



ENVISSION  
ROUTE 7

# Conceptual Engineering

Phase III

October 31, 2019

## Executive Summary

The Envision Route 7 Bus Rapid Transit (BRT) project is planned as a high performing BRT service that connects the Mark Center in Alexandria to Tysons through Bailey's Crossroads, Seven Corners, and Falls Church. The project is part of a network of BRT services being planned, designed, and implemented to better link Northern Virginia that includes the Metroway BRT in the City of Alexandria and Arlington County, the West End Transitway in the City of Alexandria, and the Embark Richmond Highway BRT in Fairfax County. The Envision Route 7 project will serve the Route 7 corridor and will operate in the West End Transitway infrastructure from Route 7 to the Mark Center.

High performing transit in the Route 7 corridor has been in the planning phase for more than five years. Early phases of the Envision Route 7 project found the need for transit in the broad corridor from Alexandria to Tysons, identified BRT as the transit technology to serve the corridor and defined an alignment for the service to travel along. Detailed analysis was undertaken in these early efforts to identify potential transit ridership, suggest the location for BRT operations within the roadway, also known as runningway, and select general station locations. Phase III, the current effort of the Envision Route 7 project, focuses on updating the initial runningway assumptions and identifying the specific station locations so that the needed rights-of-way (ROW) can be identified and a cost estimate may be determined.

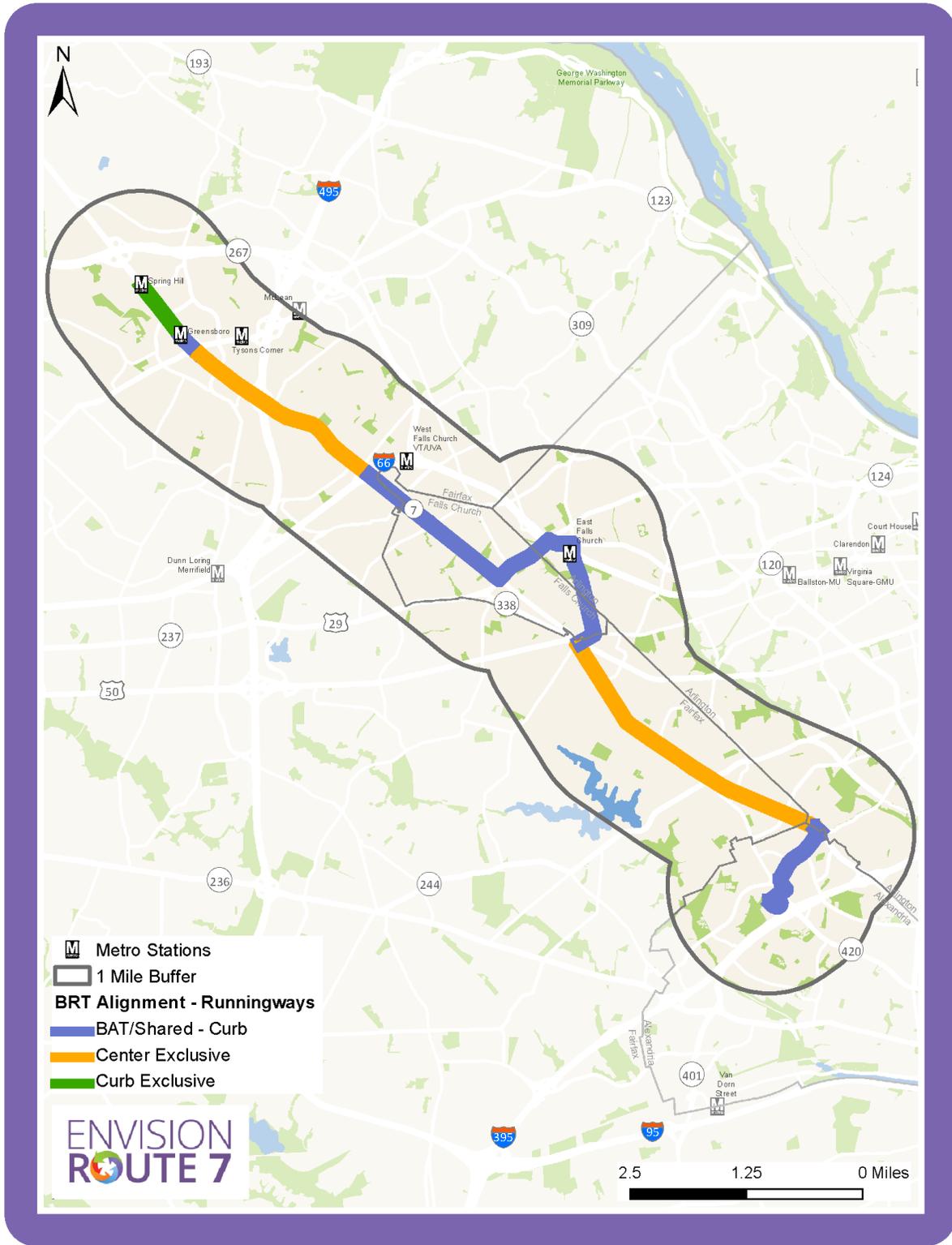
## HIGH PERFORMANCE TRANSIT

To deliver a high-performance BRT project, it is necessary to provide priority treatment for the BRT system's runningway. Where possible, the BRT runningway should be exclusively for transit vehicles and separated from general-purpose vehicles. Existing facilities can be repurposed to serve the BRT system when the ROW is constrained. Where traffic operations allow, Business Access and Transit (BAT) facilities, which allow BRT buses and turning vehicles to mix in the curb lanes, can be utilized. Where the ROW and traffic operations are constrained, buses can travel in general-purpose travel lanes. Exclusive facilities are suggested through most of the corridor from Tysons to Falls Church and from Seven Corners to Beauregard Street, BAT lanes are suggested in the more constrained portions of the corridor through the City of Falls Church, and the City of Alexandria is using general-purpose travel lanes for the portion of the West End Transitway between the Mark Center and Route 7.

## STATIONS AND ROLLINGSTOCK

Specific station locations within the ROW have been defined for each station. Best practices for station sizing and location were identified, which ultimately led to the development of multiple station templates. In addition, demographic information, existing and future land use and population and employment forecasts were considered. Consideration was also made for the specific roadway and

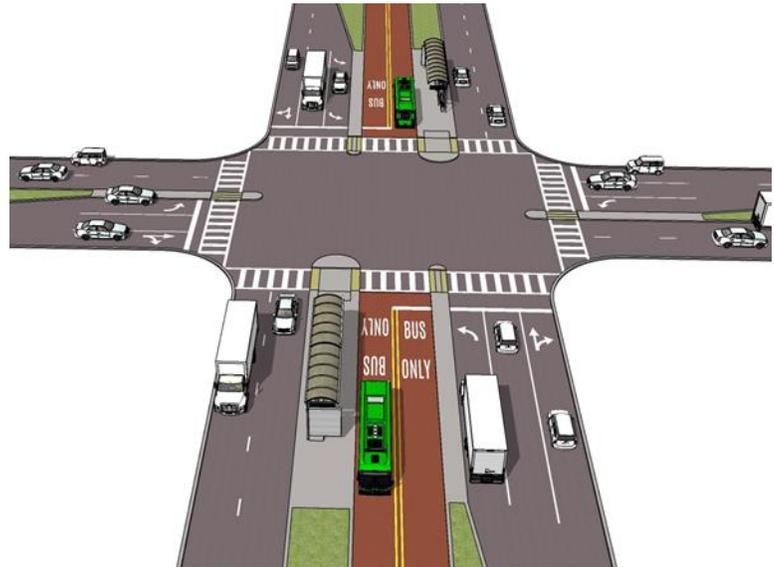
### Corridor Map Showing Runningway Type



development context of the station location. Specific station locations were then recommended considering these inputs. In some cases, slight location adjustments for stations are suggested along with additional stations and combinations of stations. Generally, stations are recommended for the far side of intersections and away from major intersections with multiple left or right turn lanes.

### Center Running Station

The study also considered station types that would necessitate buses with left side doors. While this could increase the flexibility in the use of the ROW, it would require new rollingstock as current regional rollingstock only board and alight on the right side of the vehicle. This would limit the utility of the BRT infrastructure since only the BRT service would be able to serve the transit facility. Therefore, stations will only accommodate buses with typical right-side doors. Stations will be designed to accommodate both 40' buses as well as 60' articulated buses.



## PROCESS

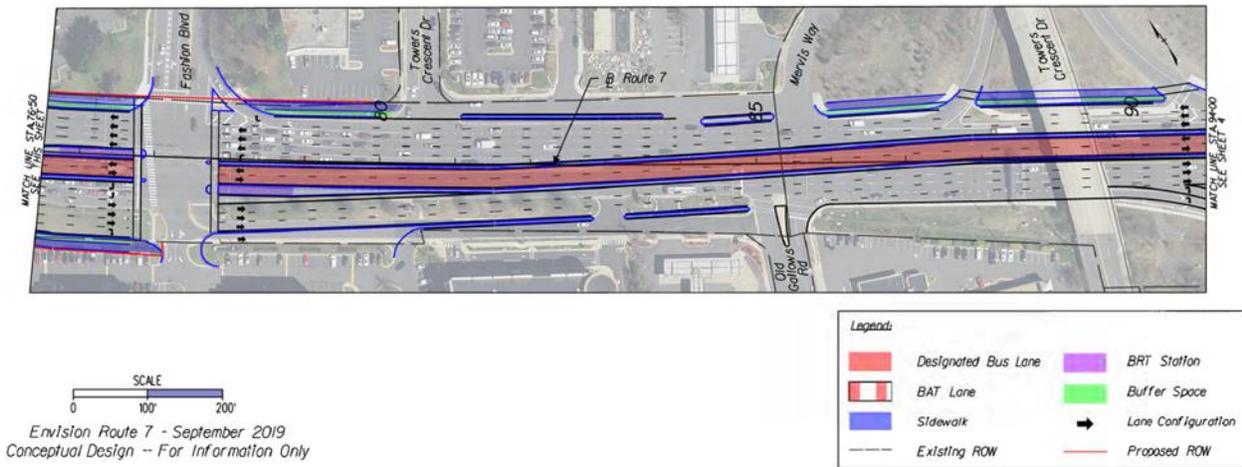
The study process has been guided by a technical advisory committee (TAC). The TAC consisted of staff representatives from Fairfax County, the City of Falls Church, Arlington County, City of Alexandria, Virginia Department of Transportation (VDOT), Virginia Department of Rail and Public Transportation (DRPT) Washington Metropolitan Area Transit Authority (WMATA), Northern Virginia Transportation Authority (NVTA), and Montgomery County, Maryland DOT. This group met regularly throughout the study process to review progress and provide input to the study team. In addition, two workshops were held where design details were discussed, and input was provided. The workshops included members of the TAC as well as technical staff from each of the agencies represented. Comments were solicited multiple times during the process and incorporated into the project.

## CONCEPTUAL LAYOUT

Conceptual layouts were developed for the corridor from Spring Hill Metrorail Station to N. Beauregard Street, a span of approximately 10.5 miles. South of the N. Beauregard Street intersection, the Envision Route 7 BRT alignment joins the West End Transitway alignment to the terminus at the Mark Center. Design for this segment is being advanced by the City of Alexandria.

The conceptual layouts align with jurisdictional plans by meeting the number of lanes and preserving all existing lane movements and configurations at major intersections along the corridor. Additionally, a sidewalk or shared use path has been included on both sides of the street unless adequate sidewalk was already available. The BRT facility and accompanying roadway have been designed to include space from service lanes where available to minimize ROW needs. The need for additional or expanded bridge structures was carefully considered, but it was determined that all future roadway and BRT facilities can be accommodated by the existing bridge structures.

### Sample Conceptual Layout



### ROW NEEDED

ROW need is determined by comparing the edge of the conceptual layouts with the edge of the existing ROW. The additional ROW needed for the project is the area where the edge of the conceptual layout is beyond the existing ROW. The ROW analysis shows that some, but not all parcels adjacent to the facility will be necessary to implement the BRT service. However, in most cases, only a small portion of the parcel will be necessary for the expansion of the Route 7 ROW. The analysis found that although portions of one hundred parcels would be needed, less than 20 percent of the total area of each parcel will be needed in most cases. Where a larger portion of the parcel is needed, the parcel is either small or located in the path of the new Ring Road. Generally, additional ROW is needed in the southern portion of Tysons, the Pimmit Hills area, Seven Corners, and Bailey’s Crossroads. In addition, small amounts of ROW are needed in immediate station areas throughout the corridor.

## ESTIMATED COST

A capital cost estimate has been developed for the project. The capital costs for the project were developed in a parametric process based upon the quantities and unit rates of similar BRT projects. Quantities for each of the items were developed using the conceptual layout plans prepared for the corridor. Items were assigned to a Federal Transportation Agency (FTA) Standard Cost Categories (SCC) code. The right-of-way costs include the fee acquisition of permanent and temporary easements, relocation costs, legal fees, business damages, and other miscellaneous costs. Right-of-way cost estimates are based on average, local, per-acre value with factors for the above properties' costs being considered. No vehicle, maintenance facility, or operations costs are included in this estimate.

To account for the level of unknowns at this point of the project, two levels of contingencies have been included in the cost estimate, allocated and unallocated. Allocated contingencies focus on specific cost or service items and vary based on the risk of the item. Unallocated contingencies are general in nature and are added on top of all costs and allocated contingencies. The allocated contingency will be included for each SCC cost category. The allocated contingency is based on each of the estimate items per their respective costs and a level of certainty and judgment based on the estimate and design progress detail. For this estimate, lower risk line items have an allocated contingency of 15 percent, while higher risk line items have a higher allocated contingency of 30 percent. Allocated contingencies for ROW acquisition are the highest at 40 percent.

To account for the current labor and construction market in the Washington, D.C. metropolitan area, the cost estimate is presented as a range from low to high. For the low range estimate, the allocated contingencies described above were applied to each line item. For the high range estimate, the allocated contingencies were doubled. In addition, an unallocated contingency of 15 percent has been added on top of the full cost which also includes allocated contingencies.

	Base Year (2019)		Year of Expenditure (2030)	
	Low-End	High-End	Low-End	High-End
Construction Subtotal + Allocated Contingencies	\$206.5 M	\$230.0 M	\$261.7 M	\$291.1 M
ROW Acquisition + Allocated Contingencies	\$32.6 M	\$41.9 M	\$43.5 M	\$55.9 M
Professional Services (30 percent)	\$59.9 M	\$66.7 M	\$77.8 M	\$86.7 M
Unallocated Contingencies (15 percent)	\$44.9 M	\$50.8 M	\$64.5 M	\$73.1 M
<b>Total</b>	<b>\$343.9 M</b>	<b>\$ 389.4 M</b>	<b>\$447.5 M</b>	<b>\$ 506.8 M</b>