



ENVIRONMENTAL ASSESSMENT

Alternatives Development Technical Memorandum

February 2020

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1.0 INTRODUCTION

The Virginia Department of Transportation (VDOT), in coordination with the Federal Highway Administration (FHWA) as the lead federal agency, is evaluating an extension of the Interstate 495 (I-495) Express Lanes along approximately three miles of I-495, also referred to as the Capital Beltway, from their current northern terminus in the vicinity of the Old Dominion Drive overpass to the George Washington Memorial Parkway (GWMP) in the McLean Area of Fairfax County, Virginia. Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, and in accordance with FHWA regulations¹, this Environmental Assessment (EA) is being prepared to analyze the potential social, economic, and environmental effects associated with the improvements being evaluated.

The purpose of this Alternatives Development Technical Memorandum is to provide detailed documentation of the Build Alternative being evaluated in the EA. This includes documentation of specific improvements included in the Build Alternative as well as supporting materials for the ability of the Build Alternative to meet the Purpose and Need of the EA. The findings of this technical memorandum support discussions presented in the EA.

1.1 PROJECT TERMINI

The project includes an extension of the existing Express Lanes from their current northern terminus south of the Old Dominion Drive overpass to the GWMP. Although the GWMP provides a logical northern terminus for this study, additional improvements are anticipated to extend approximately 0.3 miles north of the GWMP to provide a tie-in to the existing road network in the vicinity of the American Legion Memorial Bridge (ALMB). The project also includes access ramp improvements and lane reconfigurations along portions of the Dulles Toll Road and the Dulles International Airport Access Highway, on either side of the Capital Beltway, from the Spring Hill Road Interchange to the Route 123 interchange. The proposed improvements entail new and reconfigured express lanes ramps and general purpose lanes ramps at the Dulles Interchange and Route 123/I-495 interchange ramp connections.

1.2 STUDY AREA

In order to assess and document relevant resources that may be affected by the proposed project, the study area for this EA extends beyond the immediate area of the proposed improvements described above. The study area for the EA includes approximately four miles along I-495 between the Route 123 interchange and the ALMB up to the Maryland state line. The study area also extends approximately 2,500 feet east along the GWMP. Intersecting roadways and interchanges are also included in the study area, as well as adjacent areas within 600 feet of the existing edge of pavement. The study area boundary is a buffer around the road corridor that includes all natural, cultural, and physical resources that must be analyzed in the EA. It does not represent the limits of disturbance (LOD) of the project nor imply right-of-way take or construction impact, but rather extends beyond the project footprint to tie into the surrounding network, including tying into future network improvements. **Figure 1-1** depicts the project termini, study area, and LOD.

¹ NEPA and FHWA's regulations for Environmental Impact and Related Procedures can be found at 42 USC § 4332(c), as amended, and 23 CFR § 771, respectively.

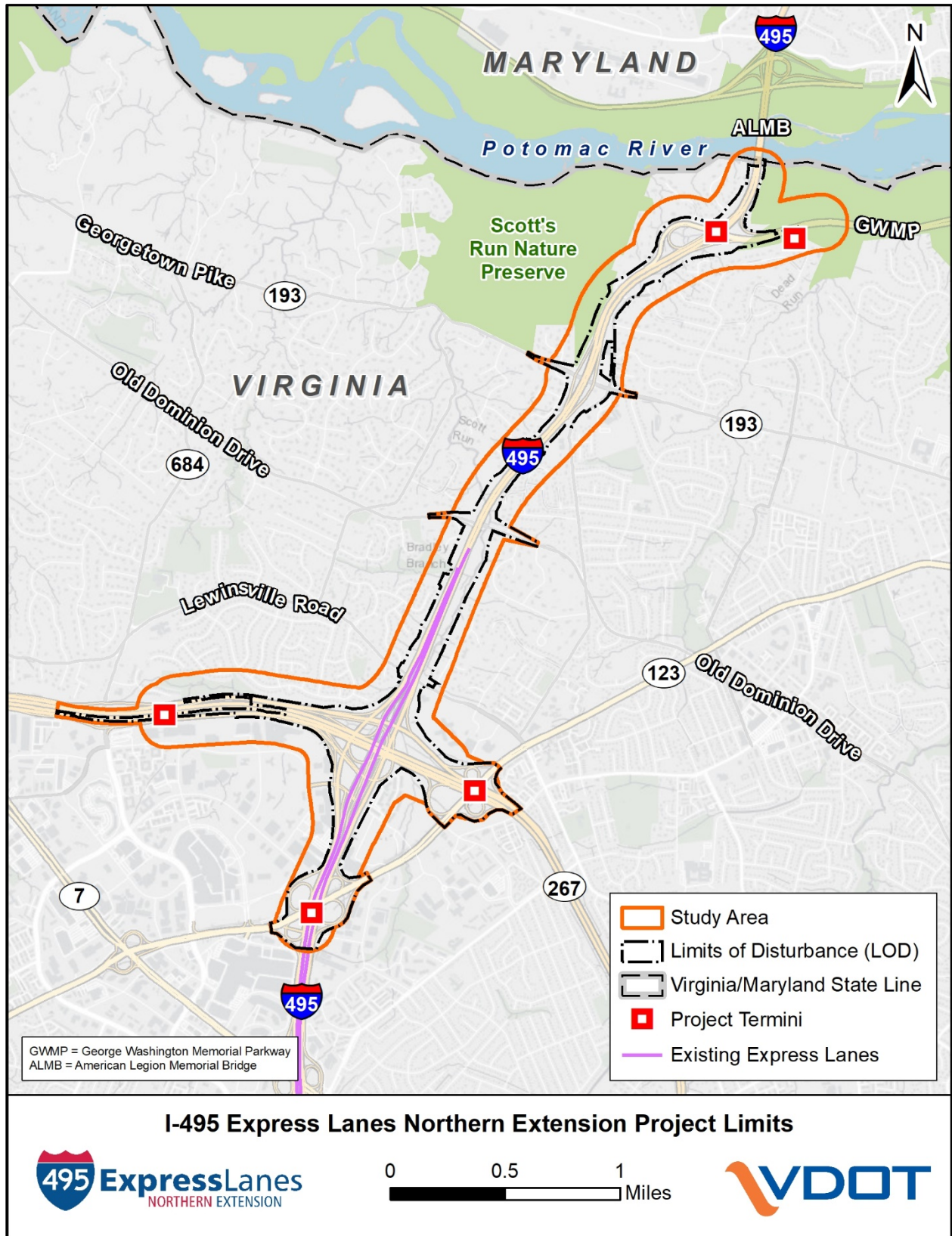


Figure 1-1. I-495 Express Lanes Northern Extension Project Limits

1.3 LIMITS OF DISTURBANCE

Potential impacts to resources have been calculated based on the footprint of the conceptual level design of the Build Alternative, referred to as the limits of disturbance (LOD). The LOD accommodates roadway improvements, drainage, stormwater management facilities, utilities, erosion and sediment control, noise control measures, construction methods, and temporary construction easements.

Impact values presented for the evaluated resources represent the worst-case scenarios and assume complete direct impact to the resource occurring in the LOD. As design progresses, measures may be taken to avoid and minimize impacts to environmental resources to the maximum extent practicable. At the time, it is not possible to anticipate the exact locations of each proposed activity; impacts outside of the existing study area would be reviewed and documented through future NEPA re-evaluations.

1.4 PURPOSE AND NEED

The purpose of the extension of Express Lanes on I-495 between Route 267 and the GWMP is to:

- Reduce congestion;
- Provide additional travel choices; and
- Improve travel reliability.

A detailed description of the purpose and need for the proposed project is in Chapter 1 of the EA.

2.0 ALTERNATIVES

Two alternatives are being considered in the EA: the No Build Alternative² and the Build Alternative, described below.

2.1 ALTERNATIVE DEVELOPMENT

Based on the established Purpose and Need and coordination with local governments, stakeholders, and public, one build alternative was developed and evaluated in detail. This conceptual alternative (the Build Alternative) includes extending the Express Lane system on I-495 north to the ALMB. In addition, there may be design options considered when the project advances beyond the NEPA phase to the more detailed permitting and design phases. The evaluation of one Build Alternative in detail through the NEPA process is consistent with FHWA's Technical Advisory T 6640.8A *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987). A No Build Alternative is also under consideration and is described in Section 2.2.1. The following sections describe the alternatives.

2.2 ALTERNATIVES UNDER CONSIDERATION

2.2.1 No Build Alternative

In accordance with the implementing regulations for NEPA (40 C.F.R. § 1502.14(d)), the No Build Alternative has been retained for detailed study and serves as a benchmark for comparison with the Build Alternative. The No Build Alternative would retain the existing lane configuration through the study area

² According to FHWA guidelines, the consideration of a No Build Alternative is a requirement under NEPA. The Build Alternative must be reasonable and practicable enough to dismiss the No Build Alternative (FHWA, 1990).

and allow for routine maintenance and safety upgrades, except for those modifications to the roadway network that have been programmed and approved for implementation by 2045, as identified in the most recent *National Capital Region Constrained Long Range Plan (CLRP)*.

Prepared by the National Capital Region Transportation Planning Board (NC RTPB), which is the designated Metropolitan Planning Organization for the Washington, D.C. region under the Metropolitan Washington Council of Governments (M WCOG), the current CLRP includes projected transit and traffic, demographic, and air quality conditions through the 2045 horizon year. The most recent 2045 CLRP was adopted in October 2018 (NC RTPB, 2018). The planned and programmed transportation projects within the study area, included in the M WCOG CLRP and assumed under the No Build Alternative, are identified in **Table 2-1**.

Table 2-1. No Build CLRP Projects within the I-495 Study Corridor

CLRP ID	Project Name	Description	Completion Date	
3186/VI4IHOTA	I-495 / Dulles Toll Road – Airport Access Road Interchange Master Plan	DAAH/I-495 Capital Beltway Interchange Flyover Ramp Relocation (Phase IV DAAH)	Relocate ramp from Eastbound (EB) Dulles Airport Access Road to Northbound (NB) I-495 General Purpose (GP)	2030
3186/VI4IHOTA		DAAH/I-495 Capital Beltway Interchange Flyover Ramp Relocation (Phase IV DAAH)	Widen ramp from EB Dulles Toll Road ramp to NB I-495 GP to two lanes	2030
3186/VI4IRMP1		DAAH/I-495 Capital Beltway Interchange Flyover Ramp Relocation (Phase IV DAAH)	Construct flyover ramp from NB I-495 GP to Westbound (WB) Dulles Airport Access Road	2030
3208/VI4IHOTB		I-495 Interchange Ramp Phase II, Ramp 3 DAAH	Construct Ramp from SB I-495 GP to WB Dulles Airport Access Road	2030
3272/VI4IAUX19		I-495 Capital Beltway Auxiliary Lanes	Add NB I-495 GP auxiliary lane between on-ramp from WB Dulles Toll Road and off-ramp to Georgetown Pike	2030
3272/VI4IAUX20		I-495 Capital Beltway Auxiliary Lanes	Add Southbound (SB) I-495 GP auxiliary lane from Georgetown Pike on-ramp to WB Dulles Toll Road off-ramp	2030
1182/1186/3281		I-495 Managed Lanes / I-270 Managed Lanes in Maryland	Construct bi-directional Express lanes system on I-495 in Maryland between the AMLB and the Woodrow Wilson Bridge	2025
3060	Jones Branch Connector	Extend Jones branch Connector bridge to provide connection between Route 123 and I-495 Express Lanes	2019*	

Source: NC RTPB, 2018

* The Jones Branch Connector was under construction during the initial planning phase of the I-495 Express Lanes project, and therefore was included in the No Build Projects list rather than as part of the existing conditions.

2.2.2 Build Alternative

The Build Alternative would consist of five elements described in further detail below: extending the existing I-495 Express Lanes, adding GP auxiliary lanes, adding access to the Express Lane network, improving two interchanges, and reconstruction of overpasses:

- Extending the existing four I-495 Express Lanes from their current terminus between the I-495/Route 267 interchange and the Old Dominion Drive overpass north approximately 1.6 miles to the GWMP interchange, at which point the Express Lanes would tie into the Capital Beltway in the vicinity of the ALMB. Express Lanes are designed to keep traffic flowing at 45 miles per hour or faster by dynamically adjusting tolls, allowing transit, high-occupancy, and toll-paying vehicles to have a much more reliable trip. In order to reduce the limits of disturbance (LOD), the extended Express Lanes would be separated from the GP lanes by flexible post delineators (see **Figure 2-1**), consistent with the configuration of the existing I-495 Express Lanes, requiring approximately an additional four feet per direction in the overall typical section of the roadway (eight feet total). This eliminates the need to provide full shoulders and concrete barrier separation between the GP lanes and the Express Lanes in each direction.
- Additional GP auxiliary lanes between the Route 267 and Route 193 interchanges. North of the Route 193 interchange, an auxiliary lane is already provided in the northbound direction up to the GWMP; in the southbound direction, a collector-distributor (C-D) road would take the place of an auxiliary lane. Through the entire project area, the Build Alternative would retain the existing number of GP lanes in each direction between the I-495/Route 267 interchange and the GWMP.
- Additional access to and from the Express Lanes network (described further in this section below).
- Improvements to I-495 interchanges between Route 123 and GWMP (described further in this section below).
- Reconstruction of I-495 overpasses in the study area at Old Dominion Drive and Live Oak Drive (described further in this section below).

Figure 2-2 shows a typical section for I-495, with two Express Lanes in either direction separated by flexible delineators. **Figure 2-3** through **Figure 2-7** provide a plan view of the Build Alternative.



Figure 2-1. Existing Flexible Post Delineators on I-495 Express Lanes

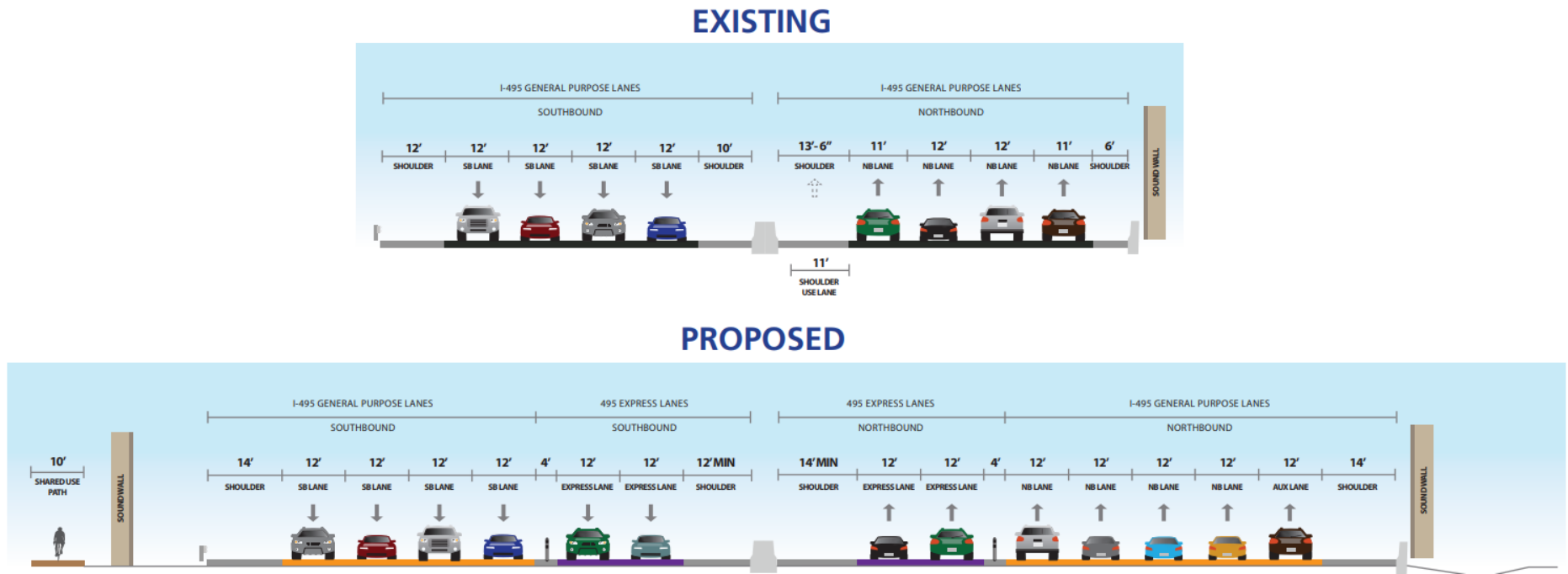
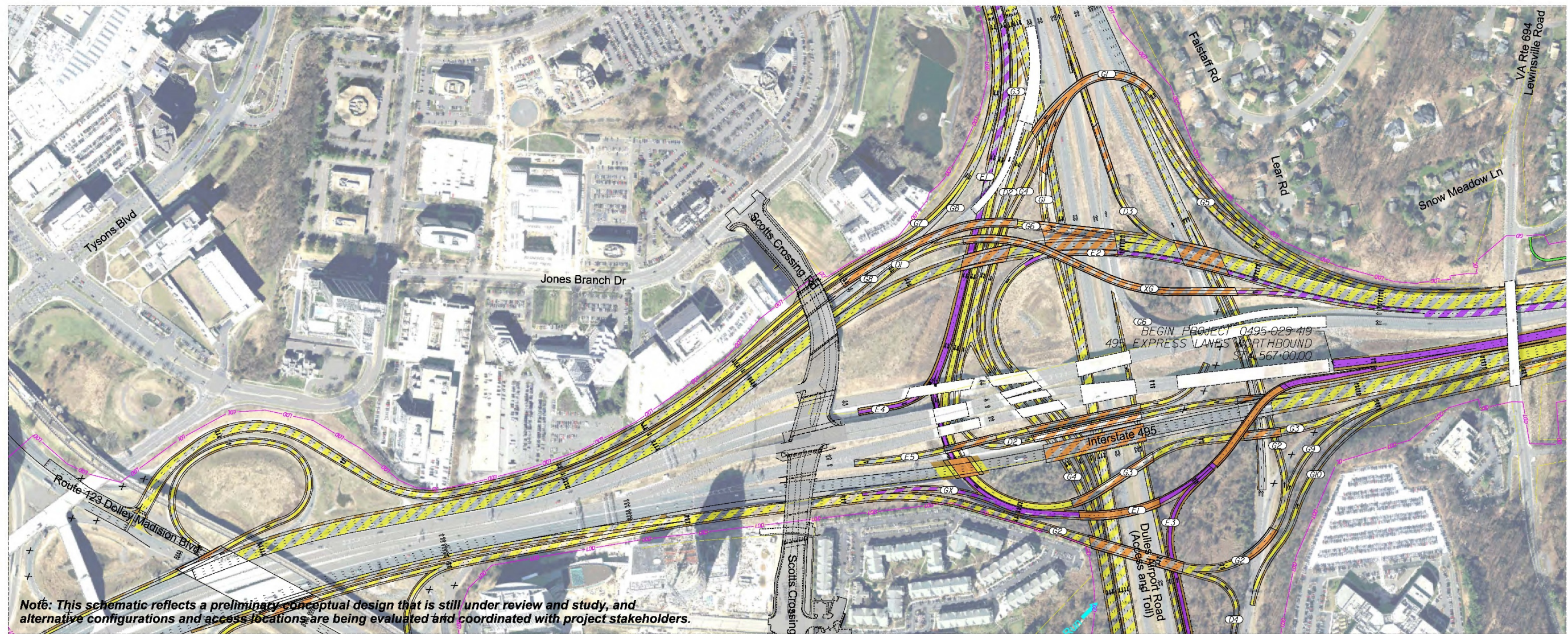


Figure 2-2. Existing and Build Alternative Typical Sections



I-495/Dulles Toll Road Area - Design Year (2045)

I-495 Express Lanes Northern Extension Study - March 2020



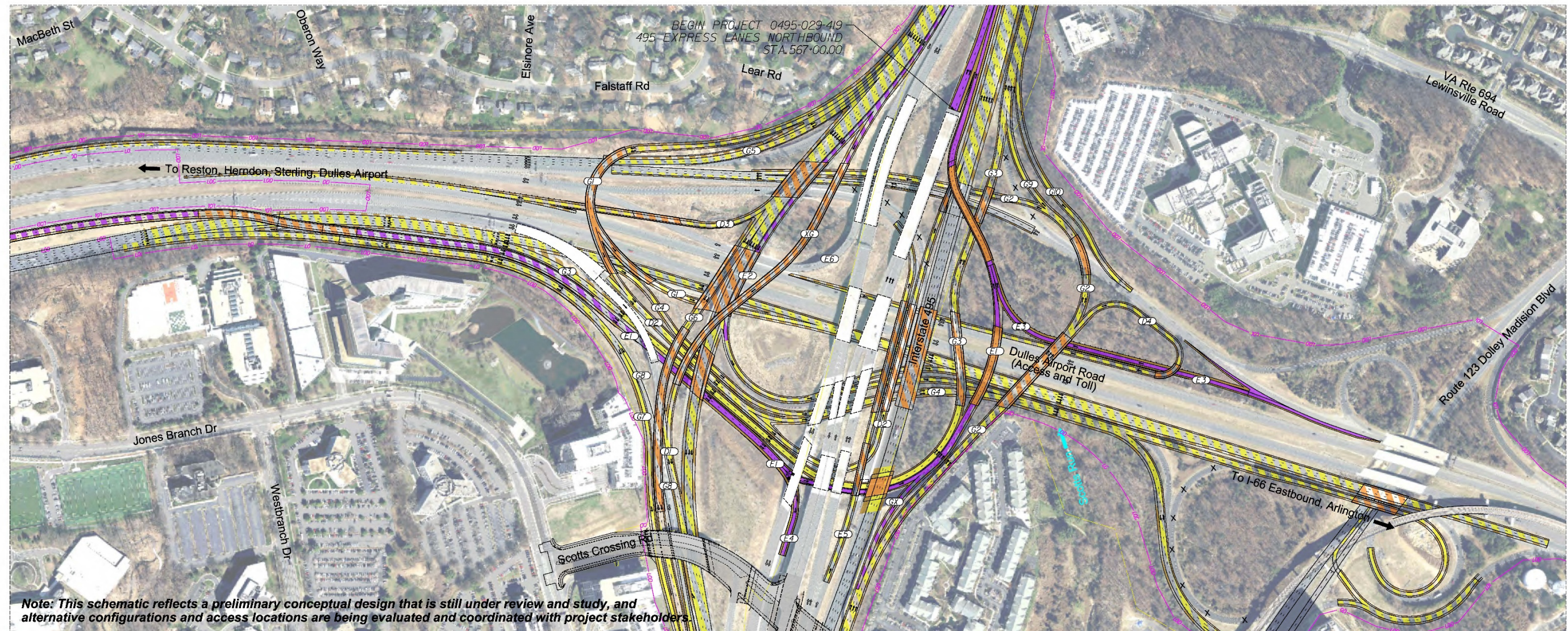
<p>Project Location</p>	<p>North Arrow & Scale</p>	<p>Legend</p> <table border="0"> <tr> <td> Proposed Express Lanes and Ramps</td> <td> Potential Future Express Lanes and Ramps By Others</td> <td> Proposed Paved Shoulder/Raised Median</td> <td> Potential Future Paved Shoulder/Raised Median By Others</td> <td> Proposed Shared Use Path</td> <td> Potential Future Shared Use Path By Others</td> <td> Existing Right of Way</td> </tr> <tr> <td> Proposed General Purpose Lanes Improvements</td> <td> Potential Future General Purpose Lanes Improvements By Others</td> <td> Proposed Bridge</td> <td> Potential Future Bridge By Others</td> <td> Signal</td> <td> Proposed Noise Barrier</td> <td> Proposed Limits of Disturbance</td> </tr> </table>	Proposed Express Lanes and Ramps	Potential Future Express Lanes and Ramps By Others	Proposed Paved Shoulder/Raised Median	Potential Future Paved Shoulder/Raised Median By Others	Proposed Shared Use Path	Potential Future Shared Use Path By Others	Existing Right of Way	Proposed General Purpose Lanes Improvements	Potential Future General Purpose Lanes Improvements By Others	Proposed Bridge	Potential Future Bridge By Others	Signal	Proposed Noise Barrier	Proposed Limits of Disturbance
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Figure 2-3. Build Alternative Ultimate Configuration Concept Design (Sheet 1 of 5)



Dulles Toll Road Area - Design Year (2045)

I-495 Express Lanes Northern Extension Study - March 2020



<p>Project Location</p>	<p>North Arrow & Scale</p>	<p>Legend</p> <table border="0"> <tr> <td> Proposed Express Lanes and Ramps</td> <td> Potential Future Express Lanes and Ramps By Others</td> <td> Proposed Paved Shoulder/Raised Median</td> <td> Potential Future Paved Shoulder/Raised Median By Others</td> <td> Proposed Shared Use Path</td> <td> Potential Future Shared Use Path By Others</td> <td> Existing Right of Way</td> </tr> <tr> <td> Proposed General Purpose Lanes Improvements</td> <td> Potential Future General Purpose Lanes Improvements By Others</td> <td> Proposed Bridge</td> <td> Potential Future Bridge By Others</td> <td> Signal</td> <td> Proposed Noise Barrier</td> <td> Proposed Limits of Disturbance</td> </tr> </table>	Proposed Express Lanes and Ramps	Potential Future Express Lanes and Ramps By Others	Proposed Paved Shoulder/Raised Median	Potential Future Paved Shoulder/Raised Median By Others	Proposed Shared Use Path	Potential Future Shared Use Path By Others	Existing Right of Way	Proposed General Purpose Lanes Improvements	Potential Future General Purpose Lanes Improvements By Others	Proposed Bridge	Potential Future Bridge By Others	Signal	Proposed Noise Barrier	Proposed Limits of Disturbance
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Figure 2-4. Build Alternative Ultimate Configuration Concept Design (Sheet 2 of 5)

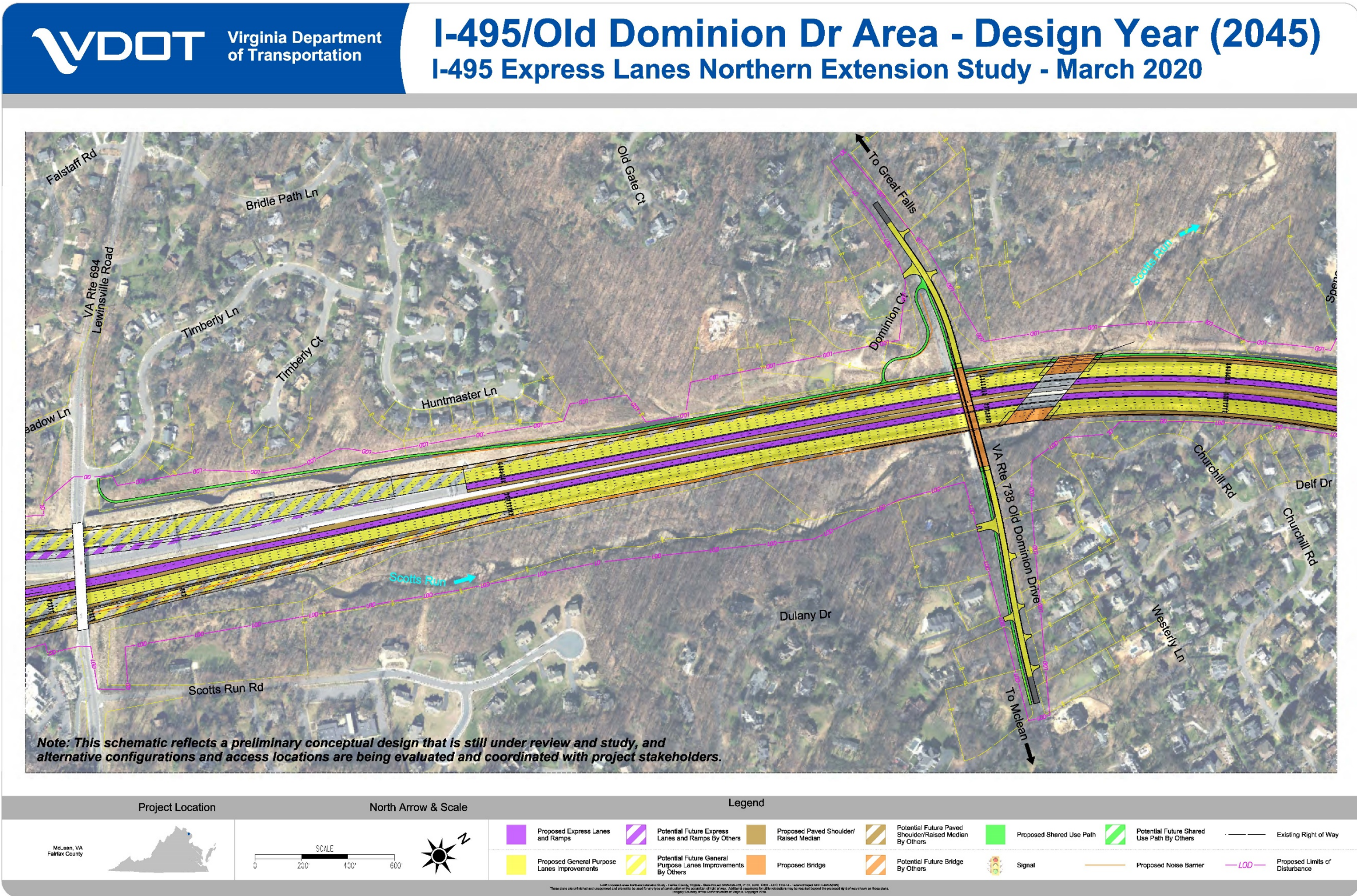
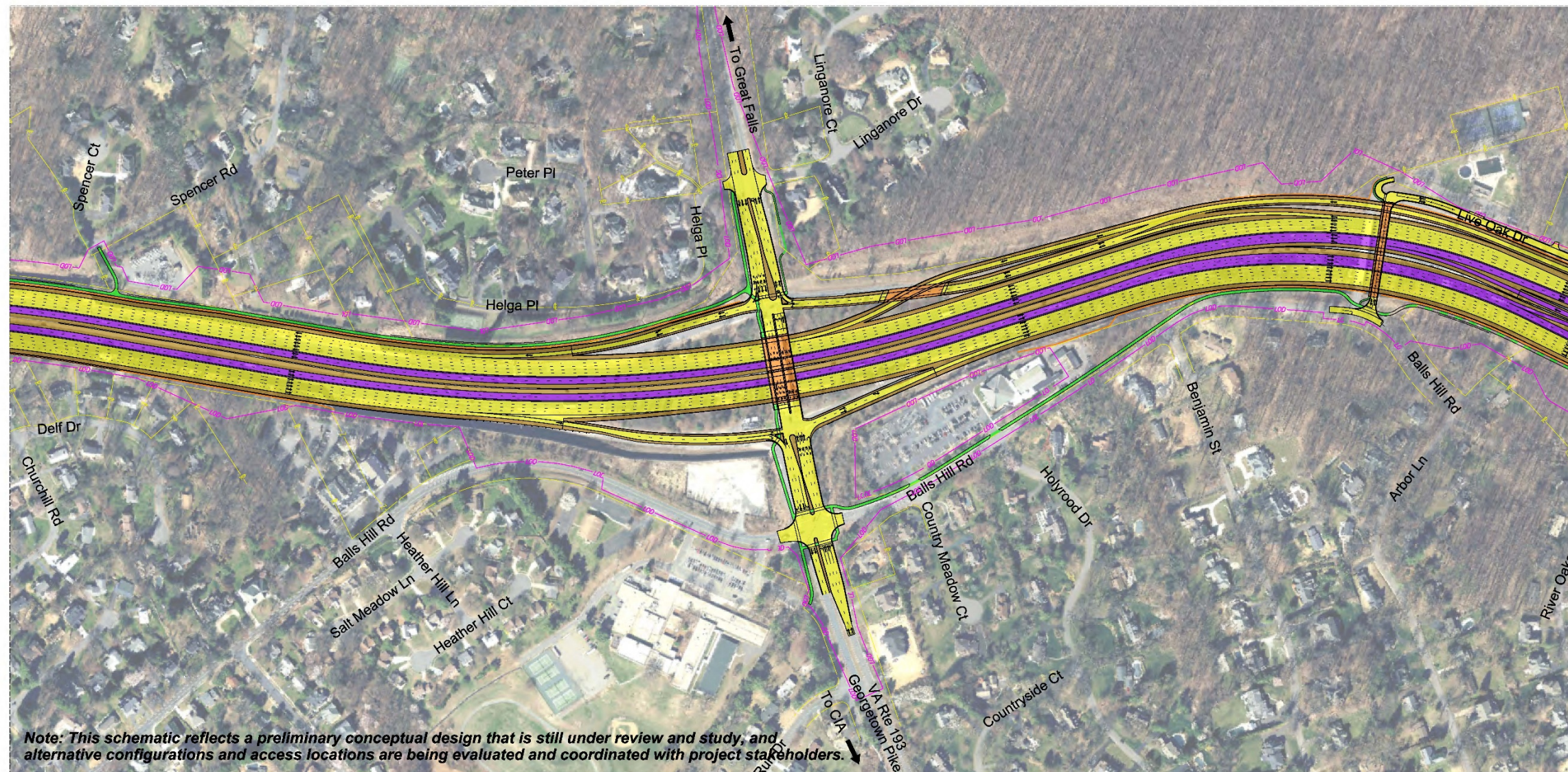


Figure 2-5. Build Alternative Ultimate Configuration Concept Design (Sheet 3 of 5)



I-495/Georgetown Pike Area - Design Year (2045)

I-495 Express Lanes Northern Extension Study - March 2020



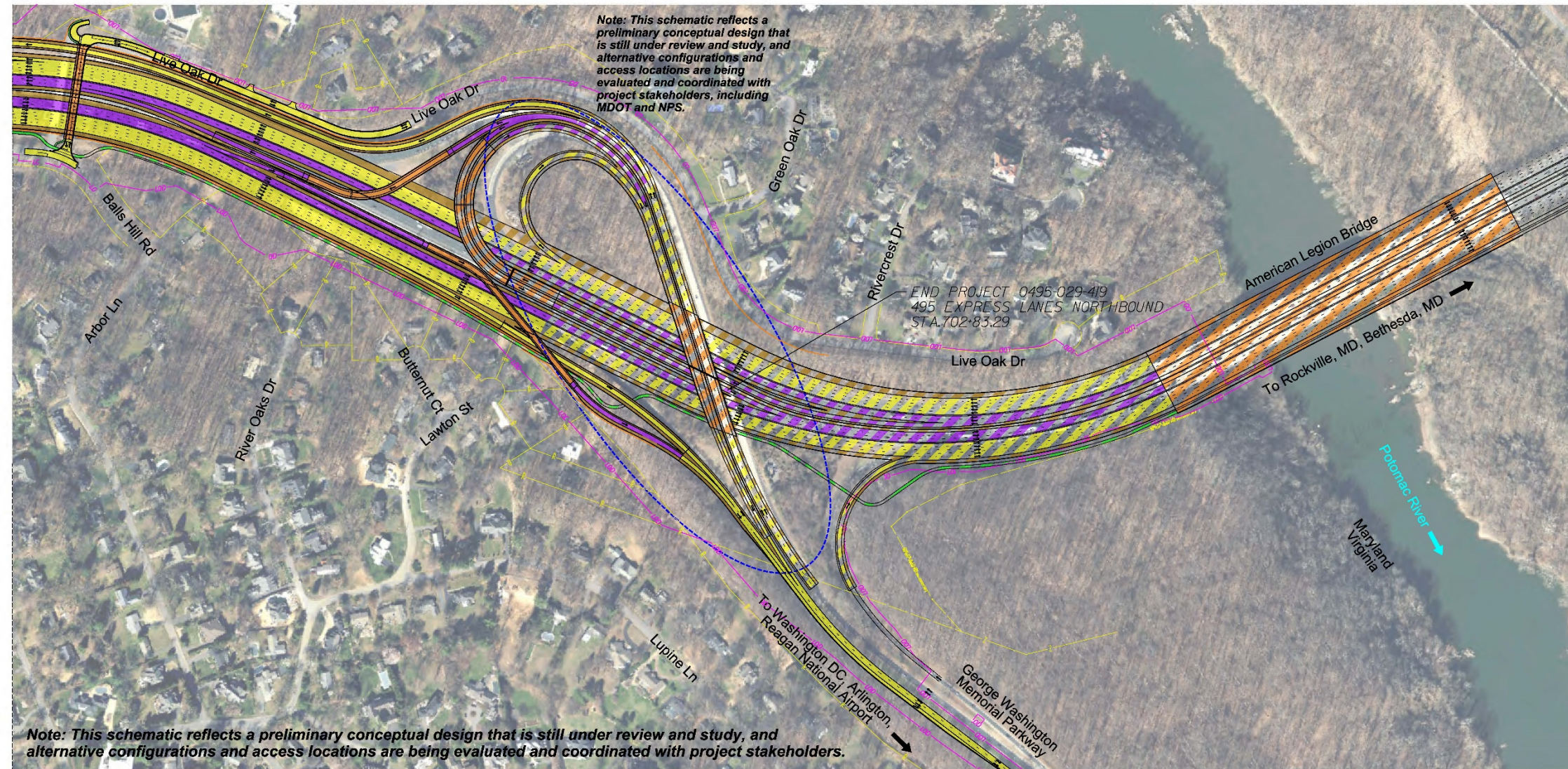
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Figure 2-6. Build Alternative Ultimate Configuration Concept Design (Sheet 4 of 5)



I-495/GW Parkway Area - Design Year (2045)

I-495 Express Lanes Northern Extension Study - March 2020



<p>Project Location</p>	<p>North Arrow & Scale</p>	<p>Legend</p> <table border="0"> <tr> <td> Proposed Express Lanes and Ramps</td> <td> Potential Future Express Lanes and Ramps By Others</td> <td> Proposed Paved Shoulder/Raised Median</td> <td> Potential Future Paved Shoulder/Raised Median By Others</td> <td> Proposed Shared Use Path</td> <td> Potential Future Shared Use Path By Others</td> <td> Existing Right of Way</td> </tr> <tr> <td> Proposed General Purpose Lanes Improvements</td> <td> Potential Future General Purpose Lanes Improvements By Others</td> <td> Proposed Bridge</td> <td> Potential Future Bridge By Others</td> <td> Signal</td> <td> Proposed Noise Barrier</td> <td> Proposed Limits of Disturbance</td> </tr> </table>	Proposed Express Lanes and Ramps	Potential Future Express Lanes and Ramps By Others	Proposed Paved Shoulder/Raised Median	Potential Future Paved Shoulder/Raised Median By Others	Proposed Shared Use Path	Potential Future Shared Use Path By Others	Existing Right of Way	Proposed General Purpose Lanes Improvements	Potential Future General Purpose Lanes Improvements By Others	Proposed Bridge	Potential Future Bridge By Others	Signal	Proposed Noise Barrier	Proposed Limits of Disturbance
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Figure 2-7. Build Alternative Ultimate Configuration Concept Design (Sheet 5 of 5)

Proposed Access to the Express Lanes

The Build Alternative would provide the following access to and from the Express Lanes:

- Flyover exchange ramps to provide access from the northbound I-495 GP lanes to the northbound I-495 Express Lanes, and from the southbound I-495 Express Lanes to the southbound I-495 GP lanes. These exchange ramps would be located at the Route 267 interchange.
- New Express Lanes access to and from Route 267:
 - Eastbound Route 267 (Dulles Toll Road (DTR)) to northbound I-495 Express
 - Westbound Route 267 (Dulles Connector Road (DCR)) to northbound I-495 Express
 - Southbound I-495 Express to eastbound Route 267 (DCR). This movement would tie into an eastbound C-D road along Route 267 at the Route 267/Route 123 interchange, allowing access to both the eastbound DCR and Route 123.
 - Note that the southbound I-495 Express to westbound Route 267 (DTR) movement is already provided today; additionally, the northbound I-495 Express to westbound Route 267 (DTR) and eastbound Route 267 (DTR) to southbound I-495 Express movements are also provided today.
- New Express Lanes access to and from GWMP:
 - Northbound I-495 Express to GWMP
 - GWMP to southbound I-495 Express
 - Note that the Maryland managed lanes system (assumed to be in place under No Build conditions) would provide access to the movements from GWMP to northbound I-495 Express and from southbound I-495 Express to GWMP.

Interchange Configurations

Route 267 Interchange

The Build Alternative includes modifications to the I-495/Route 267 interchange, including modifications to several of the GP ramp connections. Individual Ramp movements are discussed in detail below and can be seen in **Figure 2-3** and **Figure 2-4**. “Modified Access” refers to movements which are provided under the existing interchange configuration, while “Additional Access” refers to movements which are not provided under the existing interchange configuration. All access provided in the existing interchange configuration is maintained in some form through all phases of the Build Alternative. Proposed actions include the following:

- **GX**—Ramp GX is a one-lane ramp which provides Additional Access from northbound I-495 GP lanes, from and Route 123 at the I-495/Route 123 interchange, to northbound I-495 Express Lanes. Ramp GX would be provided via a connection from ramp G2 to ramp E1.
- **XG**—Ramp XG is a one-lane ramp which provides Additional Access from southbound I-495 Express Lanes to southbound I-495 GP lanes. Ramp XG would be provided via flyover ramp connecting ramp E2 to ramp D1.
- **E1**—Ramp E1 provides Modified Access from eastbound DTR and eastbound DAAR to northbound and southbound I-495 Express Lanes, with one lane of capacity to each Express Lane facility. Modified Access from eastbound DTR and eastbound DAAR would be provided via a C-D road which collects traffic from the DTR and DAAR upstream of the Route 267 interchange and then flies over eastbound DTR.

- **E2**—Ramp E2 is a one-lane ramp which provides Additional Access from southbound I-495 Express Lanes to eastbound DTR.
- **E3**—Ramp E3 is a one-lane ramp which provides Additional Access from westbound DCR to northbound I-495 Express Lanes. Ramp E3 merges with ramp E1 before tying into northbound I-495 Express Lanes.
- **G1**—Ramp G1 is a one-lane ramp which provides Modified Access from southbound I-495 GP lanes to eastbound DTR. Ramp G1 also provides access to Route 123 at the Route 267/Route 123 interchange via a connection to ramp D2 and subsequent connection to ramp G4.
- **G2**—Ramp G2 provides Modified Access from northbound I-495 to westbound DTR with one-lane of capacity. Ramp G2 also provides access from Route 123 at the I-495/Route 123 interchange via the proposed C-D road system at that interchange.
- **G3**—Ramp G3 is a two-lane ramp which provides Modified Access from eastbound DTR to northbound I-495 GP lanes. Ramp G3 would be extended to combine with ramps G10 and G9 about before tying into northbound I-495 GP lanes about 0.6 miles downstream of the existing tie in point.
- **G4**—Ramp G4 provides Modified Access from eastbound DTR to the Route 123 C-D road at the Route 267/Route 123 interchange. Ramp G4 also provides access to the Route 123 C-D from eastbound DAAR via a connection from ramp D2.
- **G5**—Ramp G5 is a two-lane ramp which provides Modified Access from southbound I-495 GP lanes to westbound DTR.
- **G6**—Ramp G6 provides Modified Access from southbound I-495 GP lanes to the proposed Route 123 C-D road at the I-495/Route 123 interchange with one-lane of capacity.
- **G7**—Ramp G7 is a one-lane ramp which provides Modified Access from eastbound DTR to the propose Route 123 C-D road at the I-495/Route 123 interchange.
- **G8**—Ramp G8 is a one-lane ramp which provides Modified Access from eastbound DTR to southbound I-495 GP lanes.
- **G9**—Ramp G9 is a one-lane ramp which provides Modified Access from the Route 123 C-D road at the I-495/Route 123 interchange to northbound I-495 GP lanes (provided access to the northbound GP lanes from Route 123). Ramp G9 is provided via a connection from ramp G2 to combined ramps G3 and G10.
- **G10**—Ramp G10 is a one-lane ramp which provides Modified Access from westbound DTR to northbound I-495. The Ramp G10 tie-in to I-495 general purpose lanes is provided via a connection from the westbound DTR mainline to ramp G3.
- **D1**—Ramp D1 provides Modified Access from eastbound DAAR (indirectly via eastbound DTR) to southbound I-495 GP lanes with one-lane of capacity.
- **D2**—Ramp D2 provides Modified Access from eastbound DAAR to northbound I-495 GP lanes with one-lane of capacity.
- **D3**—Ramp D3 is a one-lane ramp which provides Additional Access from southbound I-495 GP lanes to westbound DAAR.
- **D4**—Ramp D4 is a one-lane ramp which provides Additional Access from northbound I-495 GP lanes to westbound DAAR.

GWMP Interchange

The Build Alternative also includes modifications to the GWMP interchange, the northernmost interchange on I-495 in Virginia. These modifications can be seen on **Figure 2-7**. All existing GP movements at the

GWMP would be maintained under the Build Alternative but would be modified to accommodate additional access between I-495 Express Lanes and the GWMP provided under the Build Alternative.

Shared-Use Path

The Build Alternative includes an approximately 3.1-mile 10-foot-wide shared-use path, consistent with the Fairfax County Countywide Trails Plan Map (FCDPZ, 2018), that is not provided under the existing condition. As shown on **Figure 2-8**, the path is proposed to begin near the south end of the project corridor at Timberly Lane near Lewinsville Road and continue north along the west side of I-495 behind the proposed noise barrier. The path would continue underneath Old Dominion Drive with a spur in the southeast quadrant of the grade separation to access Old Dominion Drive near Dominion Court. The path would also have a spur to the existing Helga Place/Linganore Drive intersection just west of the Georgetown Pike interchange. The path is proposed to cross over I-495 on the south side of the proposed Georgetown Pike bridge and turn north at the Balls Hill Road intersection. The path would then continue along the west side of Balls Hill Road to the GWMP interchange where it may connect in the future to a proposed pedestrian crossing of the Potomac River adjacent to the ALMB. The path would also provide access to the proposed improved sidewalk on Live Oak Drive bridge, which crosses I-495 just south of the GWMP interchange. This access connection will allow for a continuous trail network between the shared-use path and the Scott's Run Nature Preserve trail system, as well as the Potomac Heritage Trail running along Live Oak Drive.

Overpasses

Four overpasses between the Route 267 interchange and the GWMP interchange would need to be reconstructed as part of the Build Alternative: the Old Dominion Drive overpass, I-495 over Scotts Run, the Georgetown Pike overpass, and the Live Oak Drive overpass. The Build Alternative would require each of these bridges to be lengthened and proposes building them partially on new alignment to maintain traffic during construction.

- **Old Dominion Drive**—This new overpass would be wider than the existing bridge in order to accommodate a 10-foot-wide shared-use path, which is consistent with the Fairfax County Countywide Trails Plan Map (FCDPZ, 2018). The existing overpass would need to stay in service until the new one is completed.
- **I-495 over Scotts Run**—The existing bridge carrying all I-495 lanes over Scotts Run, just north of the Old Dominion Drive overpass, would need to be rebuilt to accommodate the widened I-495 and the parallel 10-foot wide shared-use path, as well as a future trail underneath it along Scotts Run (by others), consistent with the Fairfax County Countywide Trails Plan Map (FCDPZ, 2018). The existing bridge would need to remain in service while the new bridge was constructed.
- **Route 193 (Georgetown Pike)**— This new overpass would also be wider than the existing bridge in order to accommodate additional left turn lane storage in both directions (2 full-length lanes per direction), along with a 10-foot-wide shared-use path on the south side of the bridge. On each end of the bridge, the existing signalized intersections at the I-495 ramps are being configured to improvement capacity for vehicles turning from Georgetown Pike. Due to the heavy traffic volumes on this bridge and its proximity to Cooper Middle School, the Build Alternative assumes that this overpass would need to remain in service for the entirety of the construction duration. .

- **Live Oak Drive**— The proposed new bridge would be widened to include a 6-foot sidewalk on one side, which would connect the proposed shared-use path along I-495 to the east with Scott’s Run Nature Preserve – Oak Trail and the Potomac Heritage Trail west of I-495. The proposed overpass would be built with the existing overpass still in service, as the neighborhood it serves has no other connection to the regional transportation network.

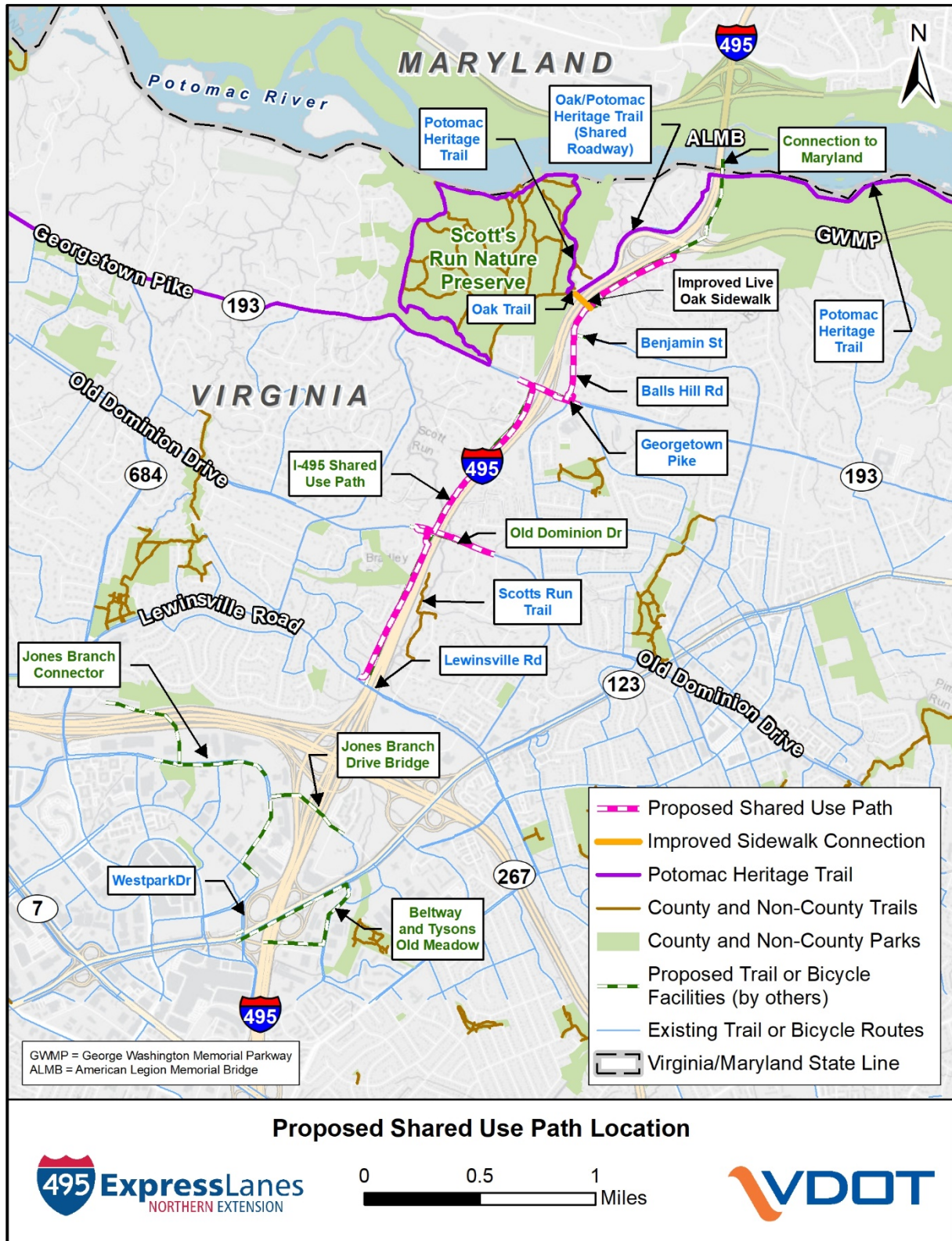


Figure 2-8. Proposed Share Use Path Location

2.3 ABILITY OF ALTERNATIVES TO MEET PURPOSE AND NEED

As documented in Chapter 1 of the EA, the purpose of the project improvements under evaluation are based on the following primary need elements: reduce congestion, provide additional travel choices and improve travel reliability.

2.3.1 Ability of the No Build Alternative to Meet Purpose and Need

As discussed in the *Traffic and Transportation Technical Report* (VDOT, 2020), I-495 within the study area is a severely oversaturated network during the weekday AM and PM peak periods. The duration and extent of congestion within the study area is expected to increase with population, employment, and subsequent traffic volumes. Variability in travel speeds and travel times is therefore expected to worsen in the future. Routine maintenance and construction of projects programmed in the 2045 CLRP would not reduce congestion, provide new travel choices, or improve travel reliability along I-495 within the project study area.

2.3.2 Ability of the Build Alternative to Meet Purpose and Need

The following sections describe how the Build Alternative would meet the purpose and need, detailed further in the *Traffic and Transportation Technical Report* (VDOT, 2020).

Reduce Congestion

The proposed project is anticipated to reduce congestion compared with the Existing and 2045 No Build scenarios in three ways as outlined below: optimizing traffic volumes and travel demand, improving traffic operations, and increasing the number of persons moved.

Optimizing Traffic Volumes and Travel Demand

Daily traffic volume projections were modeled along I-495 under Existing Conditions and the 2045 No Build and Build scenarios (**Table 2-2**). Total two-way daily volumes are forecasted to increase from the No Build to Build scenarios by approximately 2.5% across the ALMB to as much as 8% between Route 267 and Route 193, where the existing Express Lanes network currently terminates. Notably, in the segments north of Route 267 where the Express Lanes do not currently exist, forecasted volumes in the GP lanes show a slight decrease in the Build scenario as compared to the No Build scenario, as more trips shift to use the Express Lanes, which would be priced to ensure free-flow operations. This reduction in the GP lanes demand would consequently improve future congestion on these lanes.

Table 2-2. 2045 Forecasted Daily Traffic Volumes Along I-495

Location		Existing (2018)			2045 No Build			2045 Build		
		GP	Express	Total Volume	GP	Express	Total Volume	GP	Express	Total Volume
South of Route 123	NB	78,250	14,705	198,655	96,800	23,200	260,700	99,800	24,100	267,600
	SB	89,465	16,235		114,000	26,700		115,900	27,800	
Between Route 123 and Route 267	NB	69,565	15,115	183,150	90,600	24,400	250,500	95,400	25,600	259,400
	SB	83,485	14,985		110,200	25,300		112,200	26,200	
Between Route 267 and Route 193	NB	84,560	11,820	209,915	115,300	19,600	286,400	113,100	39,100	315,500
	SB	103,900	9,635		132,300	19,200		125,600	37,700	
Between Route 193 and GWMP	NB	104,915	-	224,795	139,100	-	293,100	110,900	39,100	316,100
	SB	119,880	-		154,000	-		128,400	37,700	
North of GWMP (ALMB)	NB	123,190	-	253,270	136,800	29,200	341,600	126,100	46,600	356,200
	SB	130,080	-		144,200	31,400		136,100	47,400	

Northbound = NB; Southbound = SB; GP = General Purpose Lanes; Express = Express Lanes

Improving Traffic Operations

In addition to the increased vehicular traffic volumes for the overall corridor, this project is also anticipated to increase travel speeds and reduce travel times in the study area. The following summarize these improvements to traffic operations under the Build Alternative:

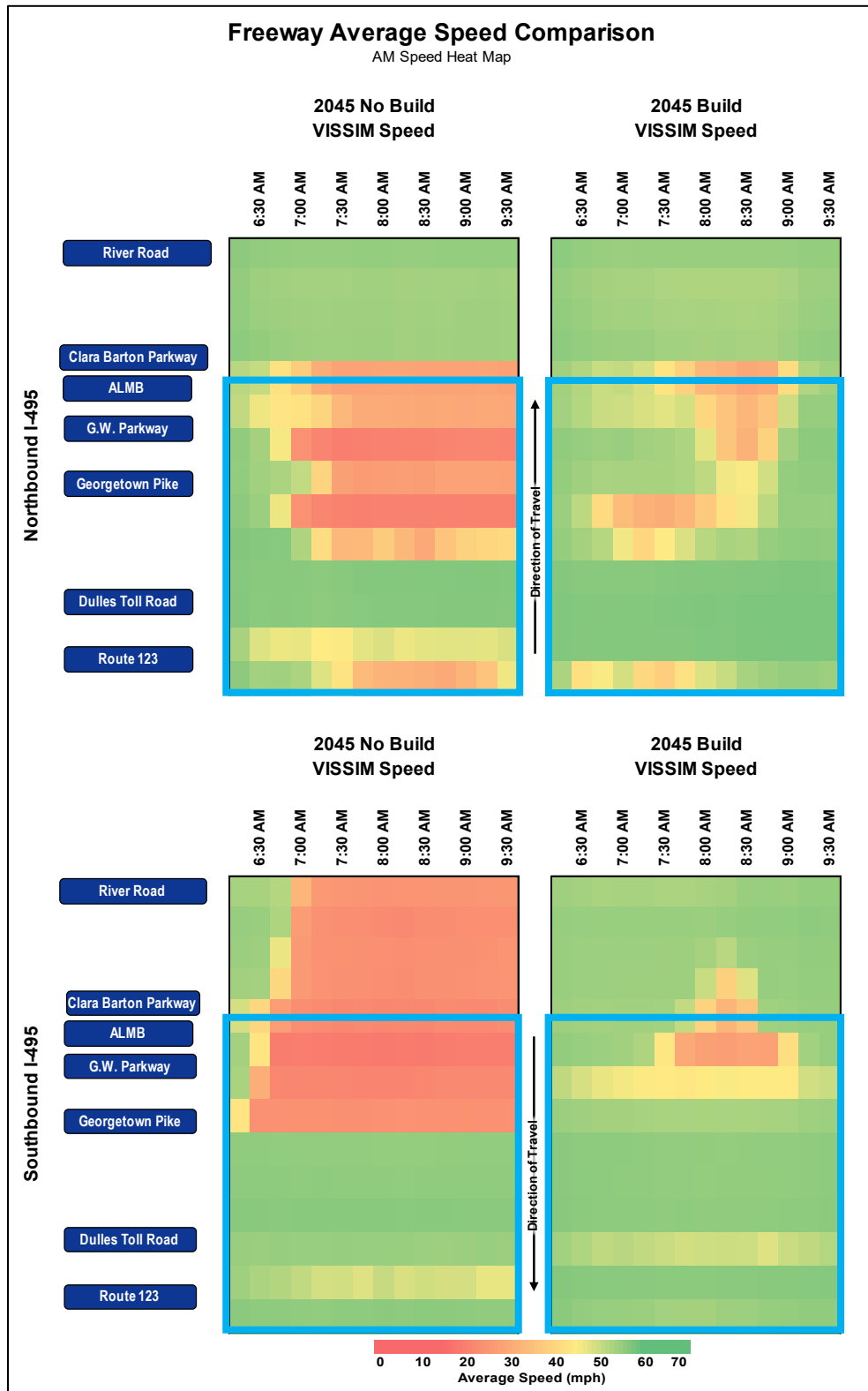
AM Peak Period: General Purpose Lanes—Under 2045 Build conditions, travel times along the northbound I-495 GP lanes between Route 123 and the ALMB decrease by approximately four minutes when compared to 2045 No Build conditions. Similarly, travel times along southbound I-495 GP lanes between the ALMB and Route 123 decrease by approximately four minutes when compared to 2045 No Build Conditions.

AM Peak Period: Express Lanes—Under 2045 Build conditions travel times on northbound I-495 Express Lanes under the Build condition decrease by approximately four minutes between Westpark Drive and the ALMB when compared to the No Build condition, in which the GP lanes must be used between just north of Route 267 and just south of the GWMP. Similarly, travel times on southbound I-495 Express Lanes under the Build condition decrease by approximately two minutes between the ALMB and Westpark Drive compared to the No Build condition. In the No Build condition, no Express Lanes exist between Route 267 and the ALMB, forcing all trips to utilize the congested GP lanes. In the Build condition, the continuous Express Lanes system operates at the posted speed limit, providing a reliable end-to-end travel time in both directions.

PM Peak Period: General Purpose Lanes—Under 2045 Build conditions, travel times along the northbound I-495 GP lanes between Route 123 and the ALMB decrease by approximately five minutes when compared to 2045 No Build conditions. Travel times along southbound I-495 GP lanes between the ALMB and Route 123 remain generally consistent compared to 2045 No Build Conditions.

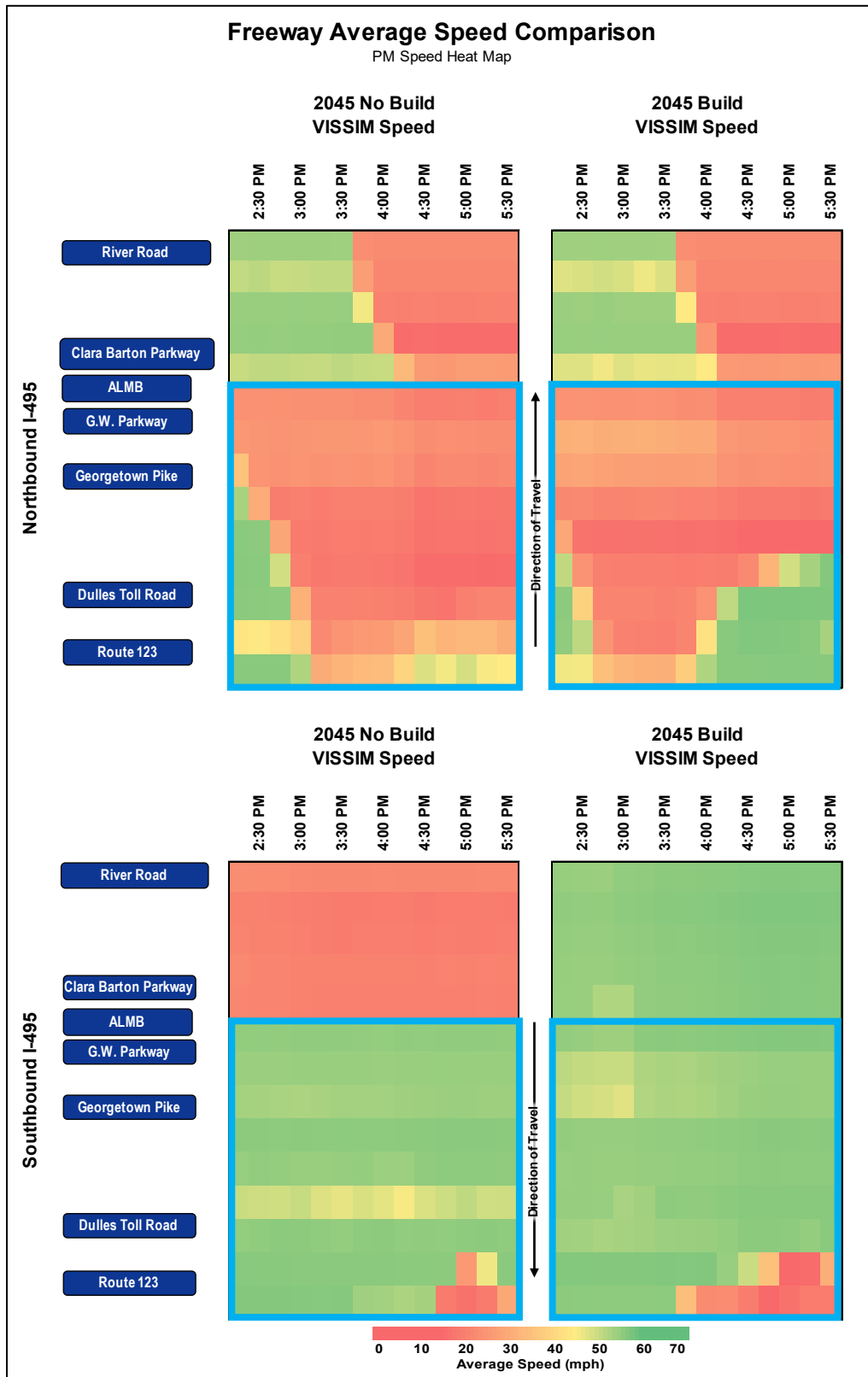
PM Peak Period: Express Lanes—Under 2045 Build conditions, travel times on northbound I-495 Express Lanes under the Build condition decrease by approximately 10 minutes between Westpark Drive and the ALMB as compared to the No Build condition. Travel times on southbound I-495 Express Lanes between the ALMB and Westpark Drive decrease by approximately one minute compared to the No Build condition. In the No Build condition, no Express Lanes exist between Route 267 and the ALMB, forcing all trips to utilize the congested GP lanes. In the Build condition, the continuous Express Lanes system operates at the posted speed limit, providing a reliable end-to-end travel time in both directions.

Figure 2-9 provides a “heat map” comparison of average speeds between 2045 No Build and Build conditions for the AM peak period along the I-495 GP lanes. **Figure 2-10** provides this same comparison but for the PM peak period. Time of day during the peak period is provided on the horizontal axis while location along the corridor is provided along the vertical axis; the colors signify average speeds for each scenario with red being the lowest speeds (0 mph) and green being the highest speeds (70 mph). The figures are consistent with the noted travel time savings and indicate a greater presence of congestion in the No Build scenario in both directions of the I-495 GP lanes during the PM peak period.



Note: Blue area represents EA study area.

Figure 2-9: 2045 No Build and Build – AM Peak Period Average Speeds, I-495 GP Lanes



Note: Blue area represents EA study area.

Figure 2-10: 2045 No Build and Build – PM Peak Period Average Speeds, I-495 GP Lanes

Increasing the Number of Persons Moved

Average vehicle occupancy rates for Express Lanes facilities in Northern Virginia (1.44 persons per vehicle) are higher than GP lanes (1.1 persons per vehicle). Because future volumes are anticipated to shift from the GP lanes to the proposed Express Lanes as a result of the Build Alternative, the total number of persons moved through the study area would increase. See Chapter 7 of the *Traffic and Transportation Technical Report* (VDOT, 2020) for more detailed information. **Figure 2-11** and **Figure 2-12** compare 2045 No Build versus Build AM peak period person throughput along I-495 northbound and southbound, respectively (GP and Express combined). These figures show that the number of persons moved increases in the Build scenario across the length of the I-495 corridor in both directions due to the added capacity from the Express Lanes and increased occupancy of vehicles in those lanes.

In the northbound direction, the highest person throughputs are across the ALMB. Increases in throughput from No Build to Build range from 6% to 33%, with the greatest increase in the segments between Route 267 and GWMP where the new Express Lanes add capacity.

In the southbound direction, the highest person throughputs are again across the ALMB. Increases in throughput from No Build to Build range from 29% to 35%, with the greatest increases again in the segments between GWMP and Route 267 where the new Express Lanes add capacity. Note that the southbound throughput in the No Build scenario is heavily constrained due to the merge with the southbound Maryland Express Lanes terminus; this reduces throughput along the length of the corridor.

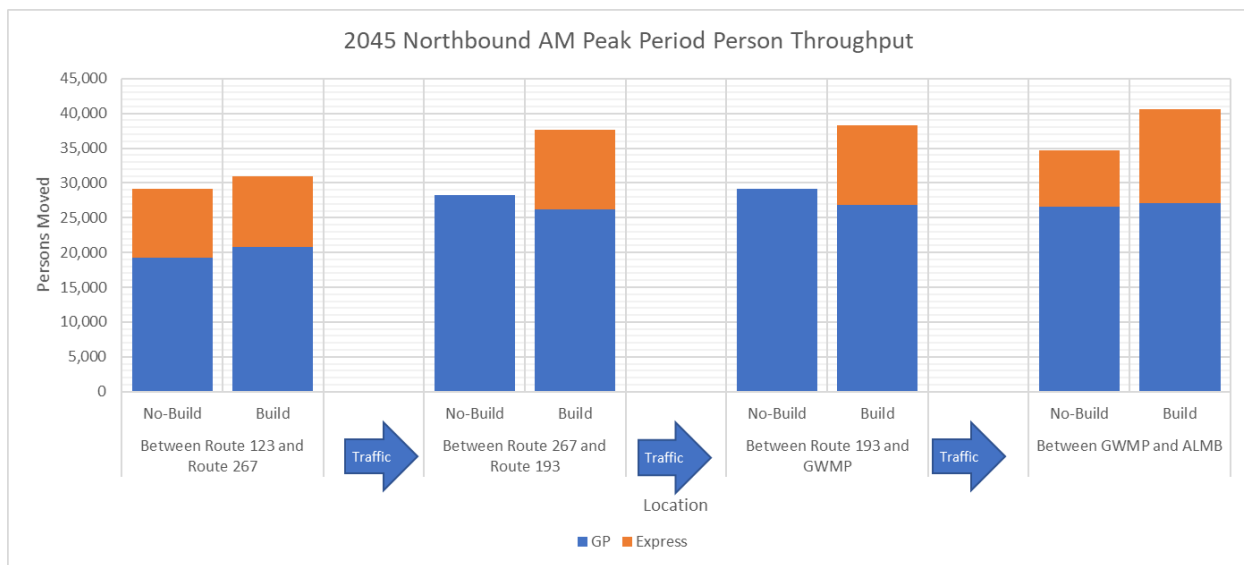


Figure 2-11. 2045 No Build and Build – AM Peak Period Person Throughput, I-495 Northbound³

³ These figures show the estimated number of persons moved across a three-hour period based on simulated vehicle throughput and assumed vehicle occupancies for GP and Express Lanes. More information on assumed vehicle occupancies can be found in the associated *Traffic and Transportation Technical Report* (VDOT, 2020).

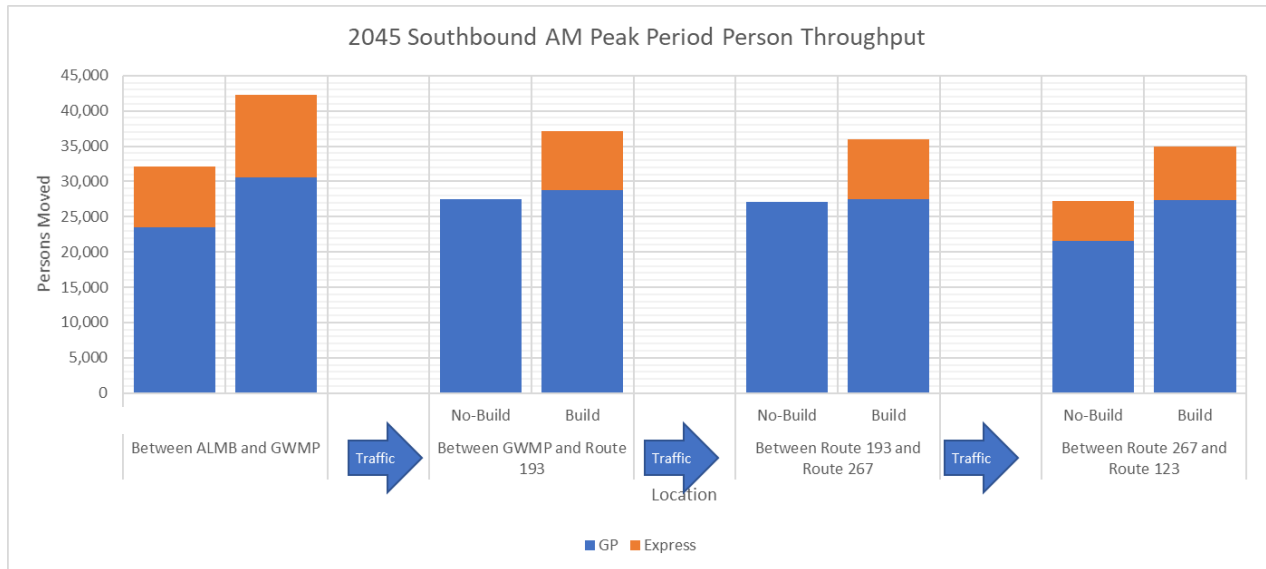


Figure 2-12. 2045 No Build and Build – AM Peak Period Person Throughput, I-495 Southbound⁴

Figure 2-13 and **Figure 2-14** compare 2045 No Build versus Build PM peak period person throughput along I-495 northbound and southbound, respectively (GP and Express combined). These figures again show that person throughput increases in the Build scenario across the length of the I-495 corridor in both directions due to the added capacity from the Express Lanes and increased occupancy of vehicles in those lanes.

In the northbound direction, the highest person throughputs are across the ALMB. Increases in throughput from No Build to Build range from 10% to 35%, with the greatest increase in the segments between Route 267 and GWMP where the new Express Lanes add capacity.

In the southbound direction, the highest person throughputs are again across the ALMB. Increases in throughput from No Build to Build range from 16% to 32%, with the greatest increases again in the segments between GWMP and Route 267 where the new Express Lanes add capacity.

The same throughput analysis was conducted for the AM Peak Period as well. This analysis indicated that the AM Peak Period would experience similar increases in throughput from the No Build to the Build scenario ranging from 6% to 33% in the northbound direction and 29% to 35% in the southbound direction. Again, the segments between GWMP and Route 267 experienced the greatest increases in throughput where the Express Lanes add capacity.

⁴ These figures show the estimated number of persons moved across a three-hour period based on simulated vehicle throughput and assumed vehicle occupancies for GP and Express Lanes. More information on assumed vehicle occupancies can be found in the associated *Traffic and Transportation Technical Report (VDOT, 2020)*.

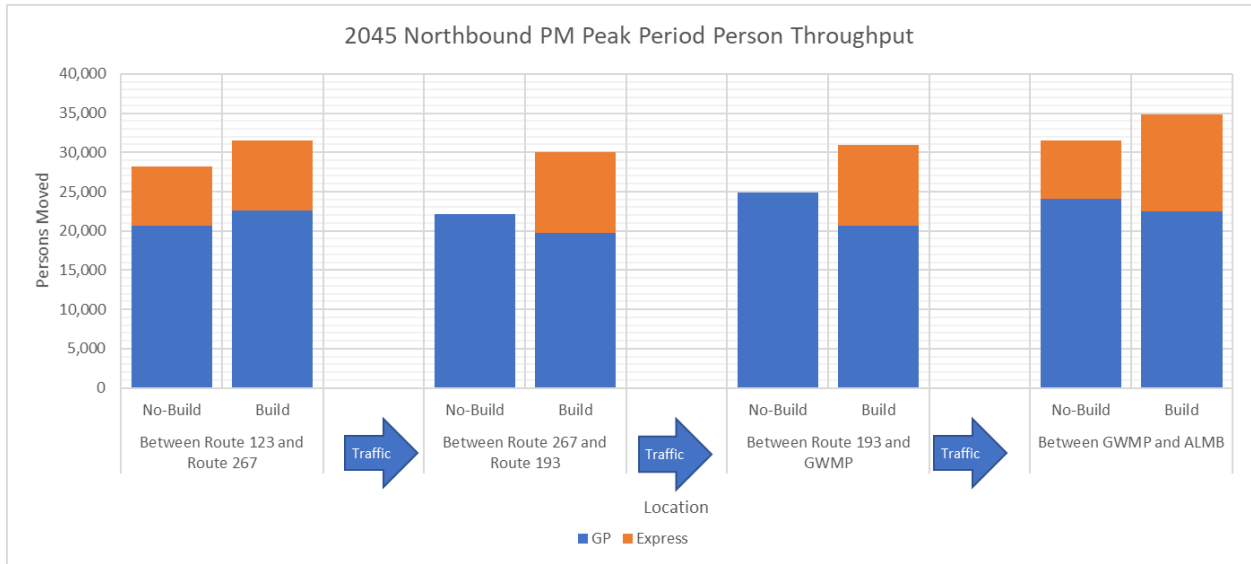


Figure 2-13. 2045 No Build and Build – PM Peak Period Person Throughput, I-495 Northbound⁵

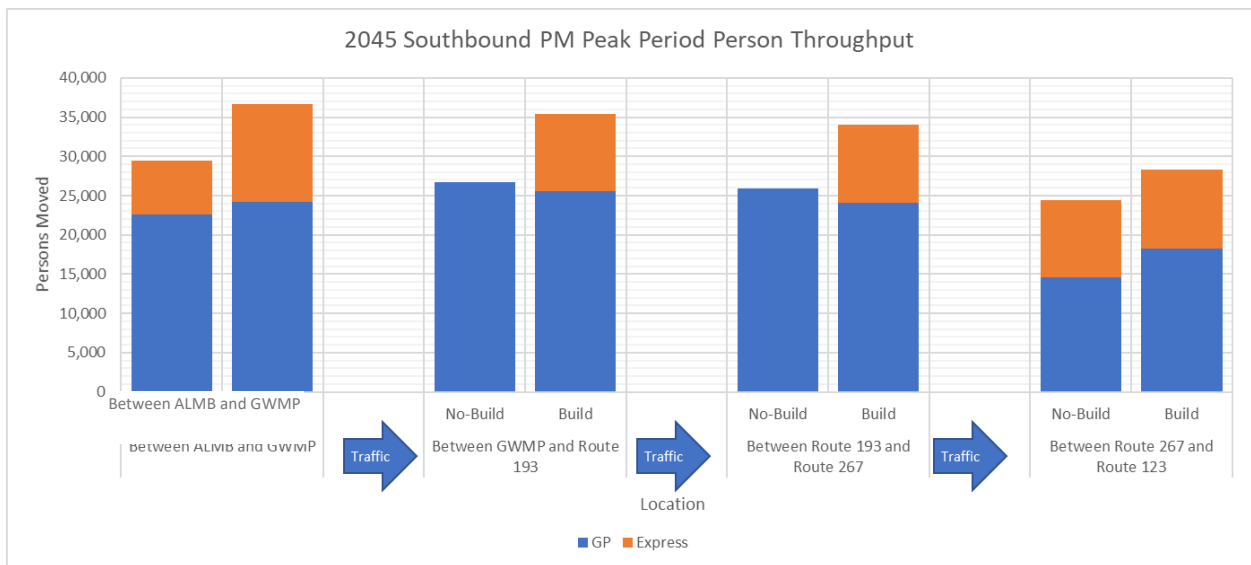


Figure 2-14. 2045 No Build and Build – PM Peak Period Person Throughput, I-495 Southbound⁵

⁵ These figures show the estimated number of persons moved across a three-hour period based on simulated vehicle throughput and assumed vehicle occupancies for GP and Express Lanes. More information on assumed vehicle occupancies can be found in the associated *Traffic and Transportation Technical Report (VDOT, 2020)*.

Provide Additional Travel Choices

As noted in Chapter 4 of the *Traffic and Transportation Technical Report* (VDOT, 2020), along the existing I-495 Express Lanes through Tysons, approximately 18% of vehicles are HOV-3 during the peak travel periods. This translates to an estimated 1.44 persons/vehicle across the Express Lanes during peak periods, as compared to an estimated 1.1 persons/vehicle observed on non-HOV interstate facilities in northern Virginia. The Express Lanes thus provide an alternative travel option for HOV vehicles and van pools or those wishing to pay a toll, and these options are shown to be utilized when provided. Additionally, as noted in Chapter 3 of the *Traffic and Transportation Technical Report*, no regional bus transit service is currently offered along I-495 through the study area and across the ALMB, in part due to the absence of dedicated or managed lanes that would allow buses to travel more efficiently. A seamless Express Lane system within Northern Virginia, to the final Capital Beltway exit in the Commonwealth, would allow for the running of potential future transit service with reliable travel times.

Further, the proposed shared-use path would provide a new multimodal travel option for local trips that is not currently provided under the existing condition and would not be provided by an extension of the Express Lanes alone. The proposed shared-use path would improve travel choice in the study area by providing a bicycle and pedestrian option for local travelers.

Improve Travel Time Reliability

The I-495 Express Lanes would offer consistent and predictable travel times for all roadway users including HOV motorists and transit buses. Although congestion would still exist during peak hours in the GP lanes, overall travel speeds would increase, and travel times would decrease compared to the No Build Alternative. **Figure 2-15** shows the current range of travel times experienced by drivers on I-495 northbound between Route 123 and the ALMB as observed during a single year between July 2017 and June 2018. During the morning rush hour, the travel times over the course of the year of observation ranged from around five minutes to more than twenty minutes, a difference of about 15 minutes. Likewise, the observed travel times over the course of the year during the evening rush hour ranged between about five minutes and almost sixty minutes, a range of almost fifty-five minutes. For comparison, the travel times for the same segments of roadway on the proposed Express Lanes were projected for the 2045 Build scenario shown in **Figure 2-16**.

These results indicated that the travel time would remain at about five minutes throughout the entire day and over the course of a year. This shows that not only would the expected travel time for drivers of the Express Lanes decrease as compared to the No Build scenario, but the range of the observed travel times would also reduce to a very small margin. The range of travel times represents the reliability of a roadway to provide efficient transportation to users. When the range, or difference in expected travel times decreases, the reliability of that roadway can be said to increase or improve.

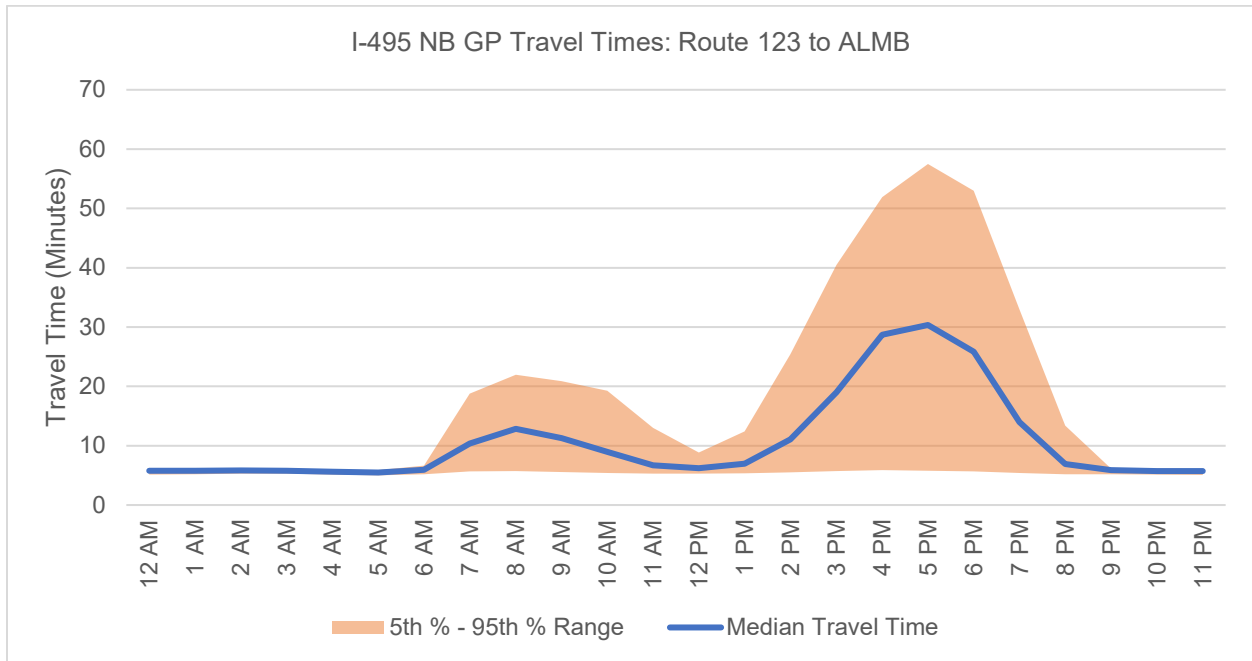


Figure 2-15: I-495 Northbound GP Travel Times Observed between July 2017 and June 2018 from Route 123 to ALMB

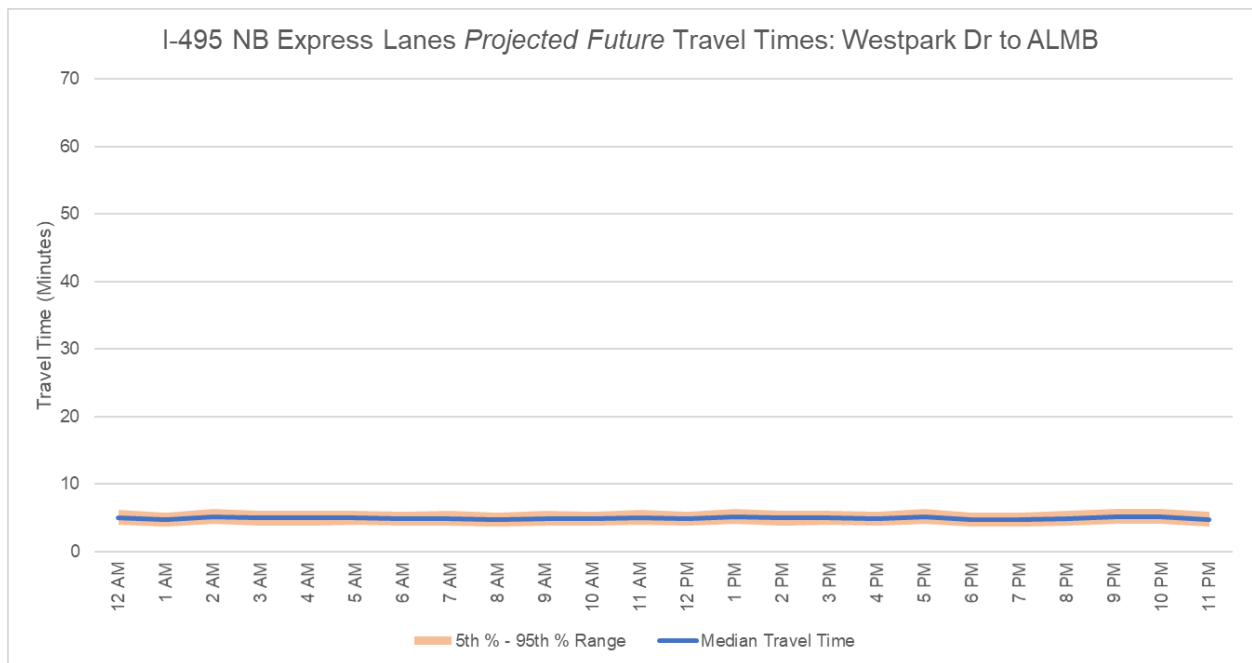


Figure 2-16: I-495 Northbound Express Lanes Projected Future Travel Times in 2045 from Westpark Drive to AMLB

3.0 REFERENCES

Virginia Department of Transportation (VDOT). (2020). *I-495 Express Lanes Northern Extension Traffic and Transportation Technical Report*.