,100
Fairfax Connector	25	20,000
Metro Bus (WMATA)	78	64,000

Source: MWCOG (2012)

Local transit agencies including Metro, Fairfax Connector, Loudoun County, and other operators have been working closely to be sure all the changes are coordinated. Although the plan will not be finalized until shortly before the Silver Line opens the following summarizes the expected changes:

- Metrobus will modify 11 routes, many to serve the Tysons area, and eliminate the 24T and 28T⁵

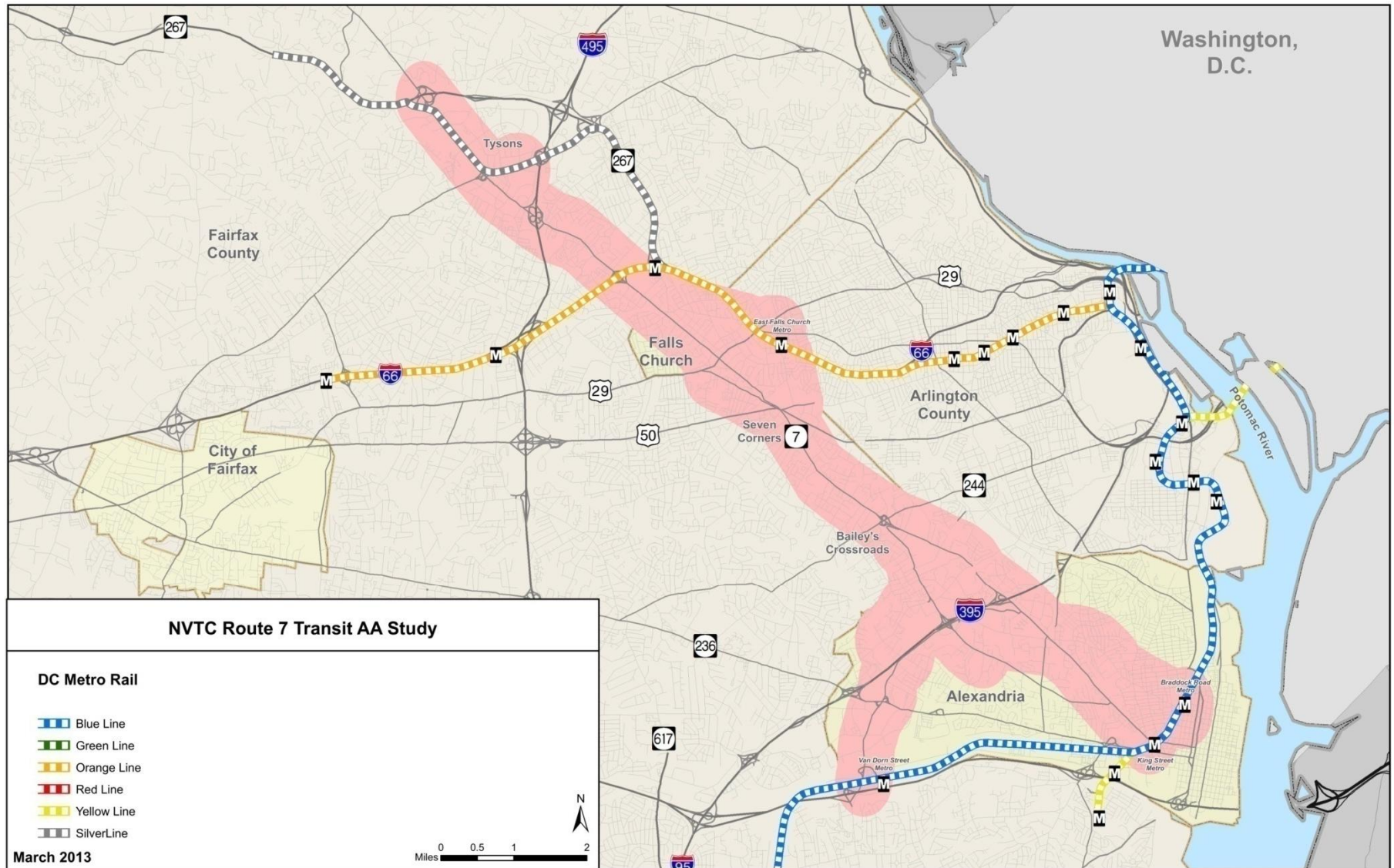
⁵http://www.wmata.com/about_metro/board_of_directors/board_docs/011013_3BSilverLineBusSvc.pdf

- A circulator bus system will serve the Tysons area, including the new Silver Line stations in Tysons⁶
- Fairfax Connector will implement 12 new routes serving Tysons, McLean, and Reston while eliminating six other routes.
- Many Fairfax Connector buses connecting Reston and Herndon to West Falls Church station will now serve the Wiehle Avenue Silver Line station⁷
- Seven Loudoun County buses will move from West Falls Church to Wiehle Avenue station
- Three PRTC buses will move to Tysons station

⁶<http://www.fairfaxcounty.gov/connector/routes/dullesrail/silverlinecirculatorroutes.htm>

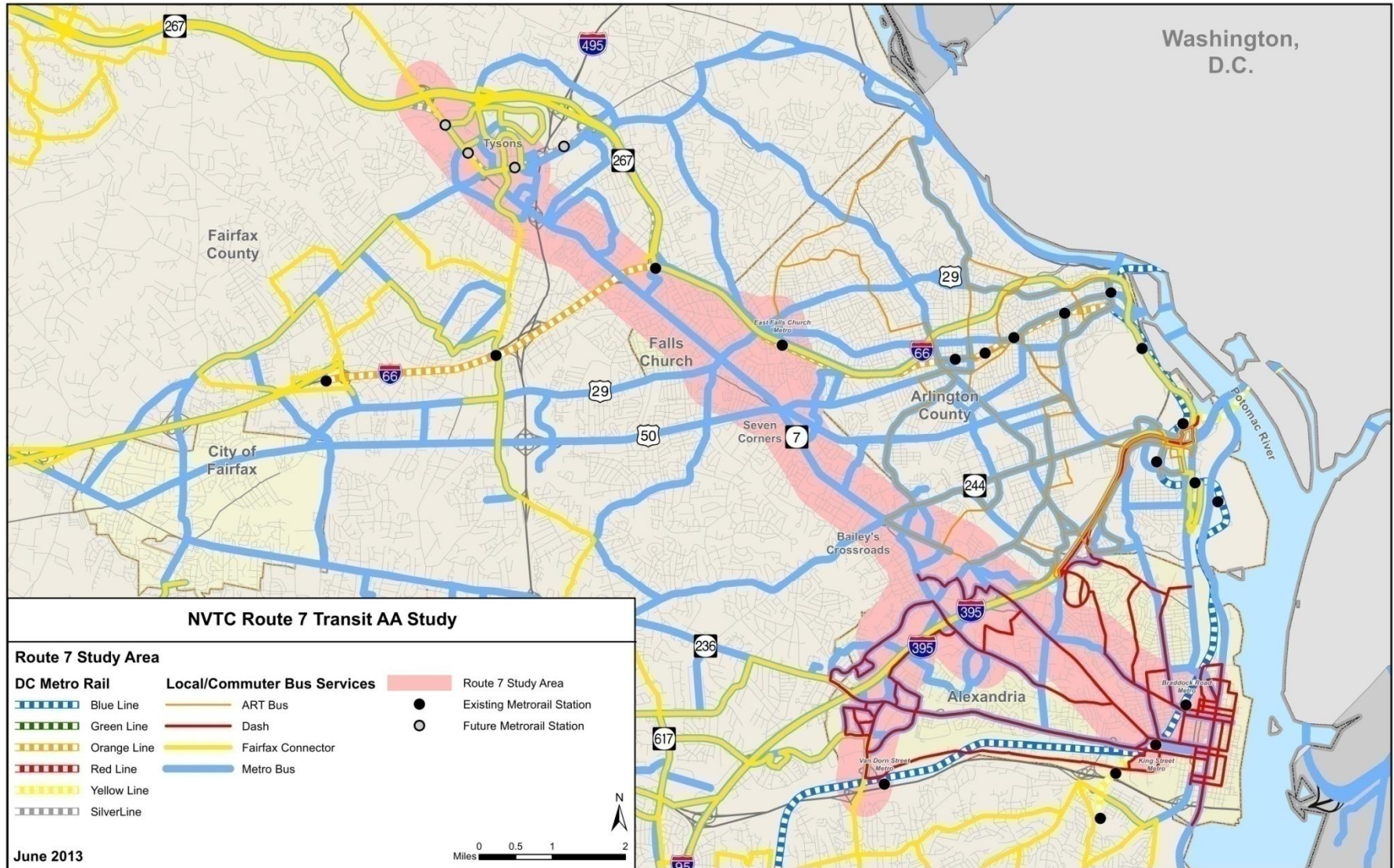
⁷<http://www.fairfaxcounty.gov/connector/routes/dullesrail/>

Figure 7: Metrorail Lines within Route 7 Study Area



Source: MWCOG, ESRI, Parsons Brinckerhoff

Figure 8: Bus Network within Route 7 Study Area



Source: MWCOG, ESRI, Parsons Brinckerhoff

Table 6: Average Scheduled Transit Travel Times during AM Peak Hour, 2012

Example Origin-Destination Pairs	Bus Route	Distance (miles)	Time (min.)	Avg. Bus Speed (mph)
Tysons to Downtown Falls Church	28X	3.5	13	16
Tysons to Seven Corners	28X	4.8	26	11
Tysons to Bailey's Crossroads	28X	6.5	32	12
Tysons to King Street Metro	28A	11.8	73	10
Tysons to Old Town Alexandria	28A/AT2	12.6	95	8
Tysons to Mark Center	28X	8.5	46	11
Tysons to Van Dorn Metro	28A/AT5	11.7	90	8
Downtown Falls Church to Bailey's Crossroads	28X	3.0	17	11
Downtown Falls Church to King Street Metro	28A	8.3	53	9
Downtown Falls Church to Old Town Alexandria	28X/AT2	9.1	77	7
Seven Corners to Bailey's Crossroads	28A	1.8	10	11
Seven Corners to King Street Metro	28A	6.9	38	11
Seven Corners to Old Town Alexandria	28A/AT5	7.9	59	8
West Falls Church Metro to King Street Metro	28A	9.7	63	9
West Falls Church Metro to Van Dorn Metro	28A/AT5	9.8	78	8
East Falls Church Metro to King Street Metro	3B/28A	8.1	74	7
East Falls Church Metro to Van Dorn Metro	2C/25B	8.3	95	5

Notes: Assumes trip starts at or near 7:00AM. Google Transit Trip Planner utilized to acquire routes and times (based on agency supplied GTFS feeds). Termini selected include major destinations and/or major cross streets at respective locations. Average bus speed includes dwell time and congestion.

Metrorail

West Falls Church

The West Falls Church Metrorail station is a major transportation hub in the region, with more than 25 bus routes from four different agencies serving the station in the peak hours. It had 10,891 daily Metrorail boardings⁸ in 2012. This station has over 2,100 parking spaces, with 2,009 available for all-day parking. The station primarily serves the surrounding communities of Pimmit, Pimmit Hills, McLean, Falls Church, and West Falls Church but is also a major transfer center for commuters along the 267 and I-66

⁸WMATA, *Metrorail Passenger Surveys, Average Weekday Passenger Boardings*, rev. 6/2012

Table 7: Percentage of Daily Access by Mode

Station	Access Percentage		
	Bus	Private Vehicle	Bike/Ped
West Falls Church	20.1%	30.8%	4.7%
East Falls Church	17.7%	38.8%	42.5%
Braddock Road	18.8%	14.1%	66.2%
King Street	23.1%	11.0%	64.4%
Van Dorn	47.8%	35.0%	14.6%

Source: WMATA 2007 Passenger Survey

Note: 43.9% percent of West Falls Church survey respondents were "Unknown."

corridors utilizing commuter buses for long-distance trips. Access by long-distance commuters will be significantly altered as bus service is shifted to the Wiehle Avenue Silver Line station in the near future.

As shown in Table 7 the predominant access mode for the West Falls Church station is private vehicle, with 20.1 percent of daily station entries having transferred from bus. This reflects the large amount of available parking at this station combined with the

significant number of bus routes serving the station.

East Falls Church

The East Falls Church Metrorail station has a much smaller profile when compared to West Falls Church, with only 12 routes from ART and WMATA and 4,287 daily Metrorail boardings. This station has over 455 parking spaces, with 422 available for all-day parking. The station primarily serves the surrounding communities of Falls Church, Seven Corners, and northwestern Arlington County. This station will also become the first transfer point between the Orange and Silver Lines when that service opens in late 2013. This could potentially increase usage at this station as Tysons becomes accessible via rail for the first time for users seeking access to employment, retail, and entertainment.

As shown in Table 7 the predominant access modes for the East Falls Church station are nearly evenly split between private vehicles and bicycle/pedestrian, with 17.7 percent of daily station entries having transferred from bus.

Braddock Road

The Braddock Road Metrorail station serves the City of Alexandria and southern Arlington County and has nine routes from WMATA and DASH serving the station in the peak hours. It had 4,484 daily Metrorail boardings⁹ in 2012. Parking is limited to eight short-term metered spaces. This station will be the southern terminus for the Crystal City/Potomac Yard transitway corridor that will run north-south between the Pentagon and Pentagon City in Arlington County and Braddock Road Metrorail Station in the City of Alexandria and provide priority treatments for bus service in the corridor (currently under construction).

⁹WMATA, *Metrorail Passenger Surveys, Average Weekday Passenger Boardings*, rev. 6/2012

As shown in Table 7 the predominant access mode for this station is bicycle/pedestrian at 66.2 percent, with 18.8 percent of daily station entries having transferred from bus. These percentages highlight the local nature of the users of this station combined with a lack of long-term parking.

King Street

The King Street Metrorail station is a significant transportation hub in the City of Alexandria, with 12 routes from three different agencies serving the station in the weekday peak hours. It had 9,060 daily Metrorail boardings¹⁰ in 2012. This station also has Amtrak service and is the primary access point for tourists using transit to visit the city. Parking is limited to 30 short-term metered spaces. The station is surrounded by commercial and retail properties to the east and south while to the north and west are nearly entirely residential. These factors combined with access to Old Town Alexandria via the King Street Trolley and several DASH routes results in the station being utilized by both inbound and outbound local commuters and a high number of visitors.

As shown in Table 7 the predominant access mode for this station is bicycle/pedestrian at 64.4 percent, with 23.1 percent of daily station entries having transferred from bus. These percentages highlight the local nature of the users of this station combined with a lack of long-term parking.

Van Dorn

The Van Dorn Metrorail station is located adjacent to Van Dorn Street and I-495 in southern Alexandria. The surrounding land use is an interesting mix of medium to high density residential, light industrial, and retail. South of I-495 is nearly all single-family residential. The station is served by 10 bus routes from three different agencies serving the station in the peak hours. These routes provide access to greater Alexandria and eastern Fairfax County. This station had 3,587 daily Metrorail boardings¹¹ in 2012. This station has 361 all-day parking spaces and 46 short-term metered spaces.

As shown in Table 7 the predominant access mode for this station is bus at 47.8 percent, with 35.0 percent arriving by private vehicle and 14.6 percent arriving by bicycle or by walking. These access mode percentages reflect the combination of surrounding land use with good access via local bus.

Planned Transit Service

Alexandria Transitways¹²

The City of Alexandria Transit Concept outlines a progressive vision for the future of travel throughout the city with a system of three primary transit corridors within secure rights-of-way dedicated exclusively to transit use. This plan is an innovative vision for the development of clean, efficient, enjoyable transit services that travel in dedicated lanes, enhancing mobility throughout the City and

¹⁰WMATA, *Metrorail Passenger Surveys, Average Weekday Passenger Boardings*, rev. 6/2012

¹¹WMATA, *Metrorail Passenger Surveys, Average Weekday Passenger Boardings*, rev. 6/2012

¹²<http://alexandriava.gov/HighCapacityTransit>, access 04/30/13

region for commuters, residents and visitors alike. The Transit Element identified three primary corridors as follows:

North-South (Corridor A, *Under Construction*) —This corridor traverses in a north-south direction in the general vicinity of Route 1 and connects to future transit high capacity corridors in Fairfax and Arlington Counties. The North-South corridor will be a transitway that facilitates both premium and local bus services in the near and mid-terms, with interim improvements constructed to accommodate BRT or LRT in the long term. The corridor will serve commuters, residents, and employees with origins and destinations along the corridor; would function as an alternative to Metrorail services (Blue and Yellow lines); and would improve access to key destinations within the city and in Fairfax and Arlington Counties such as Old Town, Potomac Yard, Crystal City, the Pentagon, and Ft. Belvoir.

Duke Street/ Eisenhower Avenue (Corridor B) —This corridor would connect Alexandria to Fairfax County to the west. It has the potential to serve the Eisenhower East area, Landmark Mall, Foxchase, Alexandria Commons, the King Street Metrorail station, and portions of Old Town. The alignment of the Duke Street corridor in an approximate east/west orientation also would allow it to connect to the North-South and Van Dorn/Beauregard corridors. On March 15th, 2012 the High Capacity Transit Corridor Work Group recommended that a phased approach be taken including dedicated transit lanes in existing six-lane sections and a reversible lane via widening in the future.

Van Dorn Street/Beauregard Street (Corridor C) —This corridor would run along Beauregard Street and Van Dorn Street in an approximately east/west direction. On the north, the corridor has the potential to tie to Columbia Pike, Fairfax County, and the Pentagon area. On the south, the corridor would directly connect to the Van Dorn Street Metrorail station. Key destinations along the corridor include the Van Dorn Street Metrorail station, Landmark Mall/Van Dorn Street commercial areas, Kingstowne, the Mark Center (and BRAC-133 site), Shirlington, and the Pentagon. The City of Alexandria began to conduct an Alternatives Analysis of this corridor in November, 2013.

Silver Line¹³

The Metropolitan Washington Airports Authority (MWAA) is constructing a 23-mile extension of the existing Metrorail system called the Silver Line that will be operated by the WMATA from East Falls Church to Washington Dulles International Airport west to Ashburn.

The extension will serve Tysons, Virginia's largest employment center, and the Reston/Herndon area, the state's second largest employment concentration. It will also provide a one-seat ride from Dulles International Airport to downtown Washington. The Silver Line will provide high-quality, high-capacity transit service in the Dulles Corridor. The new Metrorail service will help mitigate traffic congestion, expand the reach of the existing regional rail system, offer a viable alternative to automobile travel, and support future transit-oriented development along the corridor.

¹³<http://www.dullesmetro.com/about/index.cfm.html>, accessed 04/30/13

The project will include 11 new stations and be built in two phases. Phase 1 will run from East Falls Church to Wiehle Avenue on the eastern edge of Reston. It will include four stations in Tysons: McLean, Tysons Corner, Greensboro, Spring Hill and a station at Wiehle Avenue in Reston. Construction began in March of 2009 and it will be completed in September 2013, then transferred to WMATA. The opening date will be scheduled by WMATA and is anticipated to take place in late 2013.

Phase 2 will run from Wiehle Avenue to Ashburn in eastern Loudoun County.

The Route 7 study area for this Alternatives Analysis potentially interacts with the Silver Line at the following locations:

- East Falls Church Metrorail Station
- Greensboro (adjacent to Route 7)
- Spring Hill (adjacent to Route 7)

Columbia Pike Streetcar¹⁴

The Columbia Pike Streetcar project found its beginnings in the mid-1980s, when Arlington County began its Columbia Pike Revitalization Plan to transform the Pike into a vibrant corridor. An outgrowth of the revitalization plan was a local alternatives analysis study that, over the years and through various levels of study, have brought the County¹⁵ to select streetcar as the locally preferred alternative to both improve travel options within the corridor and support redevelopment into a walkable, mixed-use community. The proposed 4.9-mile, 19-station alignment will connect Bailey's Crossroads to Pentagon City Metrorail station is expected to be operational by 2017.

Pedestrian and Bicycle Facilities

Bicycle Facilities

Fairfax County consists of an extensive network of off-street and on-street bicycle facilities. Despite this extensive network, and the fact that these facilities do interact with the Route 7 study area itself, the portion of the corridor within the County is not widely served by bicycle facilities. The City of Alexandria however does contain an extensive network of on-street and off-street bicycle facilities within the Route 7 study area.

The bicycle network connects most of the Metrorail stations within the corridor to other areas of Fairfax County. There are no direct bicycle connections within the Route 7 study area between the different jurisdictions. The City of Falls Church has a self-contained, circular off street bicycle facility that circulates throughout the area.

¹⁴<http://www.columbiapikeva.us/public-process/>, <http://www.columbiapikeva.us/streetcar-transit/alternatives-analysisenvironmental-assessment/>, accessed 06/25/13

¹⁵ Arlington County is the project sponsor, but it is a joint project of Arlington and Fairfax Counties.

Pedestrian Facilities

The Route 7 study area contains a network of interconnected sidewalks. The most extensive networks along the corridor are found within the more urbanized areas such as Alexandria, Falls Church and Tysons. Not all streets and roadways within the study area consist of sidewalks however; the existing network provides connections to the Metrorail stations in the area as well as connections between the different jurisdictions.

REGIONAL CONTEXT

Various regional studies have been conducted throughout the course of the Route 7 study area's history that recommend the types of transportation improvements desired and how those improvements should relate to the surrounding communities. Key sections of vision, mission, and principle statements for those studies are summarized in Table 8, as they contribute toward a succinct vision statement for the Route 7 AA study.

Table 8: Key Vision, Mission, or Principle Statements from Regional Plans Related to Route 7 AA Study

Plans and Studies	Agency/Jurisdiction	Relationship to Route 7 Study Area	Key Vision, Mission, or Principle Statement
NVTC Handbook (2013)	NVTC	Study sponsor that plays a vital role in the development of the transit systems that serve Northern Virginia	NVTC will work to improve mobility, reduce traffic congestion, protect the environment and stimulate the regional economy by increasing transit and ridesharing use.
TransAction 2040 (2012)	Northern Virginia Transportation Authority	Route 7 corridor is one of the facilities covered in this plan	In the 21st century, Northern Virginia will develop and sustain a multimodal transportation system that supports our economy and quality of life. It will be fiscally sustainable, promote areas of concentrated growth, manage both demand and capacity, and employ the best technology, joining rail, roadway, bus, air, water, pedestrian, and bicycle facilities into an interconnected network.
Fairfax County Countywide Transit Network Study (ongoing)	Fairfax County Department of Transportation	Route 7 is one of the corridors considered in this study	Establish most effective way to serve the County's needs to accommodate planned growth over the long term by improving public transit usage.
SuperNoVA Transit/TDM Plan (2012)	Virginia Department of Rail and Public Transportation	Recommend higher capacity transit facilities such as Van Dorn/Beauregard corridor & intermodal hubs for the Route 7 study	The Super NoVa Transit/Transportation Demand Management (TDM) Vision Plan envisions safe, strategic, and seamless mobility options for rail, transit, and TDM in the greater Northern Virginia region.

MARKET RESEARCH

Economic Development Potential

Overview

As both the Washington DC metropolitan region and Northern Virginia gained new residents and businesses, the Route 7 study area increased its number of residents by 11.9 percent from 1990 to 2000 and 7.7 percent from 2000 to 2010. The growth slowed over the last decade, reflecting the built-up nature of the corridor. A review of the household mix showed a shift in favor of larger households for most of the corridor. In some sectors along the corridor, like Alexandria's Old Town and Tysons, new multi-family developments helped grow households more rapidly than population. Population projections done by the Metropolitan Washington Council of Governments (MWCOC) in conjunction with local jurisdictions, suggest Alexandria, Tysons and Baileys Crossroads/Beauregard Boulevard will capture the most population growth throughout the Route 7 study area. The market overview highlighted the shifting national demographic trends that impact residential real estate with new households increasingly attracted to close-in locations with easy access to transit.

Recent income data shows the affluent nature of study area households with a median household income of \$95,000 in 2010. While pockets of low-income households, estimated at almost one-quarter of corridor households, earning less than \$50,000 exist along the corridor, the median household income at Tysons reached \$151,700 in 2010.

While the economic downturn slowed the traditional trajectory of employment growth in Northern Virginia, the area rebounded and projections for the future anticipate growth in professional, scientific and technical services, education services and health care industries.

These MWCOC growth projections show a large amount of employment growth along the Route 7 study area, particularly in Tysons with almost 48,000 new jobs and Pimmit Hills, Baileys Crossroads/Beauregard Boulevard and Western Alexandria/Eisenhower Valley each with 21,000 to 22,000 new jobs by 2040. Accommodating this growth will require the replacement of obsolete space and more dense development along the Route 7 corridor for office development. New office space constructed to meet new demand and replacement of obsolete space would total 17.9 million square feet by 2040.

Pipeline projects in the corridor include a variety of multi-family developments as developers seek to redevelop and intensify commercial developments with new housing. Major new multi-family developments are proposed for several sites in the Tysons area with the introduction of Metro Silver Line service in late 2013 and the adoption of a new plan that seeks to create walkable mixed-use developments for a more sustainable future for the area, one less dependent on auto traffic and less constrained by the area's massive congestion delays. The Landmark shopping center site will incorporate major new housing and the Beauregard Boulevard corridor is envisioned for major residential redevelopment at significantly higher densities than now exist. The MWCOC household

projections anticipate the need for construction of 49,200 new housing units by 2040. The corridor's construction patterns of the last decade and the proposed developments suggest that 75 percent of that new housing will be developed in multi-family structures.

The potentials for other types of commercial development vary based on use type and availability of sites with necessary visibility, accessibility and other site selection criteria essential to capture customers. Retail development requires a more detailed review of market conditions and specific trends. Retailing is marked by continuous shifting and churning as retailers seek better locations and newer facilities. In general, Falls Church/Seven Corners, Baileys Crossroads/Beauregard Boulevard, Old Town and Braddock Road/ Del Ray could each support a new grocery store. More restaurants could be supported in Falls Church/Seven Corners, Baileys Crossroads/Beauregard Boulevard, West Alexandria/Eisenhower Valley and Braddock Road/Del Ray. Future hotel development demand relates most specifically to the opening of Metro's Silver Line near Tysons.

NEED FOR THE PROJECT

As shown by the description of the corridor there is a need for high quality transit service in the Route 7 corridor; however, demand is not being met because of the limitations of the existing transportation infrastructure. Specifically, the need for improved transit service in the Route 7 study area has four distinct components: (1) the need for faster and more reliable transit service, (2) the need for more direct transit connections with Metrorail, (3) the need for improved transit connections between communities and activity centers within the corridor, and (4) the ability to accommodate future growth and support economic and community development with higher capacity transit.

This Purpose and Need document has identified several critical matters that illustrate the need for increased investment in transit services in the Route 7 corridor including the following:

- Significant forecast population and employment growth
- Unreliable and slow transit travel times in the corridor between communities and activity centers
- Severe traffic congestion in the corridor
- Lack of connections between communities and between communities and the regional transit network
- Clusters of transit dependent populations throughout the corridor
- A desire by corridor residents for faster and more reliable transit service

Need for Faster and More Reliable Transit Service

Faster and more reliable transit service is needed in the Route 7 corridor to address two related transportation problems arising from existing and forecasted transit service market demands: 1) the increasingly detrimental effect of existing and expected future roadway congestion in the corridor on travel times, and 2) the resulting unreliability of the bus transit services in the corridor. The congested roadways mean that bus travel times are not predictable and there are currently no HOV or transit priority treatments on Route 7.

The transit service market demands described demonstrate the nature and importance of the local and regional travel occurring in the project corridor. Expected growth in population, employment, and activity centers will place a substantial burden on the roadway and transit service networks in the corridor between now and the design year. Road-based bus dependability will deteriorate as traffic congestion grows, making access to destinations such as major activity centers and radial transit services slow and unreliable. Populations that are transit-dependent will be particularly adversely affected by these conditions.

Need for More Direct Transit Connections to Metrorail

WMATA's Metrorail existing and planned service connects Tysons and Alexandria. However, since this service is radially-oriented, rail travel between these centers requires a lengthy, time-consuming trip into Arlington County and then a transfer to a different radial line. The corridor is deficient in fast, reliable transit services providing access to and from the Metrorail system.

The Route 7 corridor connects all four Virginia Metrorail lines (Orange, Silver, Blue, & Yellow) and the Columbia Pike Streetcar. As such, new connections to these services would improve the overall efficiency of the system and provide alternative paths for trips in the event of line closures (both routine & incident-related).

Additionally, new high quality transit service in the corridor, connecting to Metrorail, streetcar, Amtrak, and Alexandria's transitways, would provide reliable transit service to a large portion of the population in northern Virginia currently not served by frequent, reliable, and fast transit service.

New service in the corridor, acting as a feeder to the aforementioned services, would enable local jurisdictions to increase transit mode share by connecting the corridor to regional job centers and activity destinations while helping Metrorail realize projected system growth.

Need for Better Connectivity to the Communities between Metrorail Lines

Except for small portions of the corridor, such as within Falls Church, existing development in this corridor is characterized by aging strip malls, strict separation of land uses, and residential neighborhoods turned away from the main thoroughfare. Bus transit service in the corridor faces significant challenges from the lack of a street grid, poor or nonexistent pedestrian amenities on the primary thoroughfares, and numerous travel destinations separated from the roadway by acres of parking.

As noted in previous sections, the corridor lacks fast, reliable transit to serve the communities located in the wedge between the Metrorail lines. These communities are dependent on local bus services, which are often slow and unreliable because of the existing congested roadways. As described above there is a high demand for trips between communities and activity centers within the corridor between the Metrorail lines currently served only by limited local bus service. The following origin-destination pairs, and their daily trips, illustrate the demand for travel between the following pairs:

- Tysons and West Falls Church: 8,900 daily trips

- West Alexandria and Old Town: 8,400 daily trips
- Skyline Drive and West Alexandria: 6,600 daily trips
- Vienna/Pimmit Hills and West Falls Church: 6,500 daily trips
- Shirlington and East Alexandria: 6,400 daily trips
- West Alexandria and West Columbia Pike Corridor: 6,000 daily trips

These O-D pairs combined have 55,900 daily trips that could be served by new service in the corridor directly.

Summary

Transit is an important component of what makes the Route 7 corridor function and is critical to the future vision for the corridor. Improve transit will help the corridor accommodate future population and employment growth and make Route 7 a more vibrant place to live and work. Within a half-mile of the corridor there are transit-dependent populations clustered around Bailey’s Crossroads/Skyline; the Seven Corners area; the Braddock Road Metrorail station area; and the Van Dorn corridor/Landmark area. Furthermore, the corridor carries one of the highest levels of bus ridership of any corridor in Northern Virginia, with average weekday ridership of approximately 5,400 boardings per day (WMATA 2012). The need for the Route 7 Transit Alternatives Analysis originates from existing and expected transportation deficiencies along the corridor related to limited roadway and transit capacity to accommodate increasing travel demand as the population grows and development increases. Most of the corridor currently has very limited transit options restricting the regional connectivity for corridor users. Table 9 summarizes the corridor problems and needs.

Table 9: 2010 Corridor Problems and Need

Problem	Need
Limited roadway capacity to handle an increase in auto trips.	<ul style="list-style-type: none"> • Improve transit capacity; and • Improve transit mode share.
Existing transit capacity is insufficient to support future growth and development within the corridor.	<ul style="list-style-type: none"> • Invest in transit service that supports growth and economic development.
Lack of frequent reliable transit service to connect communities within the corridor and connect the corridor to regional transit services.	<ul style="list-style-type: none"> • Invest in high quality transit service that meets the needs of both local and end-to-end corridor trips; • Improve connections to other transit services; • Invest in pedestrian infrastructure to connect communities with transit services; and • Invest in intersection improvements that increase transit reliability.

Continued population and employment growth will increase transportation demand along the corridor.

According to the MWCOG forecasts, population within a half-mile of the corridor is projected to increase by 32.7 percent from 2010 to 2040, while employment is projected to increase by 46.1 percent.

As land along the corridor continues to be redeveloped with medium- to large-scale mixed-use projects, and population and employment increases and development intensifies, the demand for transit will also increase. As a result this study needs to identify potential transit investments that will

- Provide higher-capacity transit service to accommodate future growth
- Increase transit mode share while decreasing single-occupancy vehicle use along the corridor

The Baileys Crossroads Revitalization Commercial District in Fairfax County, Tysons Comprehensive Plan, and the City of Alexandria's Beauregard Small Area Plan among others have provided the necessary land use plans and zoning codes to encourage higher density redevelopment along the Route 7 corridor. These efforts have resulted in two major redevelopment projects in the Baileys Crossroads area of Fairfax County and plans for major redevelopment projects in the Tysons and Beauregard areas.

The continued success of redevelopment efforts is dependent upon a robust transportation system to connect the new developments with existing population and employment centers and accommodate growth without expanding road and parking facilities. Most critically, improved transit service will demonstrate a permanent and on-going commitment to transportation by the public sector. Sustaining and improving the level of transit service investment will reassure developers that higher-density, transit-oriented, and mixed-use projects are worth the risk in the real estate market, and given this reassurance, jobs, housing, and services will continue to flow into the corridor. As a result, this project needs to identify potential transit investments that will improve mobility and accessibility of the corridor in a way that supports growth and economic development

Furthermore, the existing transit network provides limited service with only one Metrobus line providing service throughout the corridor. This project will identify potential transit investments that will:

- Improve transit access
- Improve regional connectivity to and from corridor communities and activity centers

EVALUATION METHODOLOGY

Evaluation Framework

This evaluation methodology has been crafted in response to input provided by the Northern Virginia Transportation Commission (NVTC) and TAC members for the Route 7 study area. The intent of the methodology is to select an appropriate transit mode, termini, and alignment that will improve transit speeds and system reliability, increase the competitiveness of transit for commuting and other trip-making purposes, add transit capacity to accommodate existing and future ridership growth, and support regional goals for development, redevelopment and sustainability. The evaluation methodology

was developed to facilitate decision making in each of the project phases – Phase I which is to conclude in October of this year and Phase II which would follow and conclude with project planning documents prepared for potential application for federal funding and entry into the FTA project development process.

The proposed evaluation framework to be used in the Route 7 Study consists of a three-step process across the two identified project phases. The three steps consist of:

- A pre-screening to identify the reduced list of alternatives from the larger universe of alternatives that could be considered (Phase I)
- A Tier 1 screening to identify a short list of the most promising alternatives to be carried forward for more detailed analysis and evaluation (Phase I)
- A Tier 2 screening which will rely on more detailed analysis results, using evaluation criteria derived from the Purpose and Need, leading to the selection of a single locally preferred alternative (LPA), defined in terms of mode and general alignment (Phase II)

The methodology outlined over the following pages is based on input on goals and objectives provided by TAC members, organized with associated screening measures into evaluation perspectives identified in FTA planning documents. Organizing the evaluation framework in this way enables the analysis of alternatives based on specific analysis measures.

Table 11 summarizes screening process, which is described in more detail in later pages.

Table 10: Summary of the Screening and Evaluation Process

Screen Level	Pre-Screening (Universe of Alternatives to Reduced List of Potentially Reasonable Alternatives)	Tier 1 Screening (Reducing List of Alternatives to Short List of Most Promising Alternatives)	Tier 2 Screening (Evaluating Short List of Alternatives to Arrive at Locally Preferred Mode and Alignment Alternative)
PURPOSE	<ul style="list-style-type: none"> Document alternatives considered and eliminated prior to the formal screening of alternatives Eliminate fatally flawed alternatives from consideration 	<ul style="list-style-type: none"> Identify suitability of the alignment in each segment and of each technology Develop a small set of the most promising transit corridor alternatives within the Route 7 study area 	<ul style="list-style-type: none"> Evaluate segment-level alternatives in greater detail
APPROACH	<ul style="list-style-type: none"> Review of previous studies Document reasons why certain transit modes/technologies are not suitable for the corridor 	<ul style="list-style-type: none"> Conduct qualitative/subjective and discuss modal options Conduct qualitative/subjective evaluation of each full corridor combination and drop poorest performers 	<ul style="list-style-type: none"> Conduct qualitative and quantitative evaluation of corridor alternatives Potential to mix and match corridor alternatives
EVALUATION MEASURES	<ul style="list-style-type: none"> Has alternative been eliminated in previous studies/discussions for reasons that are still considered valid? Is a mode or alignment clearly ill-suited to addressing purpose and need in these corridors? 	<ul style="list-style-type: none"> See Tables 13 through 17 	<ul style="list-style-type: none"> See Tables 13 through 17
OUTCOME	<ul style="list-style-type: none"> List of modes and alignments for Tier 1 Screening 	<ul style="list-style-type: none"> Short list of most promising mode and alignment alternatives for refinement and more detailed analysis 	<ul style="list-style-type: none"> Locally Preferred Alternative (LPA)

PRE-SCREENING

The pre-screening step will result in an initial list of alternatives to be carried into the Tier 1 evaluation. Two questions will be used to pre-screen the universe of alternatives:

- Has the alternative been eliminated in previous studies/discussions for reasons that are still considered valid?
- Is a mode or alignment (including alignment segments) clearly ill-suited to addressing the purpose and need for transit improvements in this corridor?

If the answer to one or both of these questions is “yes” for a given alternative, the study team recommends that the alternative be dropped from further consideration prior to the Tier 1 evaluation.

The outcome of the pre-screening assessment will be a list of potentially reasonable transit alignments and technologies to be advanced to Tier 1 Screening.

TIER 1 SCREENING

The Tier 1 Screening will evaluate each alignment and technology advanced from the pre-screening to help the NVTC and stakeholders conduct detailed evaluation of a reduced set of the most promising transit alternatives.

The Tier 1 Screening will primarily utilize qualitative measures. Data for the screening will come from available demographic data, GIS data, local planning studies and documents, field reconnaissance, stakeholder and public feedback, ability to meet Purpose and Need, consistency with goals and objectives, and limited demand forecasting work. For each evaluation measure the alignment and technology alternatives will be rated on a scale of *High*, *Medium*, and *Low*, with the “High” rating representing the most promising alternative and “Low” representing the least promising. If the differences are too small on one or more of the measures to differentiate among the alternatives in a meaningful way, then all of the alternatives may be given identical ratings. The project team will present a summary matrix of the data and ratings for each measure by corridor. The poorest performers will be recommended for elimination from further consideration. Because of the qualitative nature of this process, it is not expected that the evaluation criteria would be weighted or that the alternatives would be scored numerically.

The outcome of the Tier 1 Screening will be the No Build and TSM Alternatives along with a relatively small set of the most promising mode and alignment combination alternatives for more detailed analysis in the Phase 2 study. The short list of alternatives will be brought forward to Tier 2 screening, which will be more quantitative and rigorous in nature.

TIER 2 SCREENING

As shown in Table 12, the Tier 2 Screening will evaluate the short list of full corridor alternatives at a level of detail sufficient for local decision makers to select a LPA. The Tier 2 screening will rely on detailed runs of the travel demand forecasting model. The alternatives will be refined as conceptual

station locations are identified and a limited level of conceptual engineering performed to provide a basis for capital cost estimating, operations and maintenance costs estimating, travel time savings, new transit riders, reduction in regional VMT and financial analyses.

At the outset of the Tier 2 screening, a decision will be made on whether the entire corridor should continue to be evaluated, or whether it will potentially be shortened. This decision may hinge on the number of alternatives remaining and thus the number of promising mode and alignment combinations.

Similar to the Tier 1 Screening process a rating scale will be utilized to provide a comparison between the No Build, baseline, and the remaining Build Alternatives. Ratings would be assigned on a scale of *High*, *Medium-High*, *Medium*, *Medium-Low*, and *Low* for each measure. A Refined Alternatives Evaluation Report would document the ratings and summarize the important trade-offs such that the NVTC and public and local decision makers can understand the choices, consider their relative advantages and disadvantages, and select the locally preferred mode and alignment alternative. As with Tier 1, numerical scoring of the alternatives would not be anticipated.

The outcome of the Tier 2 Screening would be a single LPA, comprised of an alignment, mode, and operational characteristics, that could be advanced for more detailed environmental and engineering studies.

EVALUATION PERSPECTIVES

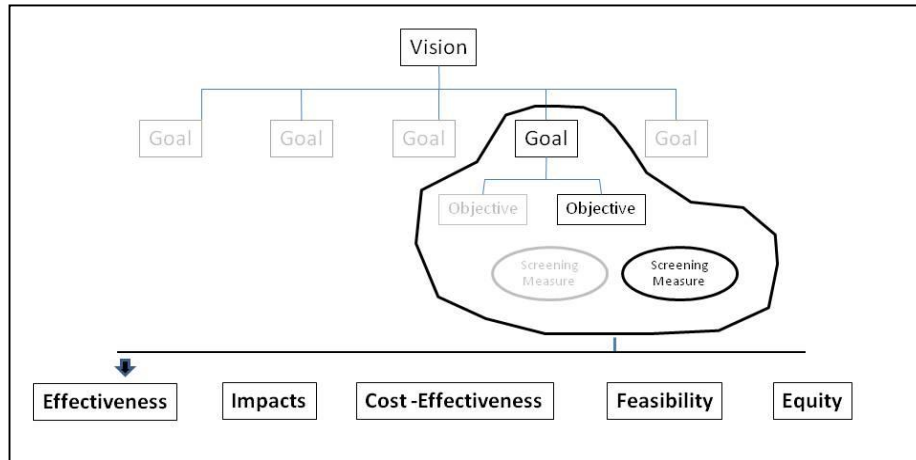
This section offers several different perspectives that can be applied to the evaluation of alternatives. While addressing the Purpose and Need is an important consideration, FTA's guidance on the conduct of Alternatives Analyses (*Procedures and Technical Methods for Transit Project Planning*) suggests that the evaluation be organized around five primary perspectives: effectiveness, cost-effectiveness, financial feasibility, impacts and equity.

- Effectiveness measures assess the extent to which the alternatives address the stated needs in the corridor. Suitable measures for evaluation are derived from adopted goals and objectives as well as the Purpose and Need.
- Impacts measures the extent to which the alternatives support other local policy goals, or present potential environmental and traffic issues that could be fatal flaws or otherwise influence the selection of a preferred alternative.
- Cost-effectiveness measures assess the extent to which the costs of the alternatives, both capital and operating, are commensurate with their anticipated benefits.
- Feasibility measures assess the financial and technical feasibility of the alternatives. Financial measures assess the extent to which funding for the construction and operation of each alternative is considered to be readily available. Technical feasibility assesses potential engineering challenges or restrictions that could limit the viability of an alternative.
- Equity measures assess the extent to which an alternative's impacts and benefits are distributed fairly across different population groups.

Organizing the evaluation around these different perspectives helps to bring out the important trade-offs to be made in selecting a locally preferred alternative.

Figure 9 is provided as a visual aide on how the analysis methodology was organized into evaluation perspectives.

Figure 9: Relationship of Evaluation Perspectives to Project Goals and Objectives



VISION, GOALS, AND OBJECTIVES FOR PROJECT

Project goals and objectives describe the desired outcomes of the transit investment that may result from the Route 7 AA Study and also provide a basis for defining evaluation measures to be used to narrow the transit alternatives under consideration. The draft goals, objectives and screening measures should also consider the vision and principles documented in NVTC's Regional Transportation System Plan and the goals and objectives in local jurisdiction plans.

The relationship of a vision to goals and objectives is further defined as follows:

- **Vision:** A vision statement is at the highest level and shows direction and aspiration. Goals and objectives are statements that describe what your vision will accomplish, or the results that will be achieved.
- **Goals:** Goals are high level statements that provide overall context for what the vision is trying to achieve. A goal is a broad statement of what the stakeholders hope to accomplish with the project. Because a goal is at a high-level, it may take more than one objective to achieve.
- **Objectives:** Objectives are lower level statements that describe the specific, tangible products, deliverables and outcomes that will be delivered. Objectives are specific, achievable, measurable statements of what will be done to achieve goals.

An overall vision for transit improvements in the Route 7 study area is as follows:

***VISION:** Transit within the Route 7 study area will provide a reliable, frequent and convenient transit service, integrating with surrounding land uses and existing transportation connections, that increases travel options while providing improved mobility and an enjoyable experience for its riders, featuring advanced technology and passenger amenities.*

Tables 12 through 16 present the goals and objectives for transit improvements in the Route 7 study area and what measures will be used in the Tier 1 and Tier 2 evaluations of alternatives to show how well each alternative is anticipated to help achieve the goals and objectives. There are also a set of criteria applied on FTA projects that were added to project analysis to meet guidance and also provide some quantitative measures for addressing viability of project alternatives. The vision, goals, objectives, and evaluation measures were developed through a series of workshops with the Route 7 AA Technical Advisory Committee.

Table 11: Transportation Effectiveness Measures

Goals	Objectives	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
<p>Increase mobility in the corridor and improve access for corridor residents, employees, customers and visitors</p>	<p>Serve areas with the greatest density of residences and jobs</p>	<ul style="list-style-type: none"> • Number of households within 1/2-mile of alignment • Number of jobs within 1/4-mile of alignment • Areas within 1/2-mile of alignment meeting minimal combined population and employment density 	<ul style="list-style-type: none"> • Transit travel time between select nodes of development (origins and destinations) • Number of riders on each alternative •
	<p>Serve areas with transit dependent populations</p>	<ul style="list-style-type: none"> • Number of low income households within 1/2-mile of alignment • Number of zero-car households within 1/2-mile of alignment • Number of minority residents within 1/2-mile of alignment 	<ul style="list-style-type: none"> • Number of low income riders on each alternative • Number of zero-car household riders on each alternative • Transit dependent population served on each alternative
<p>Attract new riders through development of an integrated regional multimodal transportation system</p>	<p>Minimize distance between Route 7 corridor transit stations/stops and other transit and bike routes</p>	<ul style="list-style-type: none"> • Number of intermodal terminals (Metrorail, VRE, bus transit center) directly served • Number of bus routes connecting with alternative 	<ul style="list-style-type: none"> • Walking distance from each alternative to intermodal terminals • Number of bus routes connecting with each alternative • Number of bike lanes/paths connecting with each alternative
<p>Increase transit use by providing transit services that meet the needs of all potential users in the corridor</p>	<p>Increase the number of linked trips on the transit system</p>	<p>N/A</p>	<ul style="list-style-type: none"> • Transit travel time between select origins and destinations, compared with highway travel time • Change in transit linked trips in 2035 in the corridor • Number of new transit riders
<p>Provide a range of transit options and improve transit reliability in the corridor</p>	<p>Reduce the percentage of transit trips that require a transfer</p>	<p>Subjective assessment</p>	<p>Number of boardings on each alternative divided by number of linked trips</p>

Goals	Objectives	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
	Increase the average speed of transit vehicles in revenue service	Average transit travel speed on new service	<ul style="list-style-type: none">• Average transit travel speed on each alternative• Total travel time savings for transit and auto users in corridor

Table 12: Social, Economic, Environmental Impact Measures

Goals	Objectives	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
ECONOMIC DEVELOPMENT			
Leverage public investment in transit to accommodate future growth and support local plans for economic and community development.	Provide convenient and accessible transit service to existing and planned activity centers.	Number of activity centers directly served	<ul style="list-style-type: none"> • Transit travel time from each targeted activity center to significant employment centers • Qualitative assessment of consistency of proposed station locations with local plans and policies
	Provide convenient and accessible transit service to areas with economic development potential.	Number of identified redevelopment sites directly served	<ul style="list-style-type: none"> • Number of parcels identified as having economic development potential within 1/2-mile of the alignment
SUSTAINABILITY			
Increase mobility and improve access for all modes in the corridor	Increase transit mode share for work trips	Estimated increase in corridor transit ridership	Transit mode share for work trips within Northern Virginia
	Reduce traffic congestion	Qualitative assessment based on increase in transit ridership	Change in VMT for corridor districts
Encourage increased use of public transit as a key element in regional efforts to improve air quality and reduce GHG emissions.	Reduce air pollutant and GHG emissions	Qualitative/quantitative assessment of difference in sustainability benefits of modal alternatives	<ul style="list-style-type: none"> • Estimated change in regional VMT and VHT • Estimated change in criteria pollutants and GHG emissions

Goals	Objectives	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
COMMUNITY AND ENVIRONMENTAL IMPACTS			
Reduce the impacts of transportation along the corridor	Enhance the environment	Qualitative assessment of opportunities to enhance the environment	Qualitative assessment of opportunities to enhance the environment
	Avoid, minimize and mitigate adverse impacts on environmental and community resources	Qualitative assessment of potential impacts	<ul style="list-style-type: none"> • Potential number of displacements • Significance of Section 4(f) and 106 impacts • Significance of wetland, stream, and floodplain impacts • Qualitative assessment of visual impacts on important view sheds

Table 13: Cost Effectiveness Measures

Evaluation Criteria	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
Transit efficiency	Qualitative assessment of estimated time savings based on priority treatments	<ul style="list-style-type: none"> • Average 2035 daily boardings per route mile • Average 2035 daily boardings per revenue hour
Select transit technologies and corridors that most efficiently serve transportation needs in a cost-effective manner.	<ul style="list-style-type: none"> • Order-of-magnitude capital and operating costs • Qualitative assessment – high, medium, low 	<ul style="list-style-type: none"> • Refined capital and operating costs • Annualized capital and O&M cost per rider • Annualized capital and O&M cost per new linked trip

Table 14: Feasibility Measures

Evaluation Criteria	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
Technical Feasibility	Qualitative assessment of constructability, etc.	Further review of feasibility questions that were not addressed in Tier 1
Financial Feasibility	N/A	<ul style="list-style-type: none"> • Competitiveness for FTA discretionary funds • Anticipated New Starts/Small Starts rating based on MAP-21 justification criteria • Local financial commitment

Table 15: Equity Measures

Evaluation Criteria	Tier 1 Screening Measures (Phase 1 Study)	Tier 2 Screening Measures (Phase 2 Study)
Impacts on minority and low-income groups	<ul style="list-style-type: none"> • Transit-dependent population within 1/2 mile of alignments • Service sector jobs within 1/4 mile of alignments 	<ul style="list-style-type: none"> • Number of low income households within 1/2-mile of a station • Number of low-income riders in base year and 2035 • Percentage of displacements that are within Environmental Justice census tracts