Appendix B

Alternatives Development

Introduction and Context

Development of alternatives was an iterative and collaborative process that built on recommendations identified in previous plans, takeaways from the existing conditions analysis, and feedback received from the TAC and community stakeholders.

The 2013 Countywide Transit Corridors Functional Master Plan (BRT Master Plan) provided broad guidance on corridor elements such as potential types of BRT treatments, the potential for additional right-of-way (ROW) width, the need for exclusive transit lanes, as well as the ability to add transit lanes to the existing ROW.

Initial list of BRT concepts that encompass all reasonable approaches for implementing Flash BRT service along New Hampshire Avenue were developed following the initial round of public engagement. These concepts ranged in scope from minor improvements, such as Transit Signal Priority (TSP) and Queue Jumps (QJ), to significant improvements such as adding new lanes in each direction. The initial list of concepts was screened to identify which elements should be developed into end-to-end alternatives for further analysis. End-to-end design alternatives define specific BRT treatments from the shortlisted concepts for each of the five corridor segments, spanning the entire study corridor from Eastern Avenue to Randolph Road.

This appendix summarizes the approach for identifying and shortlisting BRT concepts, as well as the end-to-end alternatives that were developed for alternatives analysis by applying shortlisted BRT concepts to various study corridor segments.

The study corridor was divided into five segments based on characteristics including travel demand, land use, and transit frequency:

- **Segment 1:** Eastern Avenue to University Boulevard
- **Segment 2:** University Boulevard to Piney Branch Road
- **Segment 3:** Piney Branch Road to Powder Mill Road
- **Segment 4:** Powder Mill Road to Lockwood Drive
- **Segment 5:** Lockwood Drive to Randolph Road

Concept Identification

A wide variety of potential BRT concepts were identified that could be appropriate for various portions of the New Hampshire Avenue study corridor. As the New Hampshire Avenue corridor is already developed on either side and has a constrained ROW, concepts focused on approaches that integrate BRT into existing roadway. The following documents, feedback, and guidance were reviewed in the development of these concepts:

- The Countywide Transit Corridors Functional Master Plan (BRT Master Plan) as well as previous County BRT projects
- Relevant local plans, studies, and initiatives
- Program and project goals and objectives
- Input from County staff
- Input from Technical Advisory Committees (TAC) members, including the Washington Metropolitan Area Transit Authority (WMATA), the District Department of Transportation (DDOT), the City of Takoma Park, the US Food and Drug Administration (FDA), the Maryland- National Capital Park and Planning Commission (M-NCPPC) - Montgomery County Planning Department, Maryland State Highway Administration (SHA), and Prince George's County staff.
- Input from the community, including through pop-up events, public meetings, social media, newsletters, website postings, and the Corridor Advisory Committee (CAC), which includes local bus rides, business owners, residents, and workers.
- National best practices from planned or implemented projects as well as best practices noted in various reference documents. Specifically, the approaches taken for other Montgomery County BRT projects, 16th Street Transitway for DDOT, Metroway in Northern Virginia, the DDOT Bus Pus Priority Toolbox, TCRP Report 183: A Guidebook on Transit-Supportive Roadway Strategies, and TCRP Synthesis 83: Bus and Rail Transit Preferential Treatments in Mixed Traffic.

Four broad types of BRT concepts were considered for the study corridor. The four types of concepts include: optimizing transit operations in mixed traffic, repurposing vehicle travel lanes to transit lanes, adding a single transit lane, and adding two transits lanes. Each of the four types of concepts can be implemented in a variety of ways. The various concept types are listed below:

1. **Optimize Transit in Mixed Traffic**
    a. Transportation System Management with TSP
    b. Transportation System Management with queue jumps, bus pullouts, and TSP
2. **Repurpose Lanes**
    a. Repurpose curbside running lanes for Flash and local buses
    b. Repurpose curbside running lanes for Flash and local buses with bus pullouts
    c. Repurpose median running lanes for Flash only

d. Repurpose median running lanes for Flash only with curbside bus pullouts
e. Repurpose median running lanes for Flash and local buses

3. Add One Flash Only Lane

a. Add one Flash only lane, center peak period lane Flash, curb off-peak
b. Add one Flash only lane, center loading Flash, peak direction transit lane use
c. Add one Flash only lane, center loading Flash, shared bi-directional transit lane use

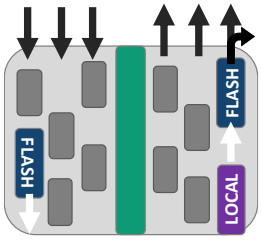
4. Add Two Lanes

a. Widen the road to add two new lanes

There are other potential BRT concepts that could be developed. However, other non-identified concepts are unlikely to improve transit operations, require large infrastructure investment, or would significantly impact adjacent properties. For instance, BRT in a separate but parallel guideway is not being considered as it is likely to be impactful on property and cost prohibitive.

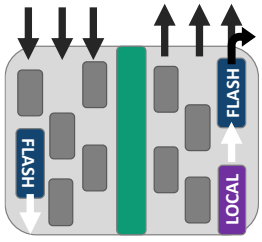
Each potentially feasible concept is described in detail below. For each concept, a brief overview of the concept is provided along with a simple graphic illustration of some of the major concept attributes. In addition, the benefits and challenges are noted.

Concept 1: Mixed Traffic with Transportation System Management



Concept 1A: Transportation System Management with TSP

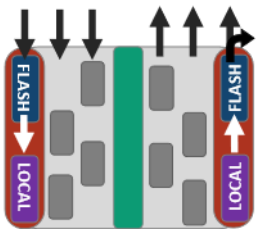
All buses share the travel lanes with all other motor vehicle traffic, priority is given to Flash buses.



Concept 1B: Transportation System Management with QJs, Bus Pullouts, and TSP

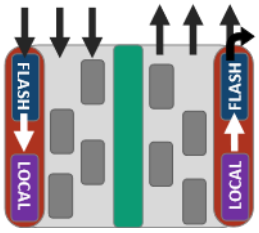
All buses share the travel lanes with all other motor vehicle traffic, but priority is given to Flash buses. QJs allow all buses to jump ahead of vehicular traffic at signals. Bus pullouts are paired with QJs to prioritize Flash buses. Additional ROW or space in the service roads is needed to accommodate bus pullouts.

Concept 2: Repurpose Existing Travel Lanes into Dedicated Bus Lanes



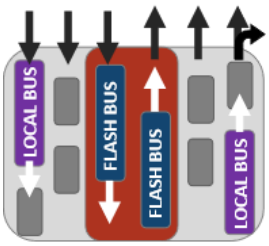
Concept 2A: Repurpose Curbside Running Lanes for Flash and Local Buses

Flash buses, local buses, and right-turning vehicles share the exclusive curbside bus lanes and stops. Local buses stop in exclusive lanes in the path of Flash buses, which may negatively affect Flash service. Only limited roadway widening would be required.



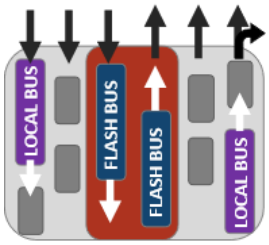
Concept 2B: Repurpose Curbside Running Lanes for Flash and Local Buses with Bus Pullouts

Flash buses and local buses share the bus lanes and stops. Local buses use bus pullouts where Flash does not stop. Right-turning motor vehicles use exclusive lanes. Additional ROW or space in the service roads is needed to accommodate bus pullouts.



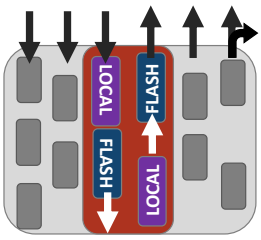
Concept 2C: Repurpose Median Running Lanes for Flash Only

Flash buses use two exclusive median bus lanes while local buses use general travel lanes. Flash and local stops are not shared. Left-turning movements must be controlled. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations.



Concept 2D: Repurpose Median Running Lanes for Flash Only with Curbside Bus Pullouts and QJs

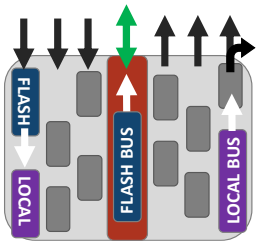
Flash buses use two exclusive median bus lanes while local buses use travel lanes with bus pullouts and QJs. Flash and local stops are not shared. Left-turning movements must be controlled. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations as well as the bus pullouts.



Concept 2E: Repurpose Median Running Lanes for Flash and Local Buses

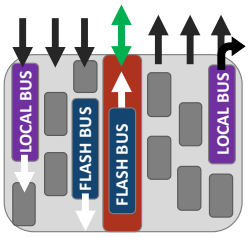
Flash buses and local buses share exclusive median bus lanes. Flash and local stops are shared. Left-turning movements must be controlled. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations.

Concept 3: Widen Roadway to Add One Dedicated Bus Lane



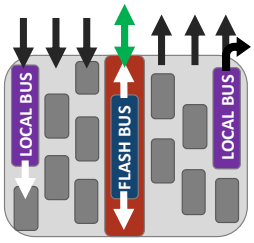
Concept 3A: Add One Flash-Only Lane, Center Peak-Period Lane Flash, Curb Off-Peak

Peak-direction Flash service uses exclusive center bus lane while off-peak Flash service uses general traffic lanes. Center-platform Flash use for peak-direction travel requires off-peak Flash service loading on the curbside. Left-turning movements must be controlled. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations.



Concept 3B: Add One Flash-Only Lane, Center-Loading Flash, Peak-Direction Transit Lane Use

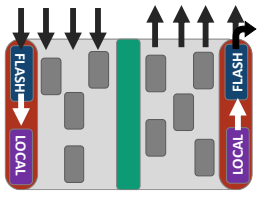
Peak-direction Flash service uses exclusive center bus lane while off-peak Flash service uses general traffic lanes. Both peak and off-peak Flash service load at center platforms. Left-turning movements must be controlled. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations.



Concept 3C: Add One Flash-Only Lane, Center-Loading Flash, Shared Bi-Direction Transit Lane Use

Flash buses traveling in both directions use the center bus lane by alternating between opposite-direction travel and waiting for the other direction to clear as needed. Passing segments could be included. Service is all day long and not oriented to a peak period. Flash service always loads at center platform. Left-turning movements must be controlled. This is similar to EmX service in Eugene, OR. Additional ROW or space in the service roads is needed along much of the corridor to accommodate left-turn pockets and stations as well as passing locations.

Concept 4: Widen Roadway to Add Two Dedicated Bus Lanes



Concept 4A: Widen the Road to Add Two New Lanes

The roadway is widened to accommodate two additional travel lanes. These lanes could be in the median or on the curbside. Flash buses and local buses would share the new exclusive bus lanes if they are on the curbside but would likely not share them if they are in the median.

Additional ROW or space in the service roads is needed along the entirety of the corridor to accommodate the wider roadway.

Initial Screening

Each concept was subjected to a high-level screening to determine which concepts might be viable. Concepts were grouped into four categories based on feasibility:

- Potentially feasible
- Fatally flawed
- Unlikely to generate operational gains
- Inconsistent with the BRT Master Plan

Fatally flawed concepts were defined as those which resulted in one or more of the following conditions:

- Major property impacts on large number of properties, especially in equity areas
- Significantly affected existing local bus service
- Major operational challenges affecting service reliability
- Complicated roadway design elements, challenging for riders to navigate
  Potential for major traffic operations impacts

Concepts were screened by segment. Corridor segments were identified by considering where the corridor has similar character related to a variety of characteristics such as travel demand, land use, and transit frequency.

Each concept was screened in each of the segments to determine if the concept is potentially feasible, fatally flawed, unlikely to generate operational gains, or is inconsistent with the BRT Master Plan. After a thorough review, the following concepts were not advanced in the specific segments noted and were removed from consideration:

Concept: 2. Repurpose Lanes, Eliminate from Piney Branch Road to Powder Mill Road

Vehicle travel volumes and delay near the Beltway, specifically between Piney Branch Road and the Beltway, are very high. Repurposing lanes by shifting general purpose travel lanes to exclusive transit lanes would increase vehicle delays throughout this area. This concept would increase delay that would likely lead to vehicle queues backing up to the ramps and through lanes of the Beltway. This creates a major safety concern on the freeway where fast moving vehicles encounter stopped vehicles. As such, reducing general purpose travel lanes by repurposing them for transit only use between Piney Branch Road and Powder Mill Road is not feasible and this concept was not advanced in this portion of the corridor. However, this concept is viable south of this portion of the corridor.

Concept: 2. Repurpose Lanes, Eliminate from North of Powder Mill Road

While it is physically feasible to repurpose lanes north of Powder Mill Road, this concept is not likely to add value as compared to the costs that would be incurred. Buses are already moving at free flow speeds through this section of the corridor. Repurposing lanes is not anticipated to improve transit service as compared to optimizing transit in mixed traffic. Thus, this group of concepts were not advanced north of Powder Mill Road.

Concept: 3a. Add One Flash Only Lane, Center Peak Period Flash, Curb Off-Peak, Eliminate for Full Corridor

Flash concepts that use a center platform for part of the day and not for other parts of the day are difficult to navigate and confusing for riders. It requires riders to interpret a complex bus schedule to understand which bus they need to board and the stop location of their bus depending on the time of day. This approach could leave riders unknowingly waiting at the center platform for a bus that is not scheduled to arrive at that location. This puts a significant burden on the rider and adds unnecessary complexity to the bus system. Therefore, this concept was not advanced.

Concept: 3b. Add One Flash Only Lane, Center Loading Flash, Peak Direction Transit Lane Use, Eliminate South of Piney Branch Road

Adding one Flash only lane south of Piney Branch Road is not consistent with the Countywide Transit Corridors Functional Master Plan, which indicates that additional transit lanes should not be added for this segment.

Concept: 3b. Add One Flash Only Lane, Center Loading Flash, Peak Direction Transit Lane Use, Eliminate North of Lockwood Drive

While it might be physically feasible to add one Flash only lane north of Lockwood Drive, this concept is not likely to add value as compared to the costs that would be incurred. Buses are already moving at free flow speeds through this section of the corridor. This concept would also not be consistent with the BRT Master Plan, which specifies not adding a new transit lane north of Lockwood Drive and not have dedicated transit lanes north of Lockwood Drive.

Concept: 3c. Add One Flash Only Lane, Center Loading Flash, Shared Bi-Directional Transit Lane Use, Eliminate for Full Corridor

The shared center runningway concept where Flash operates in both directions sharing the same single lane runningway does not provide the operational flexibility needed for this system. Unlike the system in Eugene, Oregon, the New Hampshire Avenue corridor has long distances between stops and is anticipated to operate with relatively high frequency. It is not anticipated that there will be a readily available technology that will allow for safe and efficient operations in the New Hampshire Avenue context. Implementation of this approach at this time

with current technology would likely lead to poor transit operations and the need to add multiple passing locations that would create a complex operating scenario and generate property impacts that are generally avoided with a narrower runningway. Therefore, this concept was not advanced for the whole corridor. However, this concept can be viable in short segments and was considered as part of the end-to-end- alternatives for selected segments.

Concept: 4. Add Two Lanes, Eliminate for Full Corridor

Concepts that add two new lanes to the New Hampshire Avenue corridor would necessitate a major widening of the facility that would require at least 150' of cross section width and likely would require 170' or more of cross section width. While this concept would maintain existing motor vehicle operations, it results in significant property impacts, requiring more than 15 acres of land, an estimated 53 buildings, and portions of 289 properties if the ROW is 150' and nearly 25 acres of land, an estimated 95 buildings, and portions of 360 properties if the ROW is 170'. Much of the property impacts would be in equity communities or in Prince George's County. Montgomery County DOT does not have authority to acquire or take land in Prince George's County and would need to identify an approach to acquiring the land needed for this concept. In addition, this approach would require the repurposing of most if not all service roads in the corridor. As such, access from every single-family home would be affected and would likely have to pull out directly onto New Hampshire Avenue. In addition, on-street parking would almost certainly be removed. Given the significant impacts to properties related to access and ROW needs, especially in equity areas, this concept was not advanced.

Shortlisted Concepts

Based on initial screening results and input from the TAC, CAC, and the public, the following four concept types were short-listed to be combined by corridor segment into end-to-end design alternatives. These concepts were selected because they offered feasible, scalable ways to improve transit speed and reliability while minimizing property, traffic, and cost effects. Each aligns with the County's BRT Master Plan in terms of number of lanes required, and provides a balance between operational benefit, constructability, and consistency with existing corridor constraints.

Optimize Transit in Mixed Traffic

Flash BRT and local buses share travel lanes with other vehicles, but Flash buses use TSP, QJs, and bus pullouts to reduce delays. QJs enable buses to jump ahead of other vehicles at traffic signals, while bus pullouts mitigate conflicts between Flash and local buses, further reducing delays. This concept can serve as the TSM alternative required by FTA to be analyzed as part of the alternatives analysis.

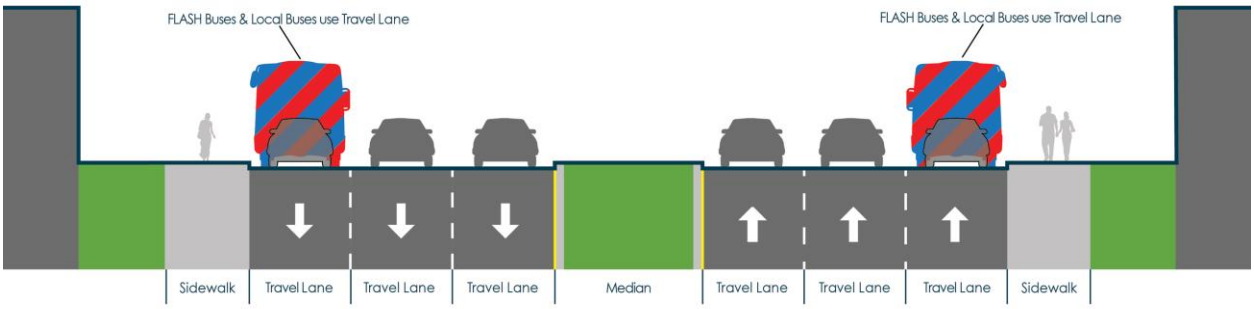


Figure 1: Mixed Traffic

Repurpose Existing General-Purpose Travel Lanes to Curbside Bus-Only Lanes

Existing general-purpose travel lanes are repurposed to curbside Bus-Only lanes that can be used by both Flash and local buses, with buses sharing a dedicated lane at intersections with only right-turning vehicles. This concept can also be paired with bus pullouts at local bus stops to reduce BRT service delays when local buses stop in the path of BRT buses. This concept offers a cost-effective and constructible way to provide dedicated space for transit without roadway widening. It has the potential to improve bus travel times and reliability and aligns with the BRT Master Plan's guidance.

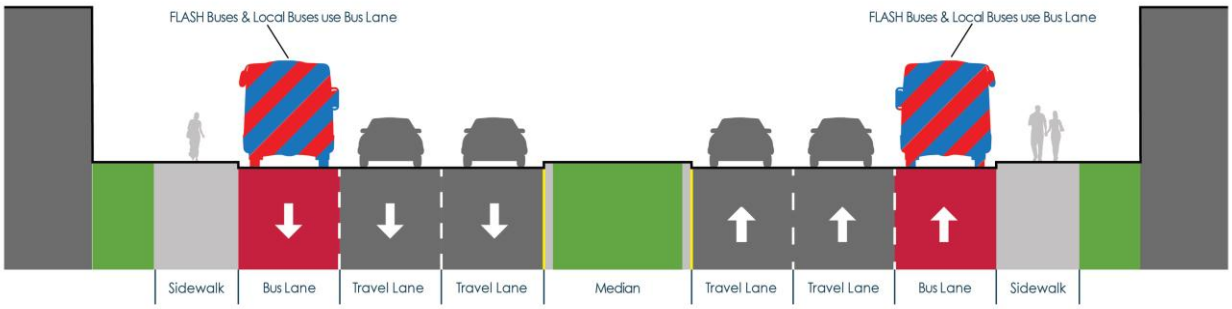


Figure 2: Curbside Bus-Only Lanes

Add One Bus-Only Lane

A single center-running Bus-Only lane with median boarding islands for Flash buses. The median lane is managed for peak-direction travel. Center-median bus-boarding islands, adjacent to the median lane, require control of left-turning vehicle movements.

This concept enhances BRT performance in the most congested segment while maintaining general traffic capacity. It provides dedicated space for peak-direction Flash operations, aligns with the BRT Master Plan's intent for dedicated lanes, and represents a balanced approach between operational improvement and corridor feasibility.

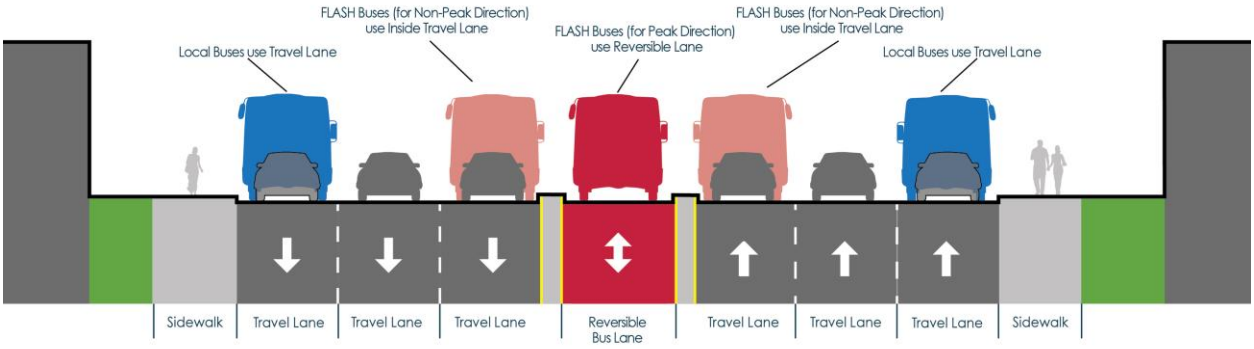


Figure 3: Single Median Bus-Only Lane

Repurpose Existing General-Purpose Travel Lanes to Two Median Bus-Only Lanes

Two fully dedicated center-running lanes exclusively for Flash buses, requiring some roadway reconstruction. Local buses may continue to use general-purpose curbside lanes for travel. Local bus performance may be negatively affected because these buses would operate in mixed traffic and repurposing two travel lanes would reduce vehicle capacity. This concept provides the highest level of transit priority and reliability by fully separating BRT service from general traffic. This configuration aligns with the BRT Master Plan's vision for dedicated median-running lanes, offers faster and more consistent bus operations, and supports long-term corridor capacity and service quality goals.

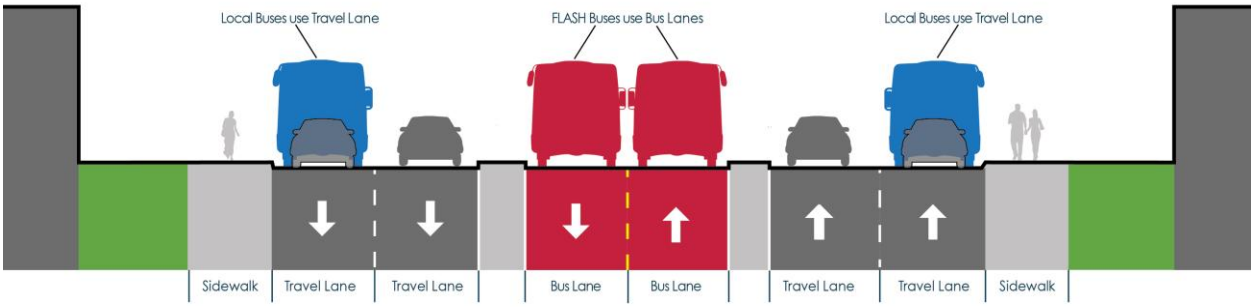
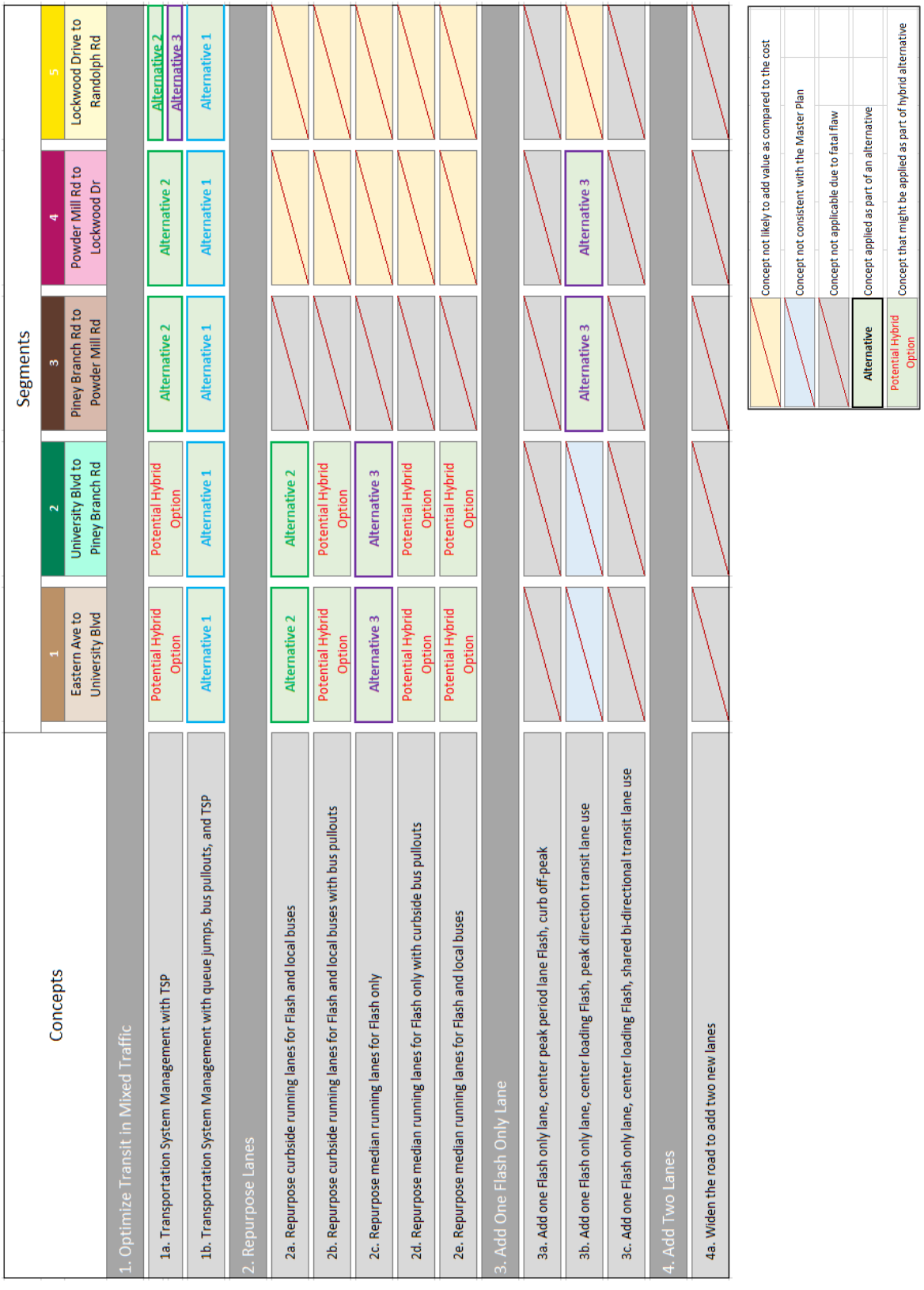


Figure 4: Two Median Bus-Only Lanes

Figure 5 shows a matrix that identifies shortlisted concepts by segments that led to the end-to end-alternatives. For each alternative, the concept utilized in each corridor segment is noted.

Figure 5: Two Median Bus-Only Lanes



End-to-End Alternatives

The end-to-end build alternatives were created by combining the shortlisted concepts across different corridor segments. End-to-end design alternatives define specific BRT treatments for each of the five corridor segments, spanning the entire study corridor from Eastern Avenue to Randolph Road. Each alternative tested specific BRT concepts broadly applied through the corridor in the segments where they were most relevant. Developing complete corridor alternatives as test cases enabled consistent comparison of results for travel times, ridership, costs, and ROW impacts.

The alternatives analysis included a review of the 'No-Build' alternative described below apart from the end-to-end build alternatives:

- **No-Build Alternative –** Maintains existing conditions along the study corridor including all existing bus service in mixed traffic conditions. No Flash BRT or any other transportation infrastructure improvements are considered as part of the 'No-Build' alternative.

Initially, the following three end-to-end build alternatives were developed:

- **Alternative 1: Mixed Traffic with Queue Jumps -** Mixed traffic with TSP or QJs throughout the corridor. This is the TSM alternative required by FTA to be included in the alternatives analysis. The TSM alternative serves as a low-cost baseline to compare with other alternatives that would require major infrastructure changes.
- **Alternative 2: Curbside Lanes –** Repurpose existing general purpose travel lanes to curbside Bus-Only lanes south of Piney Branch Road. Mixed traffic with TSP and without QJs north of Piney Branch Road.
- **Alternative 3: Median Lanes -** Repurpose existing general purpose travel lanes to two median Bus-Only lanes south of Piney Branch Road. Add a single reversible-median Bus-Only lane from Piney Branch Road to Lockwood Drive. Mixed traffic with TSP and without QJs north of Lockwood Drive.

Before conducting a detailed analysis, the three initial end-to-end corridor alternatives were presented to the TAC and CAC. Based on their feedback, a fourth alternative was introduced.

- **Alternative 4: Additional Median Lanes –** Repurpose existing general purpose travel lanes to two median Bus-Only lanes south of Piney Branch Road and between Powder Mill Road and Lockwood Drive. Add a single reversible-median Bus-Only lane from Piney Branch Road to Powder Mill Road. Mixed traffic with TSP and without QJs north of Lockwood Drive.

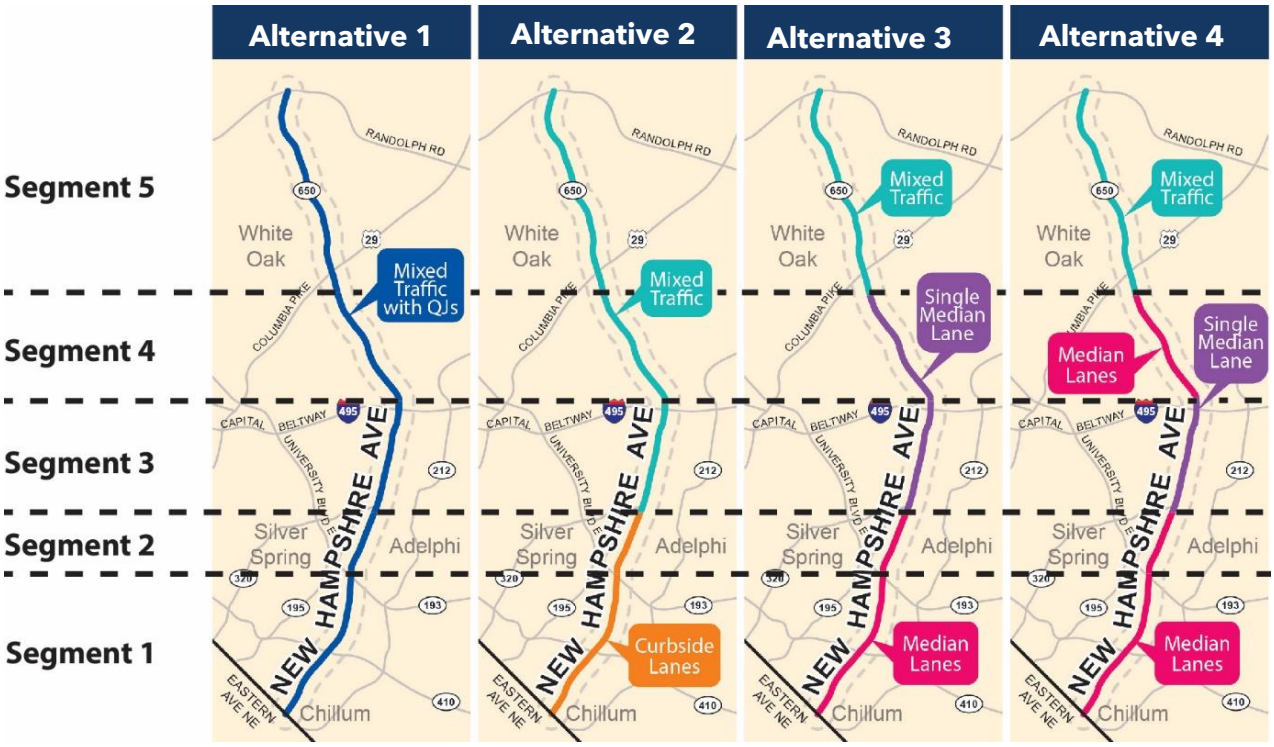


Figure 6: New Hampshire Avenue BRT Initial Alternatives

The alternatives incorporated BRT infrastructure and improvements including:

- **Bus Lanes:** A traffic lane on a surface street reserved for exclusive bus use. Bus lanes can be located either at the curb or in the median.
- **TSP:** Passive TSP re-times signals to align with average bus speeds. Active TSP detects the presence and status of a vehicle and adjusts the signal cycle in line with corridor priorities, including lengthening or shortening a signal cycle to reduce the frequency and duration of buses stopping at red lights.
- **QJs:** A short stretch of bus lane combined with TSP. Queue jumps allow buses to bypass general traffic in a dedicated lane and cut ahead of the queue with an early green signal.
- **Local Bus Stop Relocation:** In alternatives where BRT service operates in mixed traffic or in curbside lanes, local bus stops near BRT stations will be relocated nearby, if needed, to improve transit travel time, access, wayfinding, and transfers between services.

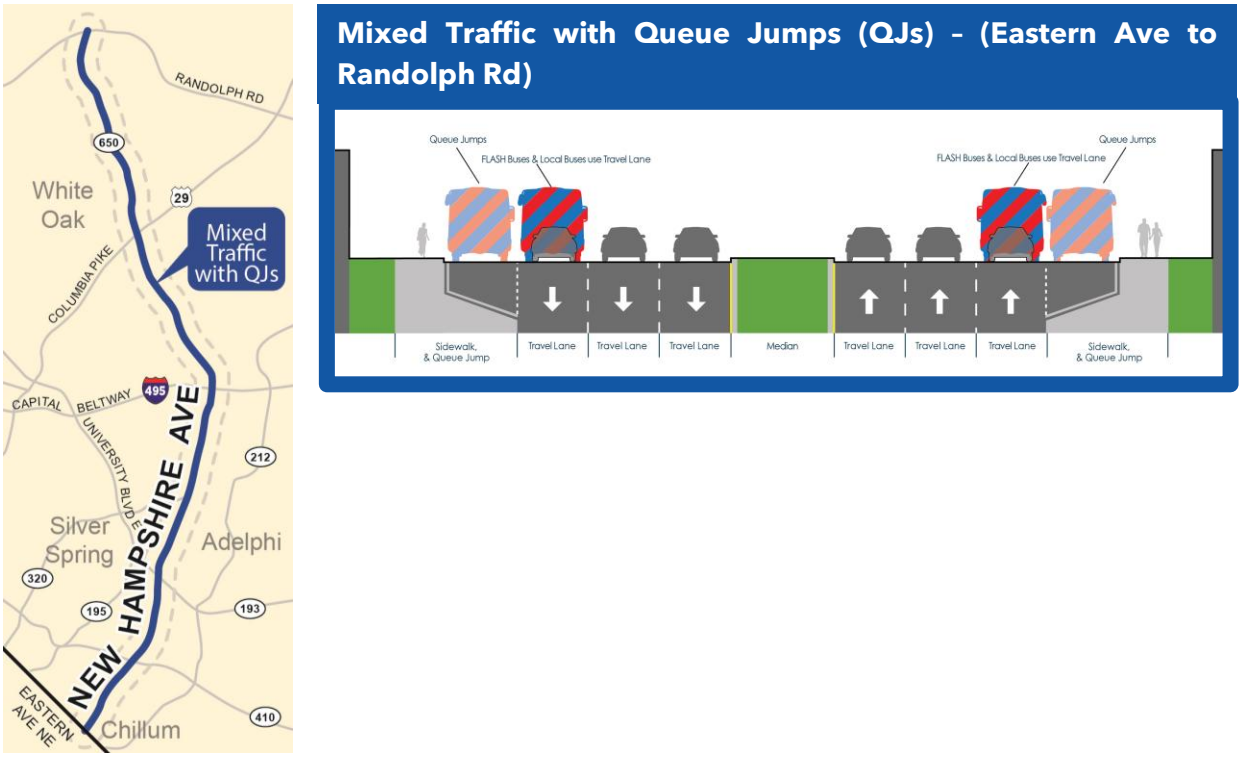
Alternative 1 – Mixed Traffic with Queue Jumps

In Alternative 1, buses operate in mixed traffic but benefit from QJs and TSP at key intersections. QJs are paired with bus pullouts so local buses can stop without blocking Flash buses, improving overall efficiency. These treatments extend along the entire corridor from Eastern Avenue (Maryland–Washington D.C. line) to Randolph Road. QJs are included only in this alternative to evaluate their effectiveness in mixed traffic, compared to segments in other alternatives without QJs.

This is the Transportation Systems Management (TSM) alternative the Federal Transit Administration (FTA) requires in the alternatives analysis. TSM represents a minimum set of improvements that could enhance the performance, safety, and reliability of existing transportation systems without major new construction. The TSM alternative serves as a low-cost baseline to compare with other alternatives that would require major infrastructure changes.

Along New Hampshire Avenue, except at the Fort Totten Transit Center and at the White Oak Transit Center, each proposed station location will have a separate northbound station platform along the east side curb of the road and a southbound station platform along the west side curb of the road. Flash BRT stops and bus bay locations will differ at different transit centers.

Figure 7: Alternative 1 – Mixed Traffic with Queue Jumps



Alternative 2 – Curbside Lanes

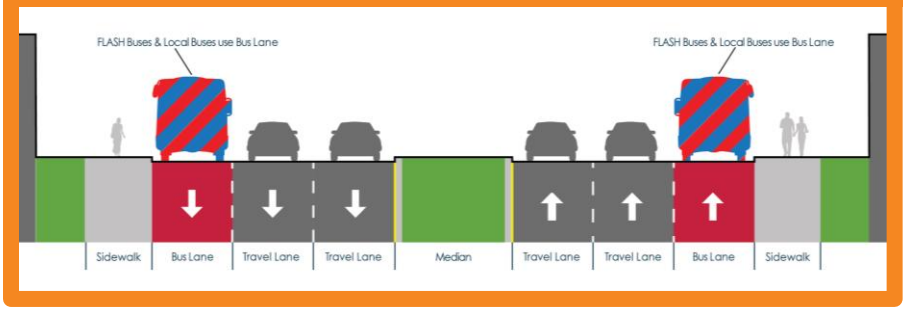
In this alternative, existing curbside general-purpose lanes are converted to curbside bus lanes between Eastern Avenue and Piney Branch Road. Right-turning vehicles are allowed to use these lanes at intersections and driveways. North of Piney Branch Road to Randolph Road, all buses continue to operate in mixed traffic without queue jumps. Some local-only stops near BRT stations are relocated. Because no pullouts are provided for local buses, Flash buses may occasionally be delayed behind local buses.

Curbside bus lanes are focused south of Piney Branch Road to improve Flash BRT speed and reliability in the corridor's slowest segment for buses. North of Piney Branch Road, buses remain in mixed traffic due to high traffic volumes near I-495 that make lane repurposing impractical and lower traffic volumes with higher bus speeds farther north. This configuration also aligns with the BRT Master Plan recommendation.

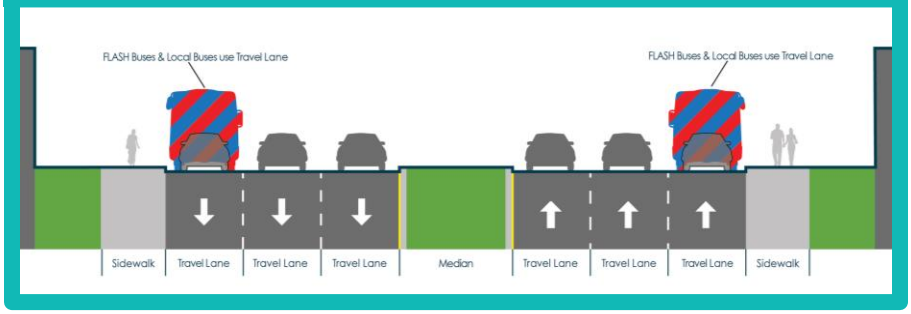
Along New Hampshire Avenue, except at the Fort Totten Transit Center and at the White Oak Transit Center, each proposed station location will have a separate northbound station platform along the east side curb of the road and a southbound station platform along the west side curb of the road. Flash BRT stops and bus bay locations will differ at different transit centers.

Figure 8: Alternative 2 – Curbside Lanes

Curbside Lanes (Eastern Ave to Piney Branch Rd) – Segment 1 & 2



Mixed Traffic (Piney Branch Rd to Randolph Rd) – Segment 3, 4, & 5



Alternative 3 – Median Lanes

Alternative 3 introduces median bus lanes along much of the corridor to prioritize Flash BRT service where transit demand is highest and bus speeds are slower. The length of median lanes in this alternative is consistent with the BRT Master Plan recommendation.

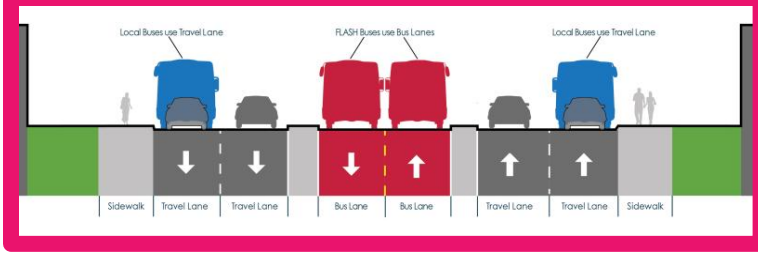
Between Eastern Avenue and Piney Branch Road, two median lanes are repurposed for Flash-only use, while local buses stay in general traffic lanes. Flash and local stops are separate, requiring passengers to walk between them when transferring. Left turns are managed through signal timing and turn restrictions to prevent conflicts. Some additional ROW or repurposed service road space is needed for left-turn pockets and station areas.

Between Piney Branch Road and Lockwood Drive, Flash operates in a single, reversible median bus lane used in the peak direction. This lane is added without removing existing traffic lanes but requires similar left-turn controls and limited additional ROW. Passengers board at different stops for local and Flash services. North of Lockwood Drive, all buses remain in mixed traffic without QJs. This approach reflects lower traffic volumes, faster bus speeds, and consistency with the BRT Master Plan recommendation for the northern corridor segment.

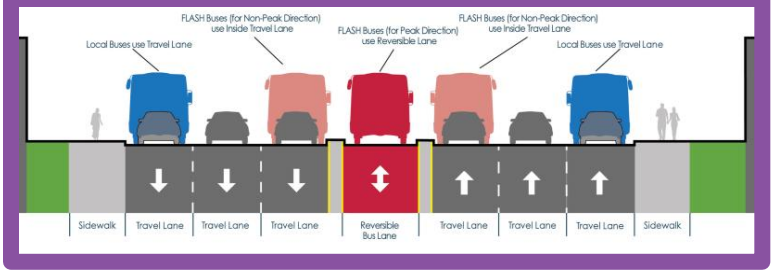
Along New Hampshire Avenue, except at the Fort Totten Transit Center, and at the White Oak Transit Center, each proposed station location will have separate northbound and southbound platforms. For segments with median bus lanes, station platforms will be in the middle of the roadway along the medians. Northbound station platforms will be located on the eastern median, and southbound station platforms will be located on the western median. Segments with a single median lane will include median cuts to allow buses to enter a widened area with two bus lanes at station locations to service the station platforms. Segments with mixed traffic will have separate northbound and southbound station platforms, one along the east curb and one along the west curb. Flash BRT stops and bus bay locations will differ at different transit centers.

Figure 9: Alternative 3 – Median Lanes

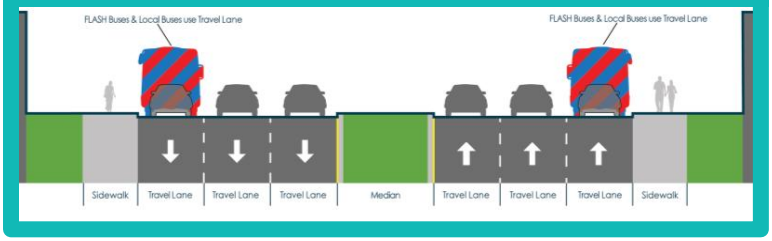
Median Lanes (Eastern Ave to Piney Branch Rd) – Segment 1 & 2



Single Median Lane (Piney Branch Rd to Lockwood Dr) – Segment 3 & 4



Mixed Traffic (Lockwood Dr to Randolph Rd) – Segment 5



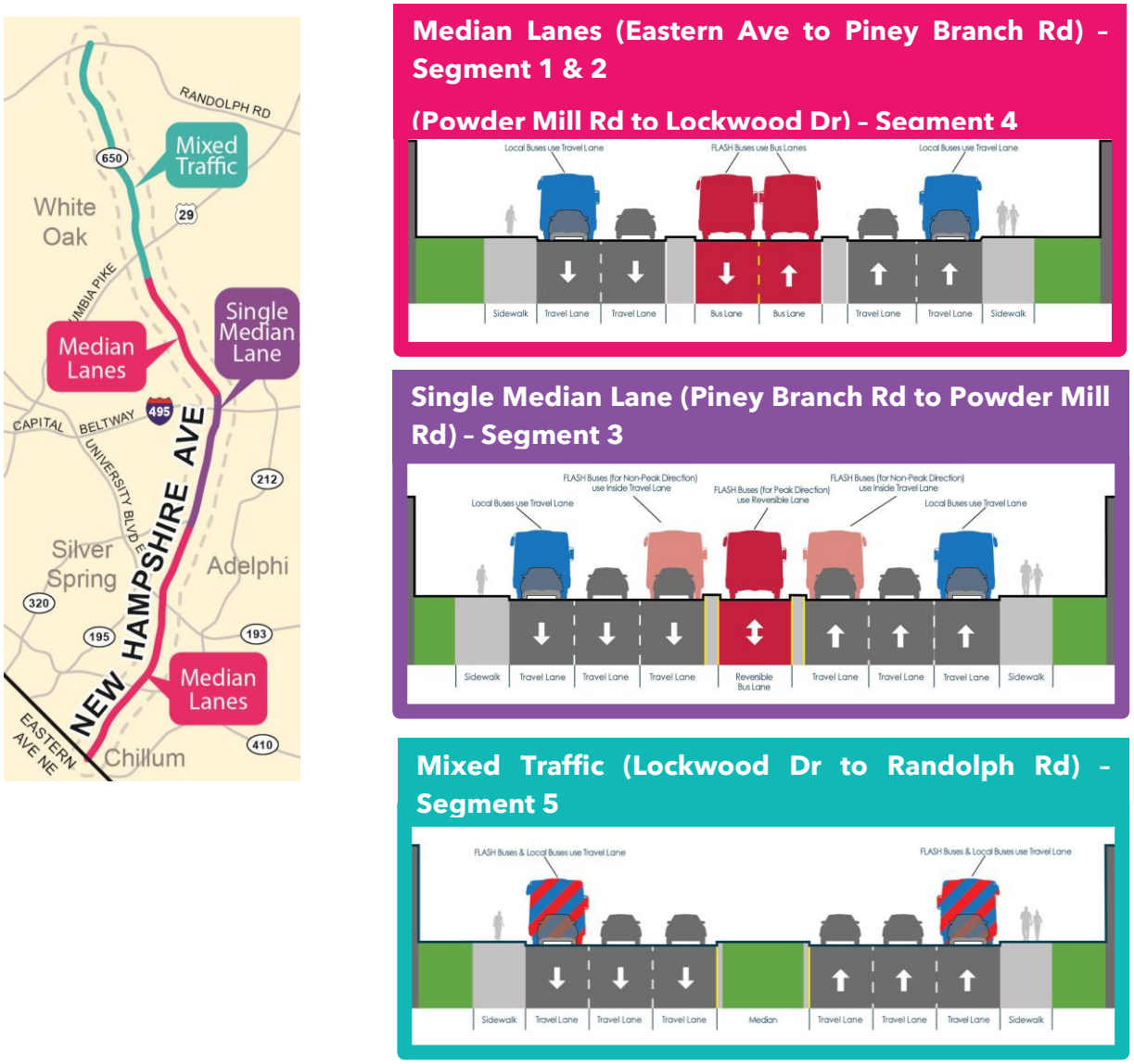
Alternative 4 – Additional Median Lanes

Alternative 4 builds on Alternative 3 and TAC input to test two median bus lanes between Powder Mill Road and Lockwood Drive. It includes dedicated median bus lanes from Eastern Avenue to Piney Branch Road and again from Powder Mill Road to Lockwood Drive. As in Alternative 3, Flash buses use the median lanes, while local buses stay in general traffic lanes. Flash and local stops are separate, and left turns are managed to avoid conflicts.

Between Piney Branch Road and Powder Mill Road, Flash operates in a single reversible median lane—used in the peak direction—while off-peak buses use general traffic lanes. From Lockwood Drive to Randolph Road, all buses operate in mixed traffic, consistent with the BRT Master Plan. North of Lockwood Drive, traffic volumes are lower and bus speeds are relatively high, making dedicated bus lanes unnecessary.

Along New Hampshire Avenue, except at the Fort Totten Transit Center, and at the White Oak Transit Center, each proposed station location will have separate northbound and southbound platforms. For segments with median bus lanes, station platforms will be in the middle of the roadway along the medians. Northbound station platforms will be located on the eastern median, and southbound station platforms will be located on the western median. Segments with a single median lane will include median cuts to allow buses to enter a widened area with two bus lanes at station locations to service the station platforms. Segments with mixed traffic will have separate northbound and southbound station platforms, one along the east curb and one along the west curb. Flash BRT stops and bus bay locations will differ at different transit centers.

Figure 10: Alternative 4 – Additional Median Lanes



Evaluation of Initial Alternatives

The four alternatives were evaluated based on Measures of Effectiveness (MOEs) related to travel time, transit ridership, access to jobs, costs, and right-of-way (ROW) requirements. A detailed analysis was performed using VISSIM microsimulation analysis for traffic operations and travel time, Simplified Trips-on-Project Software (STOPS) modelling was conducted for transit ridership, additional Geographic Information System (GIS) analysis was performed using travel time data to calculate accessibility to jobs, and conceptual designs were produced in Computer-Aided Design (CAD) to assist in calculating costs and ROW requirements. Additional detailed alternatives analysis results based on all MOEs is included in **Appendix J**.

Conclusion and Hybrid Alternative

The initial segment-level evaluation of both qualitative and quantitative criteria concluded that none of the four alternatives performed best across all MOEs or across all segments. Alternative 2 (Curbside Lanes) performed the best among the four alternatives across most MOEs, but other Alternatives outperformed Alternative 2 on certain segments of the corridor.

To optimize performance throughout the corridor, a Hybrid Alternative was developed by combining the best-performing (based on cost, travel times, conflicts with local buses, and traffic and property impacts) elements from the four rigorously tested alternatives. The Hybrid Alternative was created by combining the most effective BRT treatments in different segments. It builds on Alternative 2 (Curbside Lanes) with additional treatments such as QJs in mixed-traffic segments. In addition to combining the best-performing segments, the Hybrid Alternative also includes other spot improvements to further refine it. Following consultation with the TAC and community stakeholders, the Hybrid Alternative was officially added to the project and comprehensively evaluated, alongside the initial four alternatives, across the Primary MOEs.

Development Approach

Figure 11 illustrates the Hybrid Alternative development approach. It adopts the most effective treatments by corridor segment to minimize travel time and maximize cost savings.

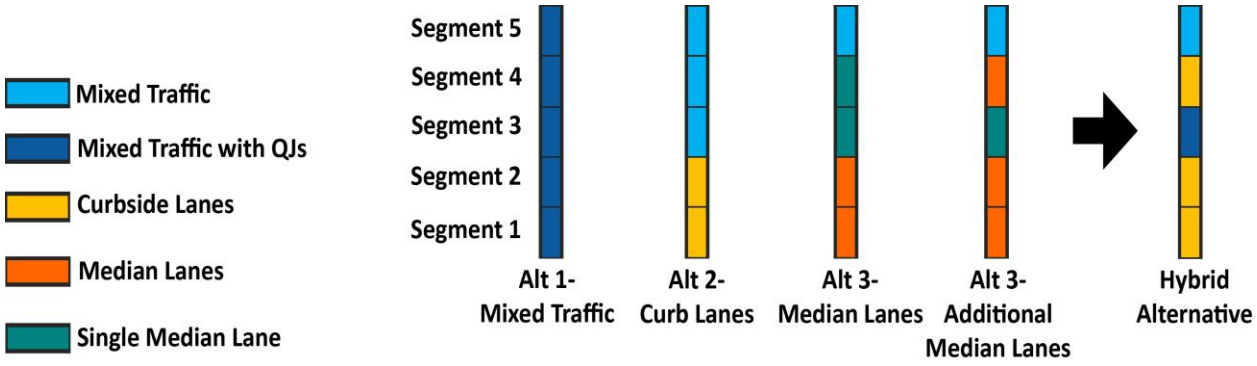


Figure 11: Approach to Develop Hybrid Alternative

BRT Treatments

As shown in **Figure 12**, the Hybrid Alternative includes the following treatments:

- Curbside bus lanes with local bus stop pullouts at certain locations from Eastern Avenue to Piney Branch Road and from Powder Mill Road to Lockwood Drive
- Mixed traffic with QJs from Piney Branch Road to Powder Mill Road
- Mixed traffic without QJs from Lockwood Drive to Randolph Road

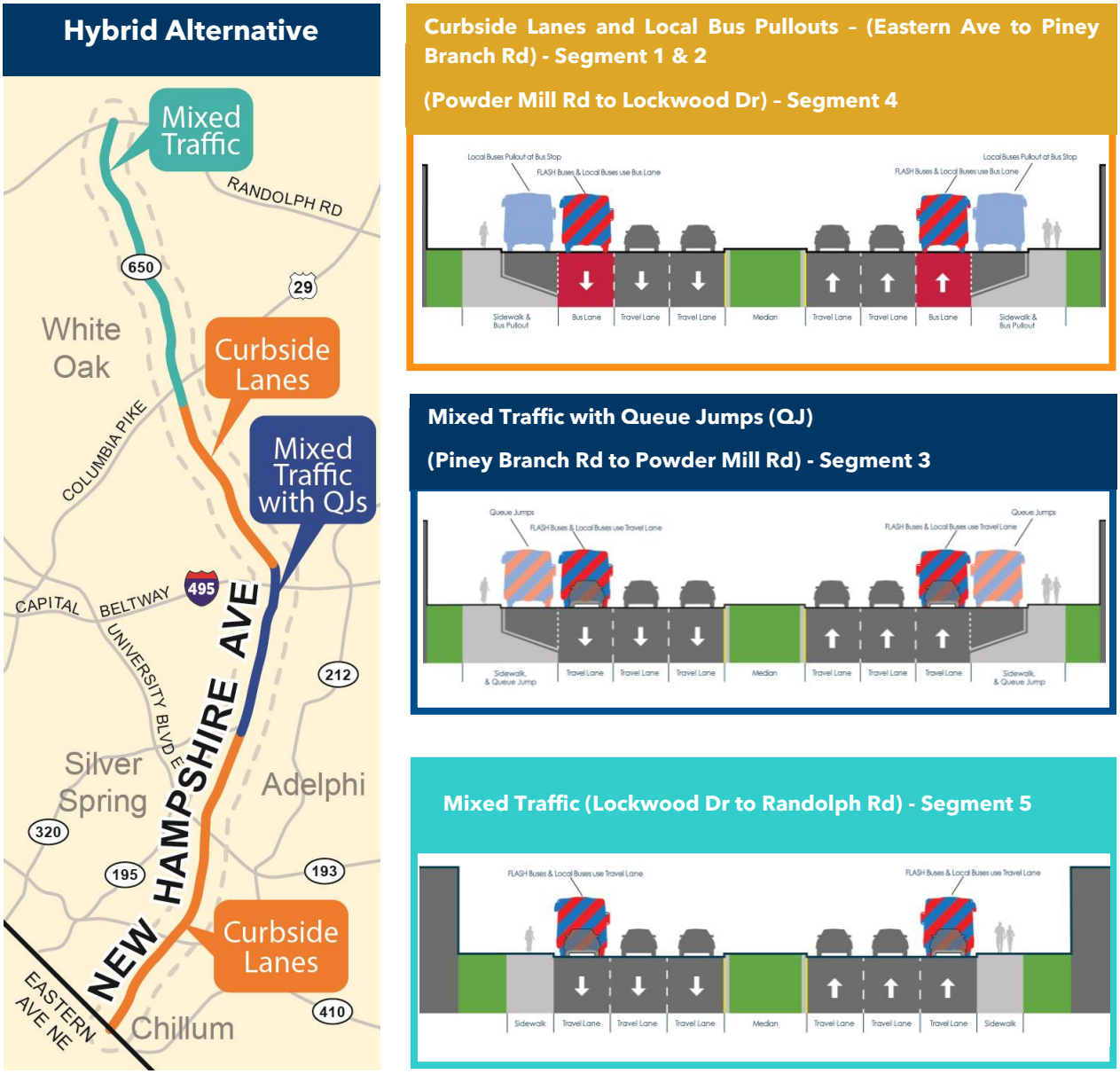


Figure 12: Hybrid Alternative Treatments

Local Bus Stop Pullouts

To mitigate potential effects to Flash buses following frequently stopping local buses, local bus pullouts (**Figure 13)** at certain high-ridership local stops were added as part of the Hybrid Alternative. The 13 (of 55 total) locations were selected based on:

- High potential BRT travel time savings
- High local bus ridership and dwell time
- Favorable geometric and environmental conditions
- Availability of a curbside bus lane for easy re-entry

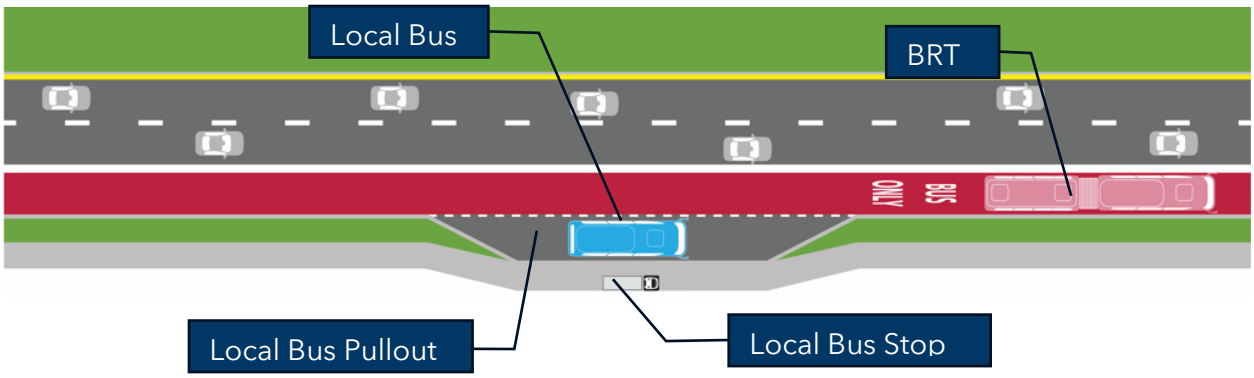


Figure 13: Bus Pullouts Example