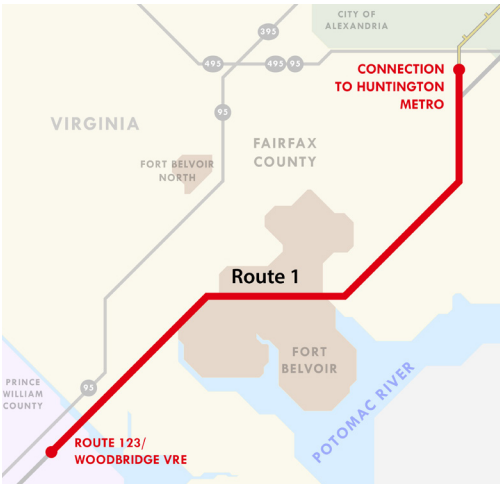
Route 1
Multimodal Alternatives Analysis

EXECUTIVE BRIEF
February 2015

DRPT Virginia Department of Rail and Public Transportation
Office of INTERMODAL Planning and Investment
VDOT

INTRODUCTION

The Route 1 Multimodal Alternatives Analysis addresses the mobility needs of Richmond Highway in Northern Virginia. The study evaluated the benefits, costs, and impacts of implementing multimodal improvements along a 15-mile stretch of Richmond Highway, extending from the I-95/I-495 Beltway area, through Fairfax County, to the VRE Station at Woodbridge in Prince William County. The study was initiated to identify a program of multi-modal improvements that best meets both the community needs and the needs of travelers to and through the corridor.



Study Corridor

Through stakeholder participation and technical analysis, the study resulted in a recommended program of transportation improvements for adoption by Fairfax County and Prince William County. Solutions included combinations of transit, roadway, pedestrian, and bicycle improvements.

PROJECT PROCESS AND PUBLIC INVOLVEMENT

Led by the Virginia Department of Rail and Public Transportation (DRPT), the study was an 18-month collaborative effort among Fairfax County, Prince William County, the Virginia Department of Transportation (VDOT), and the Virginia Office of Intermodal Planning and Investment (OIPI). An Executive Steering Committee, comprised of elected officials and senior staff from the key stakeholder groups, provided guidance throughout the study. The process also included frequent public outreach and events to ensure that the community and stakeholders played an active role in guiding the outcomes of the study.

PROJECT PURPOSE AND GOALS

The purpose of the study is to provide improved transit, bicycle and pedestrian, and vehicular conditions and facilities along the Route 1 corridor that support long-term growth and economic development. The study developed and evaluated a range of multi-modal solutions to address the transportation needs of the corridor.

LOCALLY PREFERRED ALTERNATIVE RECOMMENDATION

After reviewing the technical results and listening to feedback from the project committees and the community, the project's Executive Steering Committee endorsed a phased implementation of the multimodal (roadway, bicycle/pedestrian, and transit) improvements of "Alternative 4 BRT/Metrorail Hybrid", including:

- **Roadway Widening** – Widen roadway from four lanes to six through lanes where necessary to create a consistent, six-lane cross section (three lanes in each direction)
- **Bicycle and Pedestrian Facilities** – Create a continuous facility for pedestrians and bicyclists along the 15 mile corridor; the configuration will vary depending upon urban design, right-of-way availability, and other local considerations
- **Transit** – Contingent upon increased land use density and project funding, implement a median-running Bus Rapid Transit (BRT) system from Huntington to Route 123 in Woodbridge (curb-running BRT in mixed traffic within the Prince William County portion) and a 3-mile Metrorail Yellow Line extension from Huntington to Hybla Valley as expeditiously as possible

Goals

CORRIDOR PLANNING INITIATIVES

Numerous past studies and plans completed for the corridor consistently identified four key findings:

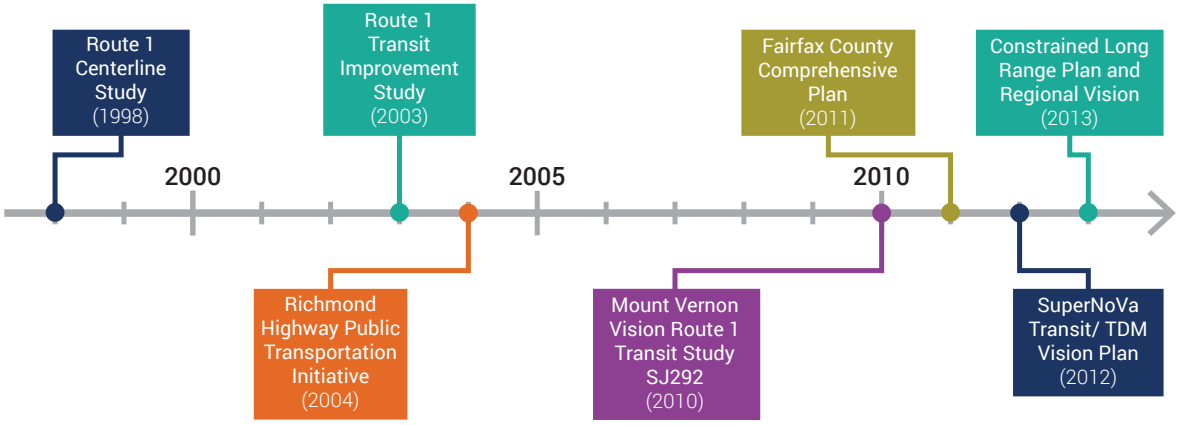
- Growth in regional population and employment, as well as changes in job concentrations, have driven greater demand for travel in the constrained corridor.
- Safety for users of all types (drivers, walkers, bicyclists, and transit riders) remains a concern.
- Land use and economic plans anticipate further growth and redevelopment.
- Maintaining housing affordability and diversity is an increasing challenge.

The two foundational studies for this effort are the VDOT Route 1 Centerline Study (1998) and the DRPT Route 1 Transit Study (2010). The VDOT study recommended widening the roadway and improving pedestrian and bicycle facilities, as well as preserving right-of-way for transit.

The DRPT study recommended a further detailed assessment to examine the feasibility of dedicated transit running way and evaluation of modes to address congestion, capacity, and pedestrian safety issues along the corridor.

The Fairfax County Comprehensive Plan incorporates the findings of the Centerline Study, but stipulates that there should be no more than six general purpose travel lanes on Route 1 through the study area. The Prince William County Plan also calls for Route 1 to be a six-lane facility within the study area. These recommendations are already being carried out through Route 1 widening projects around Fort Belvoir in Fairfax County and at the Route 1/Route 123 interchange in Prince William County.

Previous Plans and Studies



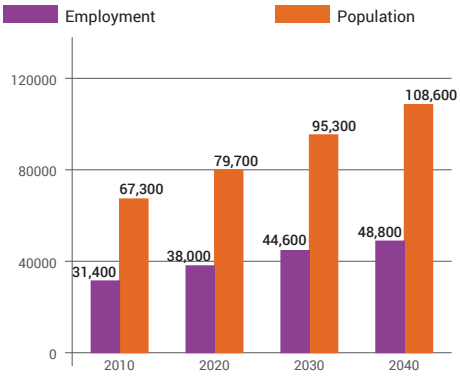
CORRIDOR TRANSPORTATION CHALLENGES

The need for the project stems from existing and anticipated transportation problems along the corridor related to limited transit service, poor bicycle and pedestrian facilities, and high traffic volumes. These deficiencies limit accessibility and multimodal connectivity and are not supportive of the desired economic development and growth along the corridor.

The existing person carrying capacity of the corridor is constrained. Integrated multimodal improvements are needed to support the anticipated high levels of employment and residential growth. Without transportation capacity improvements that encourage pedestrian and transit travel, it is unlikely that the projected growth can be accommodated within the corridor, and the associated economic opportunity of additional jobs and residents will be limited.

Attractive multimodal options are needed to help serve the large transit-dependent population who rely on bicycling, walking, and/or transit to meet the needs of daily life. According to the American Community Survey (2008-2012), within ½-mile of the study corridor, there are over 2,000 households that do not own a car. Of the existing transit riders, nearly three-quarters have no access to an automobile as a travel alternative. Over half of corridor transit riders have household incomes of less than $30,000. Preserving affordability and mobility on the corridor over the long term requires improved transit and other transportation options.

Projected Employment and Population for the Study Area



By 2040, the Route 1 Corridor expects approximately:

45,000 new residents; and

18,000 new jobs

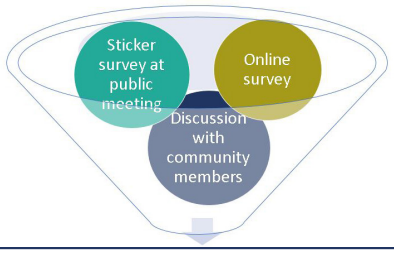
	Challenges	Needs
Transit	• Transit travel time is not competitive with auto travel time • Peak and off-peak transit service is infrequent • Delays caused by transit dwell time at stops and peak period congestion	• Attractive and competitive transit service
Pedestrian/ Bicycle	• Facilities for non-auto travel are limited, substandard, and unable to compete with the attractiveness of single occupancy vehicle travel • Pedestrian crossings of Route 1 are infrequent, long, and disconnected from existing transit stops • Bicycle access is difficult with few dedicated paths	• Safe and accessible pedestrian and bicycle access
Vehicular	• Significant congestion along Route 1 during peak periods • Travel times are highly variable and unpredictable	• An appropriate level of vehicle accommodation • Additional attractive travel choices in the corridor to minimize auto use
Land Use/ Economic Dev.	• Current development patterns fail to optimize development potential at designated activity centers • The street network is limited, offering few alternatives to Route 1 travel	• Support for more robust land development to support anticipated population and employment growth

ADDRESSING TRANSPORTATION CHALLENGES

The project team developed and evaluated three types of alternatives: (1) Bicycle and Pedestrian, (2) Number of Vehicle Travel Lanes, and (3) Transit Technologies. From the broad range of possible options, a set of initial alternatives emerged based on their applicability in the Route 1 Corridor.

Early analyses focusing on traffic operations and right of way requirements determined that a consistent six-lane roadway and continuous bicycle and pedestrian facilities would be a way to simultaneously address the current and future congestion and bicycle/pedestrian access and safety issues along the corridor.

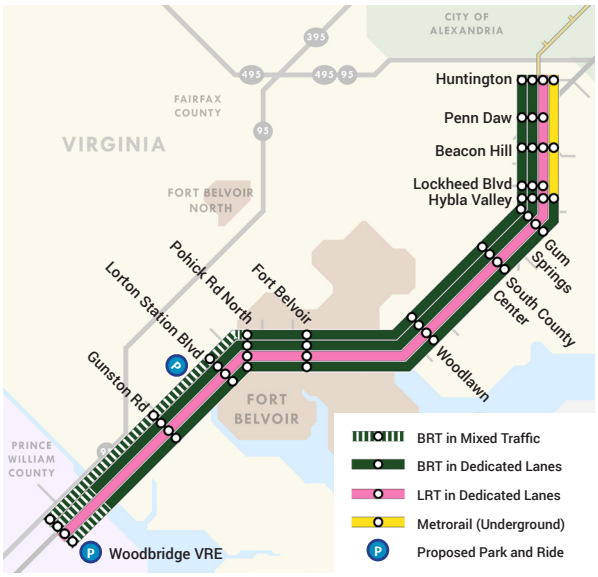
What We Learned From Corridor Residents



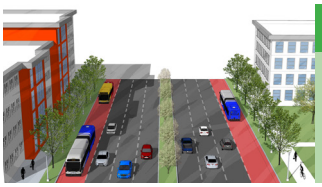
- **Purpose and Need**
- **Weighting of Evaluation Measures**
- **Recommendations and Action Plan**

Four detailed alternatives examined bus rapid transit, light rail, and Metrorail options for the corridor. Each assumed a consistent six vehicular travel lanes along the entire corridor, as well as a 10-foot shared path for bicycles and pedestrians on each side of the roadway.

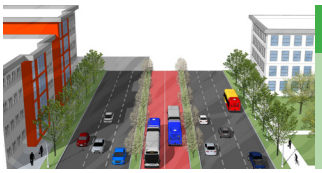
MULTIMODAL ALTERNATIVES



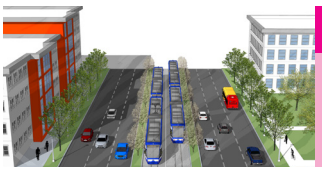
Note: Each alternative includes six vehicular travel lanes and a shared bicycle/pedestrian path on each side of the roadway.



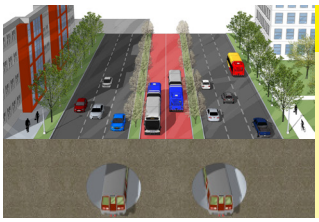
Alternative 1
Bus Rapid Transit - Curb
Bus operates in curb, dedicated transit lanes from Huntington to Pohick Road North, and in mixed traffic south of Pohick Road to Woodbridge.



Alternative 2
Bus Rapid Transit - Median
Bus operates in median in dedicated lanes for the entire length of the corridor and in mixed traffic in Prince William County.



Alternative 3
Light Rail Transit
Light rail operates in the median dedicated lanes for the entire length of the corridor.



Alternative 4
Metrorail/BRT Hybrid
In the short term, BRT operates in dedicated lanes and transitions into mixed-traffic in Prince William County. In the long term, Metrorail is added underground from Huntington to Hybla Valley.

LAND USE IMPLICATIONS

Land use and transportation planning are interconnected. To maximize the quality of public transit service, development patterns must support higher density populations, a mix of uses, and pedestrian access to stations. This study included an analysis of land use potential as one way to evaluate the multimodal alternatives.

The study identified 13 potential transit stations on the corridor. The half-mile radius around each station was used for the land use analysis because it represents a typical walking distance for transit riders, and therefore a generally appropriate location for transit-oriented development. It is also the area of analysis for Federal Transit Administration (FTA) funding criteria relating to land use and economic development.

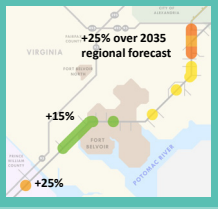
The land use analysis was carried out for three growth scenarios, which informed the evaluation of alternatives. Several key principles of transit-oriented development are reflected in illustrative land use and urban design plans for the station areas:

- Compact, higher-density, mixed-use development patterns, including office, retail, and residential to allow residents to live, work, and shop within the Route 1 Corridor.
- Focused growth that "steps down" as a transition from station areas to existing neighborhoods
- Street designs that allow for wide sidewalks, street trees, street furniture, well-defined crosswalks, and on-street parking, all of which promote pedestrian activity
- A street grid within the station area and to adjacent neighborhoods that allows multimodal travel within the study area, but off Route 1
- High quality parks and public spaces

Population and Employment Growth Scenarios

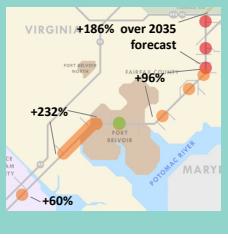
Scenario 1

"Base Land Use Scenario" 2035 MWCOG regional forecast



Scenario 2

Reasonable growth expectation for a corridor that invests in high-quality BRT or LRT.



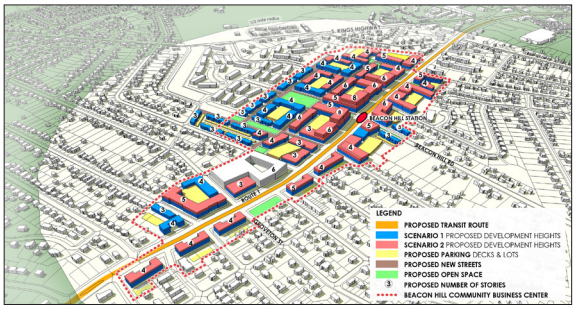
Scenario 3

Increase in population and employment needed to achieve density levels typically supportive of Metrorail (Huntington to Hybla Valley) and BRT (Gum Springs to Woodbridge).

- Urban Core (Rail)
- Urban Center (BRT/LRT)
- Large Town/Suburban Center (Express Bus)
- Medium Town/Suburban Center (Fixed Route Bus)

Source: DRPT Multimodal Design Guidelines (2013)

Proposed Beacon Hill Station Area Today



Beacon Hill Potential Development Pattern

EVALUATION OF TRANSIT ALTERNATIVES

The evaluation process assessed how well each transit alternative and cross section addressed the project goals and objectives. It also assessed the feasibility of the alternatives.

The evaluation assessed each alternative's ability to meet the project goals and objectives by using evaluation measures that provided either quantitative or qualitative data on how well each alternative met the goals. Based on feedback from community members and other stakeholders (including Technical Advisory Committee, Executive Steering Committee, and Community Involvement Committee members), certain measures were weighted double or triple to reflect their importance.

The evaluation also included a qualitative assessment of how well each alternative supported key objectives for successful and timely implementation. Implementation factors, based on stakeholder input, reflect the likely physical/operational and financial feasibility of the project, likelihood of development levels appropriate to the type of transportation investment, and ability to secure funding for recommended improvements.

Alternatives 2 and 4 performed best overall. The full-corridor BRT service, combined with the recommended program of street and pedestrian/bicycle improvements, would provide strong mobility benefits in a cost-effective way. A long-term Metrorail extension at the north end of the corridor would provide additional mobility and support economic development.

Goals	Evaluation Measures	Alt. 1: BRT-Curb	Alt. 2: BRT-Median	Alt. 3: LRT	Alt. 4: Metrorail-BRT (Hybrid)
Goal 1: Local and regional mobility	• Project ridership* • Number of transit dependent riders* • Transit travel time savings* • Provides connection to existing transit network* • New transit riders • Person throughput • Number of riders who walked to access transit • Provides improved bicycle and pedestrian facilities	0.7	0.8	0.8	1.00
Goal 2: Safety and accessibility	• Auto Network Delay* • Pedestrian access to stops* • Pedestrian crossing time* • Auto travel time • Impacts due to turns • Preserves flexibility for bike lane	0.7	0.8	0.8	0.8
Goal 3A: Economic Development	• Potential to begin transit within 10 years** • Tendency to encourage additional development* • Jobs within 60 minutes* • Per passenger O&M cost savings with growth • Tendency to accelerate development	0.6	0.6	0.6	0.7
Goal 3B: Cost Effectiveness	• Cost per rider** • Estimated Capital Cost* • Estimated Annual O&M cost*	1.0	0.9	0.7	0.5
Goal 4: Community health and resources	• Change in VMT* • Total Right of Way* • Trips diverted from I-95 • Temporary construction impacts • Environmental benefits	0.7	0.7	0.7	0.8
Ability to Meet Project Goals - Average Score		0.7	0.8	0.7	0.8

* measure weight doubled. ** measure weight tripled.

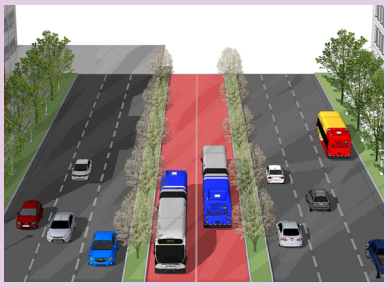
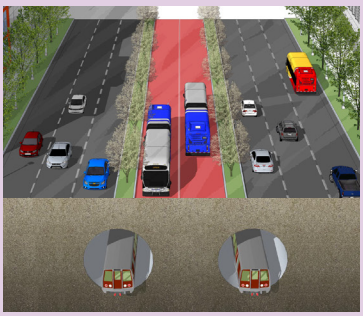
Key Indicators	Alt. 1: BRT-Curb	Alt. 2: BRT-Median	Alt. 3: LRT	Alt. 4: Metrorail-BRT (Hybrid)
Average Weekday Ridership (2035)	15,200	16,600	18,400	26,500* (BRT 10,600; Metrorail 22,900)
Conceptual Capital Cost	$832 M	$1.01 B	$1.56 M	$2.46 B (BRT $1 B, Metrorail $1.46B)
Annual O&M Cost**	$18 M	$17 M	$24 M	$31 M (BRT $8M, Metrorail $17M)
Cost Effectiveness***	$19	$20	$27	$28 (BRT $29; Metrorail $28)

* Corridor ridership, excluding transfers between Metrorail and BRT Portions
** Each Alternative includes $5 M annual cost for Ft. Belvoir shuttle service
*** Annualized capital + operating cost per rider

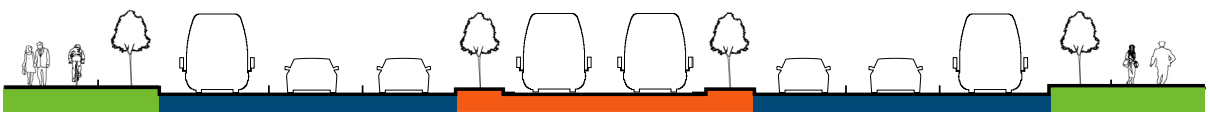
RECOMMENDED MULTIMODAL ALTERNATIVE

The recommended transit alternative is a phased implementation of **Alternative 4 (Hybrid BRT-Metrorail)**, contingent upon increased future land use density:

- **Near-term: Median-running Bus Rapid Transit** would provide a cost effective transportation solution to support economic development plans.
- **Long-term: A Metrorail extension to Hybla Valley** (in addition to the BRT system) has potential to provide a higher level of local and regional mobility and support long-term corridor development.

Recommendations	Near-Term Vision	Long-Term Vision
Transit – Median-running Bus Rapid Transit System in the near-term, with a Metrorail extension to Hybla Valley in the long-term. BRT would be configured in dedicated median transitway through Fairfax County and in curb-running general purpose lanes in Prince William County.		
Pedestrian/Bicycle – 10-foot shared use path on both sides of street (may transition to on-street bicycle lanes in higher density areas).		
Vehicular – Route 1 to include consistent 3 lanes in either direction.		

Recommended Cross-Section



Notes:
[1]The multiuse path may transition to on-street bicycle lanes in higher density areas.

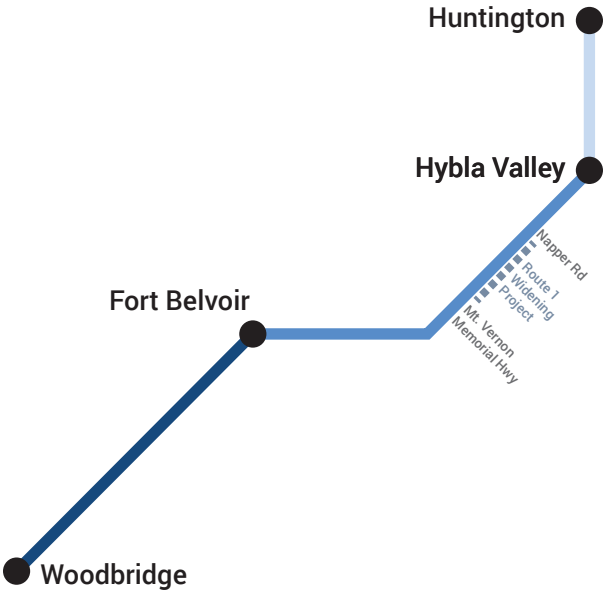
[2]Curb-running BRT within the Prince William County portion.

POTENTIAL TIMELINE AND ESTIMATED COSTS

The recommendation calls for a four-phase approach to implementation. The BRT system, roadway widening, and pedestrian/bicycle facilities will be implemented during the first three phases (through 2032), with the Metrorail extension in the 2040 timeframe.

The recommended projects would require funding from a range of sources, including local, regional, state, and federal funds. These transit project elements are potentially competitive for federal funding through the FTA Capital Investment Program, which historically funded transit projects at 50 percent of project capital costs. Local, regional, and state contributions would also be necessary. The funding mix for roadway/vehicular improvements may include state, federal formula, regional and local funds.

Phasing Timeline



BRT Phase I (2026)
Huntington to Hybla Valley

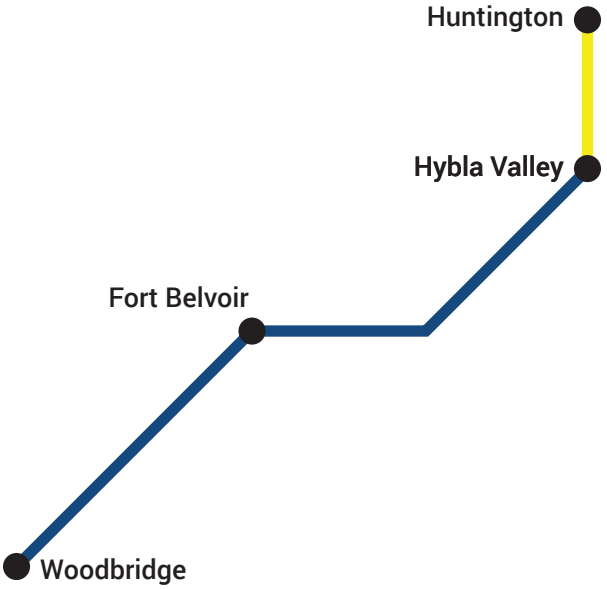
$306M, 3.1 miles

BRT Phase II (2028)
Hybla Valley to Fort Belvoir

$224M, 7.3 miles

BRT Phase III (2032)
Fort Belvoir to Woodbridge

$472M, 4.6 miles



Metrorail Phase IV (2040)
Metrorail Yellow Line Extension to Hybla Valley

$1.46B, 3.1 miles

Note: The recommendation calls for implementation of the vehicular, bicycle, and pedestrian improvements at the same time, if not before, the phased transit improvements.

Woodlawn Vision (Artist's Rendering)

RECOMMENDATIONS FOR SUCCESSFUL IMPLEMENTATION

Study findings include several supporting recommendations that would be necessary for successful implementation. One key finding is that a Metrorail Yellow Line extension to Woodbridge along Route 1 (a 15-mile extension) would not be feasible. In keeping with the Prince William County Comprehensive Plan, a potential Metrorail Blue Line extension could be considered in a subsequent study.

Successful implementation for all phases will require sustained and coordinated effort in three key areas: land use and economic development, transportation investment, and financial planning.

LAND USE AND ECONOMIC DEVELOPMENT ACTIONS

Every transportation action affects land use, and all land use actions have transportation implications.

An integrated vision for the Route 1 corridor will guide actions to maximize economic development potential by creating a range of housing and commercial opportunities within the corridor. These recommendations build on the principles laid out in the Fairfax County and Prince William County Comprehensive Plans.

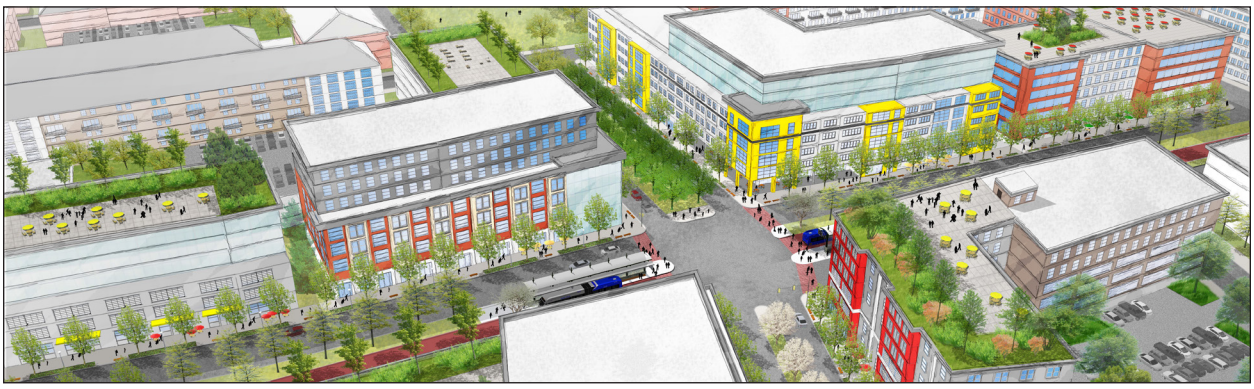
Market Absorption Study – Identify future land use and development scenarios that are desirable from a TOD and Smart Growth standpoint and feasible from a development standpoint.

Comprehensive Plan Updates – Revisit Plan documents in light of the Locally Preferred Alternative for transit and transportation. Develop policies to implement the Plan in the Route 1 corridor. Key elements include:

- Station locations and specific station area plans
- Infrastructure requirements (schools, public safety, parks, and other critical public investments)
- Urban design regulations and parking policies
- Future Local Street Network

Economic Development Activity – Implement incentives and guidance to encourage denser, mixed-use development around proposed transit stations. The Inova Mount Vernon Hospital and the expansions at Fort Belvoir provide an initial economic attraction in the corridor. Additional focused investment would define centers of economic and community activity.

Affordable Housing – Preserve and increase affordable housing. In a growing region, the corridor will continue to attract a new generation of residents and businesses. With the complementary goals of equity and economic development, both jurisdictions should ensure that affordable housing is included as part of market-rate development.



Beacon Hill Vision (Artist's Rendering)

TRANSPORTATION ACTIONS

Travel along and within the current Route 1 corridor relies heavily on the Route 1 right-of-way. These recommendations outline changes along Route 1 that will safely and efficiently accommodate all modes of transportation.

Transit Investment – Advance the next stage of transit project development, and continue to coordinate actively across agencies. Phased construction/reconstruction of Route 1 will include a systematic effort to preserve right-of-way and remove utility conflicts for median-running BRT.

Bicycle and Pedestrian Improvements – Continue near-term County programs to improve sidewalks and bicycle facilities, prioritizing immediate small-scale connections to improve safety and access. Phase construction of continuous sidewalks and multiuse paths along Route 1 in step with transit and roadway projects.

Supporting Street Grid – Expand the local street network to provide better connections to local destinations. Route 1 traffic congestion is the combination of local and through travel. A more connected system of walkable streets provides alternatives for local trips and supports access to transit stations.

Right-of-Way Preservation – Establish the future right-of-way limits for the proposed Route 1 multimodal needs. As land values continue to rise in this area, protective buying will secure the corridor for future investment and create a specific framework for private development and redevelopment activity.

Roadway Widening – Advance roadway widening projects to achieve the vision for a consistent six-lane vehicular cross-section, providing three travel lanes in each direction. Coordinate with transit, bicycle, and pedestrian facility improvements.

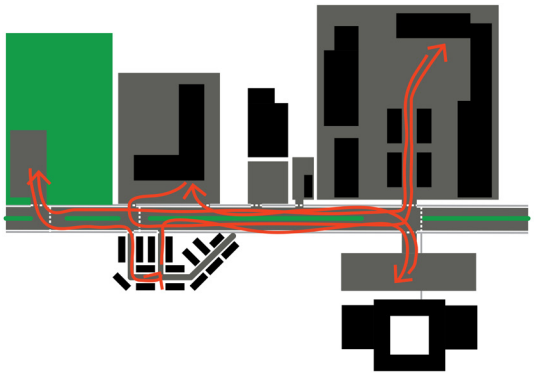
PROJECT FUNDING ACTIONS

An initial funding analysis shows that implementation of the recommended transportation projects will require funding from a range of sources.

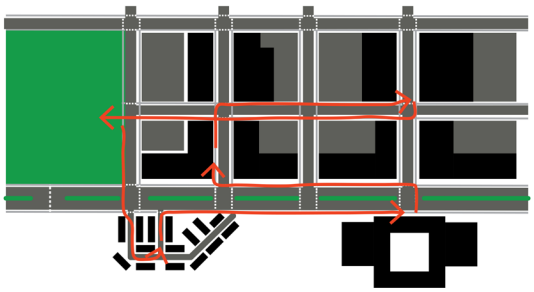
For typical County-sponsored transportation improvements, funds from local, regional, state, and federal sources are combined, incorporated into the County Capital Improvement Programs, and applied to the projects. The Route 1 corridor improvements are also expected to rely on regional funding through the Northern Virginia Transportation Authority (NVTA), state funding through DRPT and VDOT, and federal funding through the FTA Capital Investment (New Starts/Small Starts) program, the National Highway Performance Program, and other Federal sources.

Next steps are to identify funding for the environmental documentation and conceptual engineering phase of the project, and during that phase, to continue refining the assumed sources and amounts of capital and operating funding.

Conventional Development



Grid Pattern, Mixed-Use Development



NEXT STEPS

The timeline below illustrates a framework of implementation steps for the near-term BRT project, the long-term Metrorail extension, and the roadway and bicycle/pedestrian improvements. The immediate next phases of project development are accompanied by the recommended market absorption study and Comprehensive Plan updates.

The recommendations of this study recognize that many related corridor improvements are already underway. Roadway widening, a robust program of pedestrian and bicycle improvements, intersection upgrades, and transit service refinements are examples of the ongoing improvements being carried out by County and State agencies.

The next steps towards project implementation include:

- Forward study recommendations to local governments for endorsement and implementation
- Begin to incorporate recommendations in local, regional, and state plans
- Coordinate environmental documentation "Class of Action" with responsible federal agencies: FTA and FHWA
- Initiate environmental documentation for Phases I and II (Huntington to Fort Belvoir)
- Conduct corridor-wide market absorption study
- Initiate Comprehensive Plan updates
- Conduct a right-of-way survey to define potential impacts and create structure for public corridor preservation and private parcel consolidation

Implementation Timeline