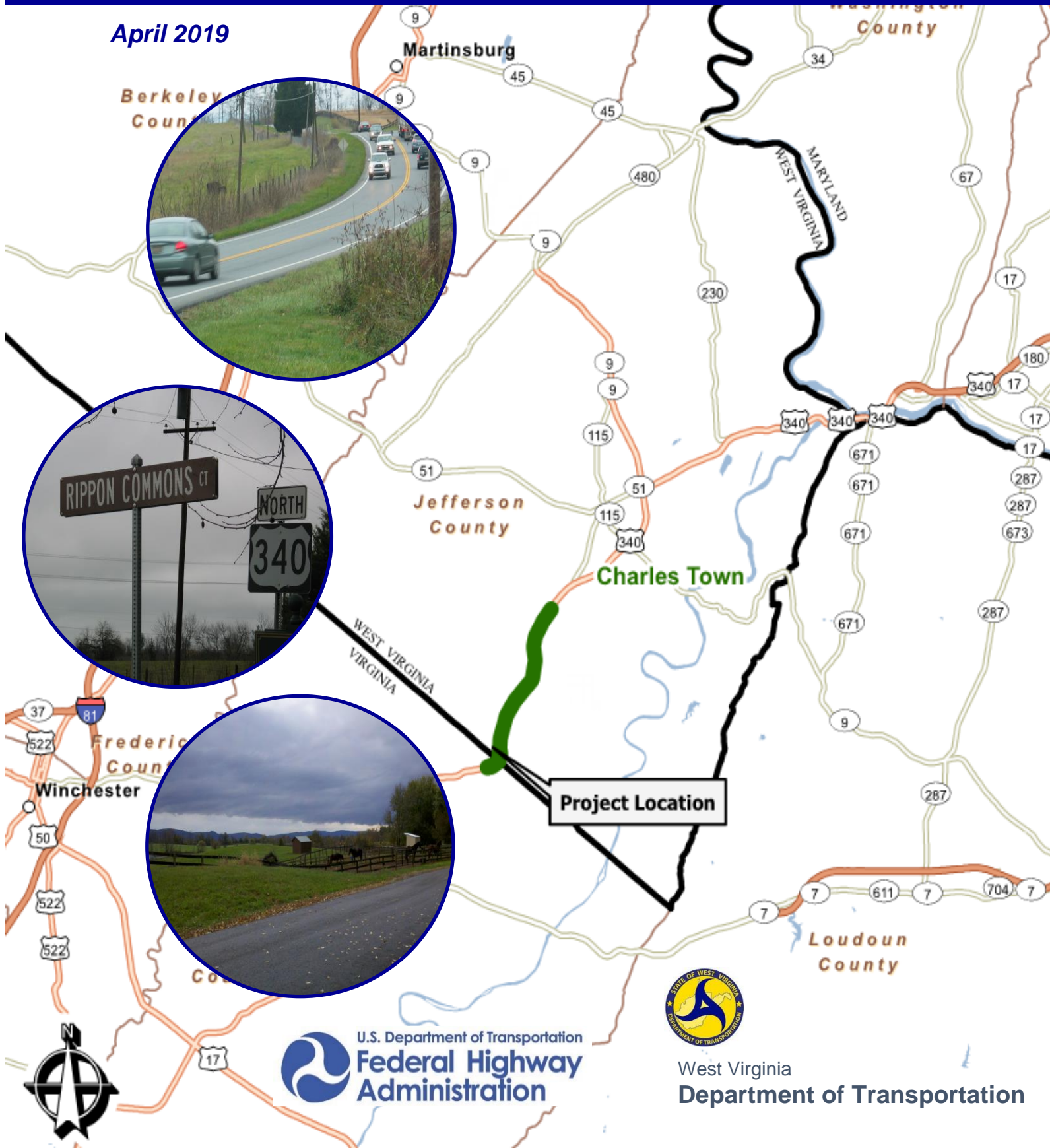


Final Environmental Impact Statement

US 340 Improvement

Jefferson County, West Virginia

April 2019



SECTION III
Alternatives

III. ALTERNATIVES

At the outset of this project, four broad-ranged alternatives were established for consideration. These included the Mass Transit Alternative, the Transportation Systems Management (TSM) Alternative, the No-Build Alternative, and the Build Alternative. The Build Alternative includes the construction of a partially controlled access four-lane divided highway with a depressed median.

The Mass Transit Alternative and the TSM Alternative were eliminated from further consideration because they do not serve the needs of the project or have been determined not to be prudent alternatives. The TSM Alternative does not address the capacity or roadway continuity needs. The Mass Transit Alternative does not have sufficient ridership to eliminate the need for roadway capacity improvements. According to “Envision Jefferson 2035,” land development patterns have created a more automobile dependent community. There is a lack of safe bike and pedestrian connections in the County and funding of new facilities remains a challenge. Commuter rail is available nearby via the Maryland Area Regional Commuter (MARC) Brunswick Line. Three round trips per day are provided with stops in Duffields and Harpers Ferry.

The No-Build Alternative involves maintenance of the existing two-lane rural arterial highway but no capacity improvements to the roadway are made. The No-Build Alternative does not address the many roadway deficiencies that currently exist along the facility, nor does it address safety or operations based on future travel demand based on the following:

- Currently and as described in Section II, US 340 in the project area operates at an unacceptable Level of Service (LOS) E. By the design year, travel conditions will continue to deteriorate as traffic volumes increase from 15,200 vehicles per day to 21,600 vehicles per day. The delay per vehicle will get worse although the level of service will remain in the unacceptable LOS E range.
- The *Envision Jefferson 2035 Comprehensive Plan* cites the lack of road improvements as a major restraint on the economic growth of the County. Better access via interstate highways and other four-lane roadway facilities could make Jefferson County more attractive to prospective businesses and industries. Improving this section of US 340 will serve to support the *Envision Jefferson 2035 Comprehensive Plan*.

- Existing roadway elements, which are considered substandard using current design standards, also create undesirable driving conditions along this section of US 340. These deficient roadway elements include variable shoulder widths, narrow travel lanes, limited passing zones, steep side slopes, lack of turn lanes, and unprotected fixed objects such as culvert headwalls and trees.
- The accident rate in one of eight segments analyzed along the project is five times higher than the statewide rate for similar routes in West Virginia. The injury rate in two of the eight segments exceeds the statewide average for similar routes. The Severity Index meets or exceeds the statewide average in three of eight segments analyzed.

Based on the above discussion, the No-Build Alternative does not meet the purpose and need of this project. However, it is retained for comparative purposes as shown on Table III-3.

A brief history of the Build Alternative follows. In November 2001, a Draft Environmental Impact Statement (DEIS) was approved and published. Eight build alternates (Alternates 1-8) were presented in the DEIS and six (Alternates 1, 3-6, and 8) were evaluated in detail. Alternates 6 and 8 were presented at a Public Hearing in January 2002 as the recommended alternates for implementation. For the full descriptions and analysis of the original build alternates, please review the approved DEIS that is provided on a compact disc inside the back cover of this FEIS.

In response to public input received from the 2002 hearing, an additional concept, Alternate 9, was developed to avoid the Kabletown Rural Historic District and the Ripon Lodge historic property. Alternate 9 required relocation of the Norfolk Southern Railroad between CR 19 (Withers and Larue Road) and CR 340/2 (Wheatland Road). An Informational Public Workshop was conducted in July 2002 to present Alternate 9 along with Alternates 6 and 8.

Following the 2002 Workshop, further evaluations related to the federally-protected historic resources west of US 340 were completed. The Bullskin Run Rural Historic District and Shenandoah Valley Railroad (Norfolk Southern Railroad) were found to be eligible for the National Register of Historic Places (refer to Exhibit V-5). Alternate 6 was eliminated due to the total number of business and residential relocations (10) and the impacts on historic resources including Rippon Lodge, Wheatland Farm, Kabletown Rural Historic District, and the Bullskin Run Rural Historic District. The elimination of Alternate 8 was due to the total number

of business and residential relocations (8), the impacts on historic resources, including Kabletown Rural Historic District, Bullskin Run Rural Historic District, William Grubb Farm, and the Norfolk Southern Railroad, and the high costs of both construction and long-term maintenance associated with two grade separation structures over the railroad. Alternate 9 was eliminated from further consideration due to having a high number of business and residential relocations (14 total), impacts on historic resources, including Kabletown Rural Historic District, Bullskin Run Rural Historic District, William Grubb Farm, and the Norfolk Southern Railroad, and the high cost of construction due to relocating 17,000 feet of the Norfolk Southern Railroad. Every Build Alternate, including those previously eliminated, will impact historic properties and/or districts, therefore all alternates were once again reviewed and Alternate 4, originally eliminated due to its impact on the Kabletown Rural Historic District, survived and was chosen as the Preferred Alternate. The Alternate 4 alignment, east of US 340, avoided Ripon Lodge and minimized the number of residential and business relocations that include contributing structures that are eligible or listed in the NRHP. The build alternates, along with their primary reason(s) for being eliminated are listed below:

- Alternate 1 - With an alignment west of existing US 340, it would have a direct impact on Ripon Lodge, a NHRP listed property.
- Alternate 2 - The alignment follows the existing US 340 through the Village of Rippon and right-of-way impacts are significant.
- Alternate 3 - Similar to Alternate 1, the alignment west of existing US 340 would have a direct impact on Ripon Lodge, a NHRP listed property.
- Alternate 5 - The alignment swings to the eastern edge of the project study area and is nearly entirely on new location, it has the greatest right of way impacts and traverses the highest number of eligible historic properties.
- Alternate 6 - With an alignment west of existing US 340 and very near the Norfolk Southern Railroad, it impacts the Shenandoah Valley Railroad and Ripon Lodge, a NRHP listed property.
- Alternate 7 - Similar to Alternates 1 and 3, the alignment west of existing US 340 would have a direct impact on Ripon Lodge, a NHRP listed property.

Alternate 8 - With an alignment west of existing US 340 and west of the Norfolk Southern Railroad (with two rail crossings), it directly impacts the Shenandoah Valley Railroad. Additionally, it would be the most costly to construct and maintain over the life of the project.

Alternate 9 - With an alignment west of existing US 340, near the Norfolk Southern Railroad, and requiring the relocation of 17,000 feet of railroad track, it directly impacts the Shenandoah Valley Railroad and would be one of the most costly to construct.

As a result of decreased available funding, the US 340 project was placed on hold. During this time, the project study area experienced residential growth and development. Due to the growth and development within the area of Alternate 4, and a desire to potentially further minimize impacts to historic resources, two modifications of Alternate 4 (Alternates 4A and 4B) were developed. These modifications include a slight westerly shift of Alternate 4, identified as Alternate 4A, to further minimize impacts to the Byrdland Historic Property and residential properties, as well as an easterly shift of Alternate 4, identified as Alternate 4B, to further minimize impacts to the Village of Rippon Historic District and residential properties. A Public Information Workshop was held on September 24, 2012, to present these modifications to Alternate 4 to the public, update the public on the project status, and gather input and feedback from the public. Verbal and written comments received at the workshop expressed opposition to Alternates 4, 4A, and 4B due to their impacts to the Ryan's Glen subdivision and the proposed Rippon Commons subdivision and a desire by the public for all previous alternates to be re-evaluated using current data and conditions.

Additional build alternates (Alternates 4C, 10A, 10B, and 11) were created in response to public input received at the 2012 workshop. These alternates, along with Alternates 4, 4A, and 4B, were presented at a Public Hearing in June 2013. These alternates are displayed in Exhibit III-2. WVDOH and FHWA have agreed that these alternates should be discussed in a Supplemental Draft Environmental Impact Statement (SDEIS). FHWA placed a Notice of Intent in the Federal Register on January 14, 2014 to prepare a Supplemental Draft Environmental Impact Statement.

In July 2016, the SDEIS was approved by the West Virginia Division of Highways and the Federal Highway Administration. Alternate 4A was presented as the Preferred Alternate on the

basis of relocations, new right of way required, impacts on historic resources, and overall costs. A combined public workshop/public hearing was held in Charles Town on August 30, 2016. There were 65 attendees and nine speakers at the formal public hearing. Overall, there was general support for the improvements and, in particular, Alternate 4A.

Agencies, including West Virginia Division of Environmental Protection, US Army Corps of Engineers, West Virginia Division of Culture and History, and the United States Environmental Protection Agency, concurred with the original Purpose and Need for the project.

A. BUILD ALTERNATIVE

1. Build Alternative Design Criteria

Projected traffic volumes for this roadway corridor indicate that a four-lane facility is needed in order to address future travel demand and improve safety through the project area. The proposed typical section for this project is shown in Exhibit III-1. It will tie to the existing four-lane sections that exist to the south in Clarke County, VA and north of Wheatland, WV. A divided highway with a 40-foot depressed median is proposed throughout the length of the facility. The facility is designed in accordance with the AASHTO's *A Policy on Geometric Design of Highways and Streets*. The design speed is 60 miles per hour. All proposed profile grades are well below the maximum allowable grade of 4 percent. All horizontal curvature is above the minimum radius of curvature of 1,528 feet. The Design Criteria are listed in Table III-1.

2. Build Alternates 4, 4A, 4B, 4C, 10A, 10B, and 11

The seven build alternates considered for evaluation in the SDEIS are shown on Exhibit III-2 and described in detail in the following sections.

Alternate 4 - Beginning south of the Virginia-West Virginia state line, where the existing 4-lane US 340 begins to transition to two lanes, Alternate 4 generally follows the existing alignment to a point north of CR 340/1. Here it departs the existing alignment and veers easterly crossing CR 21 approximately 650 feet east of the existing US 340 and bypasses the Village of Rippon to the east. The new alignment then turns northerly and rejoins the existing US 340 alignment south of Bullskin Run Creek. Alternate 4 then follows existing US 340, with some minor curvature improvements near the intersection of CR 340/2, to the 4-lane divided highway north of Wheatland. The total length of Alternate 4 is 4.6 miles. Exhibit III-3 shows the location of Alternate 4.

Table III-1: Design Criteria

Description	Mainline	Major Access Roads
Class of Highway	Rural Arterial	Rural
Type of Terrain	Rolling	Rolling
Design Speed	60 mph	40 mph
Required Stopping Sight Distance	570 feet	325 feet
Design Stopping Sight Distance	725 feet	
ADT Present (2011/2012)	12,900	
ADT Future (2033)	19,000	
DHV (2015)	1,420	
D%	55/45	
%T (DHV)	10%	
K	10%	
Maximum Grade	4.0%	8.0%
Minimum Radius	1,200 feet	444 feet
Maximum Superelevation	0.08	0.08
Roadway Width:	4 lanes @ 12 feet ea.	
Median Width:	40 feet (Depressed)	
Shoulder Width:	Outside - 12 feet (10 feet Paved) Inside - 6 feet (3 feet Paved)	
Access spacing	2,000 feet Minimum	

Source: AASHTO, *A Policy on Geometric Design of Highways and Streets*, 2011.

Alternate 4A (Preferred) - Beginning south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, Alternate 4A generally follows the existing roadway for a length of 1.4 miles. The alignment then turns east away from the existing roadway and crosses CR 21 (Meyerstown Road) on the east side of the community of Rippon, but just to the west of Alternate 4. Alternate 4A turns north and merges with the existing alignment near Wheatland. The proposed improvement continues northward along the existing roadway and ends at the multilane divided segment of US 340 south of Charles Town. The approximate length of Alternate 4A is 4.5 miles. Exhibit III-4 shows the location of Alternate 4A.

Alternate 4B - Alternate 4B begins south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, and generally follows the existing roadway for a length of 1.4 miles. The alignment then turns east away from the existing roadway and crosses CR 21 (Meyerstown Road) on the east side of the community of Rippon, and just east of Alternate 4. Alternative 4B turns north and merges with the existing alignment near Wheatland. The proposed improvement continues northward along the existing roadway and ends at the multilane divided segment of US 340 south of Charles Town. The approximate length of Alternate 4B is 4.6 miles. Exhibit III-5 shows the location of Alternate 4B.

Alternate 4C - Beginning south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, Alternate 4C generally follows the existing roadway for a length of 0.9 miles. The alignment then departs the existing US 340 alignment and continues northerly crossing CR 340/1 in the vicinity of Grove Way before making a long, sweeping curve to the right and crossing existing US 340 at Ryan's Glen Drive. It continues on new alignment on the east side of existing US 340 crossing Meyerstown Road approximately 400 feet east of existing US 340. It remains on new location on the east side of Rippon Village and makes a long, sweeping curve to the left through the Rippon Commons subdivision before rejoining the existing US 340 alignment on the tangent in front of Wheatland Farm. It then follows the existing alignment, with some minor improvement to the curvature in front of the Rainbow Diner and Truck stop, and ends at the multi-lane divided segment of US 340 south of Charles Town. The approximate length of Alternate 4C is 4.6 miles. Exhibit III-6 shows the location of Alternate 4C.

Alternate 10A - Alternate 10A begins south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, and generally follows the existing roadway for a length of 0.7 miles. The alignment then departs the existing US 340 alignment and continues northerly crossing CR 340/1 approximately 500 feet east of the railroad. It then runs along the east side of the railroad before turning to the left and crossing the railroad (proposed grade separation) approximately 500 feet south of CR 19 (Withers Larue Road). It continues northward after crossing Withers Larue Road (proposed grade separation) and makes a long, sweeping curve to the right again crossing the railroad (proposed grade separation) north of Rippon Lodge Rural Historic District and south of Allen Lane. It crosses existing US 340 in the vicinity of Allen Lane turning north and then following

the existing alignment until it ends at the multi-lane divided segment of US 340 south of Charles Town. The approximate length of Alternate 10A is 5.3 miles. Exhibit III-7 shows the location of Alternate 10A.

Alternate 10B - Similar to Alternate 10A, Alternate 10B begins south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, and generally follows the existing roadway for a length of 0.7 miles. The alignment then departs the existing US 340 alignment and continues northerly crossing CR 340/1 approximately 500 feet east of the railroad. It then curves to the left near Scooter Lane and runs on the railroad right-of-way (the railroad would be relocated to the west). The alignment continues on railroad right-of-way until it curves to the right north of Rippon Lodge Rural Historic District and south of Allen Lane. It crosses existing US 340 in the vicinity of Allen Lane turning north and then following the existing alignment until it ends at the multi-lane divided segment of US 340 south of Charles Town. The approximate length of Alternate 10B is 5.2 miles. Exhibit III-8 shows the location of Alternate 10B.

Alternate 11 - Beginning south of the state line between West Virginia and Virginia where the existing 4-lane US 340 begins to transition to two lanes, Alternate 11 generally follows the existing roadway for a length of 0.9 miles. The alignment then curves to the right departing the existing US 340 alignment and runs between Olive Boy Farm and Ryan's Glen subdivision. It then curves to the left around Glenwood, Wayside Farm and Rippon Commons subdivision. It continues northerly until it rejoins the existing US 340 alignment on the tangent in front of Wheatland Farm. It then follows the existing alignment, with some minor improvement to the curvature in front of the Rainbow Diner and Truck Stop, until it ends at the multi-lane divided segment of US 340 south of Charles Town. The approximate length of Alternate 11 is 5.1 miles. Exhibit III-9 shows the location of Alternate 11.

B. BUILD ALTERNATE COMPARISON

The evaluation process included developing a comparative summary of the impacts based on the detailed environmental studies prepared for each of the seven alternates considered in the SDEIS phase of the project. Table III-3 identifies the categories that are considered to be important when comparing alternates and quantifies the impact in each category for each alternate. Details of these impacts are presented in Section IV. By ranking each of the seven alternates under each category on a scale from 1 - 7, with 1 being the least impact and 7 being

the greatest impact, a total can be calculated, effectively ranking each alternate based on the extent of impacts with no weighting of the categories. While this is purely a quantitative method of analysis, judgment and subjectivity will be employed to select a Preferred Alternate.

C. ANALYSIS OF BUILD ALTERNATES

The Comparative Summary Table (Table III-3) and Rank of Alternates Table (Table III-2) were utilized to perform an analysis of the build alternates. Each of the alternates is discussed below along with a determination on whether or not the alternate should be eliminated or retained for further consideration. It is important to note that each of the seven alternates under consideration satisfies the project purpose and need by:

1. Connecting to the existing 4-lane highway at either end,
2. Addressing existing roadway deficiencies by meeting project design criteria specified by AASHTO,
3. Improving traffic operations with additional travel lanes and exclusive turn lanes,
4. Improving safety through improved sight distance, additional lanes for passing, and adding turn lanes to remove turning/stopped vehicles from through travel lanes.

Table III-2 identifies the categories used for ranking the alternates and shows the quantities and rank in each of the individual categories. The categories or criteria for ranking were selected from both the human and natural environmental topics that were evaluated in the analysis of alternatives. All categories received a weighting of "1" meaning that no one category was weighted more than any other. Total points were obtained by simply adding the rank from each of the categories for each of the alternates and is provided at the bottom of the table.

Alternate 4 received an overall rank of 1 when compared to the other seven alternates. It has the fifth highest number of relocations (business and residential) but requires the least amount of new right-of-way. It has a rank of 3 for impacts to the number of acres within historic resources, requiring acquisition within three historic districts, Summit Point Battlefield, and five individual historic property boundaries. Alternate 4 has the least impact on streams and second least impact on wetlands compared to the other build alternates. It had the least impact to floodplains and farmlands. Alternate 4 was also the least costly of the seven build alternates. Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing,

eight comments favored Alternate 4 while four opposed all build alternates. Alternate 4 will be retained for further consideration based on the low overall cost, low number of relocations, low impacts on historic resources, and low impacts to wetlands.

Table III-2: Rank of Alternates

Description	Alternate						
	4	4A*	4B	4C	10A	10B	11
Residential Relocations (#)	10	3	5	14	12	8	8
Rank	5	1	2	7	6	3	3
Business Relocations (#)	4	4	4	3	3	4	5
Rank	3	3	3	1	1	3	7
Right of Way (Acres)	112	116	120	140	153	156	137
Rank	1	2	3	5	6	7	4
Hist. Arch Resources (Acres)	218	239	236	253	169	192	239
Rank	3	5	4	7	1	2	5
Wetlands (Acres)	0.354	0.327	0.407	0.432	0.417	0.417	0.381
Rank	2	1	4	7	5	5	3
Floodplains (Acres)	5.1	6.1	6.3	6.3	6.0	6.0	6.0
Rank	1	5	6	6	2	2	2
Streams (LF)	578	743	743	722	697	697	697
Rank	1	6	6	5	2	2	2
Farmlands (Acres)	98	104	112	126	132	133	122
Rank	1	2	3	5	6	7	4
Cost - Right of Way (\$**)	10.6	13.8	15.3	16.4	14.9	20.3 ¹	13.6
Rank	1	3	5	6	4	7	2
Cost - Construction (\$**)	36.5	36.1	35.6	37.6	62.1	42.4 ¹	39.6
Rank	3	2	1	4	7	6	5
Total Points	21	30	37	53	40	44	37
Overall Ranking	1	2	3	7	5	6	3

* Preferred Alternate

** Multiply table value by 1,000,000 to get estimated cost.

¹ Cost does not reflect relocation of 12,500± linear feet of railroad

Alternate 4A (Preferred) has an overall rank of 2 when compared to the other alternates under consideration. It has the least number of relocations (residential and business) and the second least number of acres required for right-of way. Alternate 4A has a rank of 5 with impacts to 239 acres of historic resource boundaries. It has the least impacts to wetlands, is tied with Alternate 4B for most linear impacts to streams, and second lowest in total construction cost (\$49,920,000). Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, three comments favored Alternate 4A while four opposed all build alternates. Alternate 4A will be retained for further consideration based on low number

of relocations, low acreage of right of way needed, low impacts to historic resources, and low overall costs.

Alternate 4B has an overall rank of 3 compared to the seven alternates under consideration. It has the second least number of relocations (residential and business) and the third least number of acres required for right-of way. Alternate 4B is third most in impacted acreage within historic resource boundaries (236 acres). It ranks fourth in impacts to wetlands but tied with Alternate 4A for most linear impacts to streams. It has the third lowest total impacts to farmlands and third lowest total cost (\$50,850,000). Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, one comment favored Alternate 4B while four opposed all build alternates. Alternate 4B will be retained for further consideration based on the low overall cost, low number of relocations, and lower acreage of right of way required.

Alternate 4C received an overall rank of 7 compared to the other alternates under consideration. It has the highest number of business/residential relocations and requires the third highest total acreage for right of way (140 acres). It has the highest impact to acreage within historic resource boundaries (253 acres). It ranks seventh with the most impacts to wetlands, tied with Alternate 4B for most impacts to floodplains, and third highest in linear impacts to streams. It has the third highest total impacts to farmlands and third highest total cost (\$53,975,000). Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, three comments favored Alternate 4C, two comments were opposed, and four opposed all build alternates. Due to the high extent of impacts, Alternate 4C has been eliminated from further consideration.

Alternate 10A received an overall rank of 5 compared to the other alternates under consideration. However, it will have the second highest number of business/residential relocations and require the second highest total acreage for right of way (153 acres). Additionally, it has the highest total cost (\$76,970,000 for right of way and construction) out of the seven alternates. Because of the construction of two grade separation structures over the historic Shenandoah Valley Railroad (currently the Norfolk Southern Railroad) and one grade separation over Withers Larue Road, Alternate 10A will likely have the highest long term maintenance costs as well. Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, 13 comments opposed Alternates 10A and 10B while four opposed all build alternates. For reasons stated above, Alternate 10A has been eliminated from further consideration.

Alternate 10B received an overall rank of 6 compared to the other seven alternates being considered. It was highest in amount of right of way needed (156 acres) and correspondingly, highest in right of way cost (\$20,310,000). It was also highest in total acreage of farmlands (82 acres of prime and unique and 51 acres of statewide and locally important). The total cost of Alternate 10B is second highest at \$62,690,000, trailing only Alternate 10A. Additionally, the cost included in Tables III-2 and III-3 does not include the cost of relocating 12,500 FT of railroad which would likely vault Alternate 10B to the most costly of the seven alternates. Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, 13 comments opposed Alternates 10A and 10B while four opposed all build alternates. For these reasons, Alternate 10B has been eliminated from further consideration.

Alternate 11 was introduced to minimize impacts to individual historic resources and avoid the Ryan's Glen subdivision. Its overall rank is 3 compared to the other alternates under consideration. It ranked highest in the number of business relocations (5) and tied Alternate 10B for third least residential relocations (8). It had the second most impacts to number of acres within historic resources boundaries (239 acres). Alternate 11 had the third least impact to wetlands (0.381 acres) but is tied with Alternates 10A and 10B with the second least impact on streams (697 LF). It also ranked fourth when considering farmlands impacts. The total cost of Alternate 11 (\$53,200,000) has it as the fourth most expensive alternate. Of the 49 written comments received following the June 3, 2013 Public Workshop/Hearing, three comments opposed Alternate 11, seven favored Alternate 11, and four opposed all build alternates. Alternate 11 has been eliminated from further consideration for reasons stated above.

In summary and based on the analysis presented above, build alternates to be retained for further evaluation include Alternates 4, 4A, and 4B. Build Alternates 4C, 10A, 10B, and 11 have been eliminated from further consideration for the reasons stated above. Conceptual design and right of way for the remaining build alternates are shown in Exhibits III-10 through III-12.

D. PREFERRED ALTERNATE

The WVDOH has identified **Alternate 4A** as the "**Preferred Alternate**" for improvements to US 340 in Jefferson County, WV from just south of the State line in Clark County, VA to the Charles Town Bypass, a distance of approximately 4.5 miles.

Alternate 4A begins south of the State line in Clarke County, VA and follows the existing US 340 alignment for approximately 1.4 miles. In Clarke County, VA, construction will occur

within the existing right of way. Once into West Virginia, widening will transition to the west side of the existing highway to minimize impacts to Olive Boy Farm. In this initial section, the alignment will require the acquisition of the Rainbow Café. Approaching CR 38, the alignment transitions across to the east side of the existing highway. As it approaches Ryans Glen Dr., the alignment swings easterly on new location. Two Ryans Glen residences will be displaced due to this alignment. The alignment remains to the east of existing US 340 on new location crossing Meyerstown Road. At Meyerstown Road there is a small segment of the Village of Rippon Historic District that Alternate 4A crosses, displacing a contributing element (Johnson House). The alignment then makes a long sweeping arc to the left around Rippon and cuts off a section of Rippon Commons Ct. It then begins a long transition back towards the existing alignment through the Byrdland historic property. It rejoins the existing US 340 alignment just south of Byrdland Way. Widening occurs to the east of the existing highway crossing Straithmore historic property and taking Dave's Auto Sales. Some "flattening" of the existing horizontal curvature near CR 340/2 is required to meet current design standards. Also, some realignment of CR 340/2 (Wheatland Road) and Straithmore Farm Lane is required to provide safe access to the new facility. The alignment then proceeds northerly to tie to the existing 4-lane highway. Near this northern limit, there is a farm stand that will be displaced.

Alternate 4A has the least number of residential relocations (3) when compared to the remaining alternates under consideration (Alternates 4 and 4B). It has the same number of business relocations (4) as Alternates 4 and 4B. It requires 116 acres of right of way compared to 112 and 120 acres for Alternates 4 and 4B, respectively. Alternates 4 and 4B impact 218 and 236 acres of historic resources while Alternate 4A is slightly higher with impacts of 239 acres. Wetland impacts range from 0.327 – 0.407 acres for the remaining alternates with Alternate 4A at 0.327 acres. Of the remaining alternates under consideration, linear feet of stream impacts are higher for Alternates 4A and 4B while impacts to "active" prime and unique, and statewide and locally important farmlands, i.e. lands that are currently cultivated and used for farming, are second lowest. Total estimated costs for the remaining alternates range from \$47,100,000 for Alternate 4 to \$50,850,000 for Alternate 4B with Alternate 4A estimated to cost \$49,920,000. Using these factors for comparison, WVDOH recommends Alternate 4A as the Preferred Alternate.

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Table III-3: Comparative Summary

Category	Units	No-Build	Build Alternates Remaining			Build Alternates Eliminated from Further Consideration			
			4	4A (Preferred)	4B	4C	10A	10B	11
Roadway Length	Miles	0.0	4.6	4.5	4.6	4.6	5.3	5.2	5.1
Residential Relocations	Total / Minority	0 / 0	10 / 0	3 / 0	5 / 0	14 / 1	12 / -	8 / -	8 / -
Business Relocations	Total / Minority	0 / 0	4 / 0	4 / 0	4 / 0	3 / 0	3 / 0	4 / 0	5 / 0
Non-Profit Relocations	Total	0	0	0	0	0	0	0	0
Right-of-Way	Parcels / Acres	0 / 0	49 / 112	49 / 116	44 / 120	42 / 140	30 / 153	30 / 156	30 / 137
Environmental Justice Impacts	Yes or No	No	No	No	No	No	No	No	No
Potential Hazardous Material Sites	Each	0	3	3	3	3	3	3	3
Historic Architectural Resources	Resources / Acres	0 / 0	9 / 218 ⁶	9 / 239⁶	9 / 236 ⁶	9 / 253 ⁶	8 / 169 ⁶	10 / 192 ⁶	7 / 239 ⁶
Archaeological Resources (Predictive Model)	Sites	0	0	0	0	0	0	0	0
Public Recreational Resources	Sites	0	0	0	0	0	0	0	0
Wetlands	Acres	0.0	0.354	0.327	0.407	0.432	0.417	0.417	0.381
T&E – Indiana Bat / Northern Long Eared Bat / <i>Madison Cave Isopod</i> Known Occurrence in Jefferson Co. Suitable Habitat in Project Area Biological Assessment	Yes or No Yes or No Effect (E) or No Effect (NE)	No / No / <u>Yes¹</u> Yes / Yes / <u>Yes</u> NE / NE / <u>NE</u>	No / No / <u>Yes¹</u> Yes / Yes / <u>Yes</u> NE / NE / <u>E⁴</u>	No / No / <u>Yes¹</u> Yes / Yes / <u>Yes</u> NE / NE / <u>E⁴</u>	No / No / <u>Yes¹</u> Yes / Yes / <u>Yes</u> NE / NE / <u>E⁴</u>	No / No / <u>Yes¹</u> Yes / Yes / <u>Yes</u> NE / NE / <u>E⁴</u>	- - -	- - -	- - -
Floodplains	Acres	0.0	5.1	6.1	6.3	6.3	6.0	6.0	6.0
Streams – Bullskin Run ²	Linear Feet	0	578	743	743	722	697	697	697
Farmlands – Prime & Unique	Acres (Active/Total)	0 / 0	19 / 57	18 / 59	23 / 62	27 / 72	17 / 81	16 / 82	36 / 76
Farmlands – Statewide & Locally Important	Acres (Active/Total)	0 / 0	15 / 41	13 / 45	14 / 50	14 / 54	12 / 51	8 / 51	18 / 46
Noise Impacts	# of Properties	30	2	2	1	1	-	-	-
Air Quality Carbon Monoxide Concentrations (Design Year)	PPM (1-hour / 8-hour)	0.9 / 0.7	0.7 / 0.6	0.7 / 0.6	0.7 / 0.6	0.7 / 0.6	2.3 / 1.4	2.3 / 1.4	2.3 / 1.4
Mobile Source Air Toxics (MSAT) ³	Low or High Potential	Low Potential	Low Potential	Low Potential	Low Potential	Low Potential	Low Potential	Low Potential	Low Potential
Right-of-Way & Utility Cost	Dollars	\$0	\$ 10,600,000	\$ 13,820,000	\$ 15,250,000	\$ 16,375,000	\$ 14,900,000	\$ 20,310,000 ⁵	\$ 13,560,000
Construction Cost	Dollars	\$0	\$ 36,500,000	\$ 36,100,000	\$ 35,600,000	\$ 37,600,000	\$ 62,070,000	\$ 42,380,000 ⁵	\$ 39,640,000
Total Cost	Dollars	\$0	\$ 47,100,000	\$ 49,920,000	\$ 50,850,000	\$ 53,975,000	\$ 76,970,000	\$ 62,690,000 ⁵	\$ 53,200,000

¹ The known occurrences are outside of the project study area.

² The entire length of Bullskin Run is included in the *West Virginia Department of Environmental Protection Draft Section 303(d) List of impaired waters for 2014*.

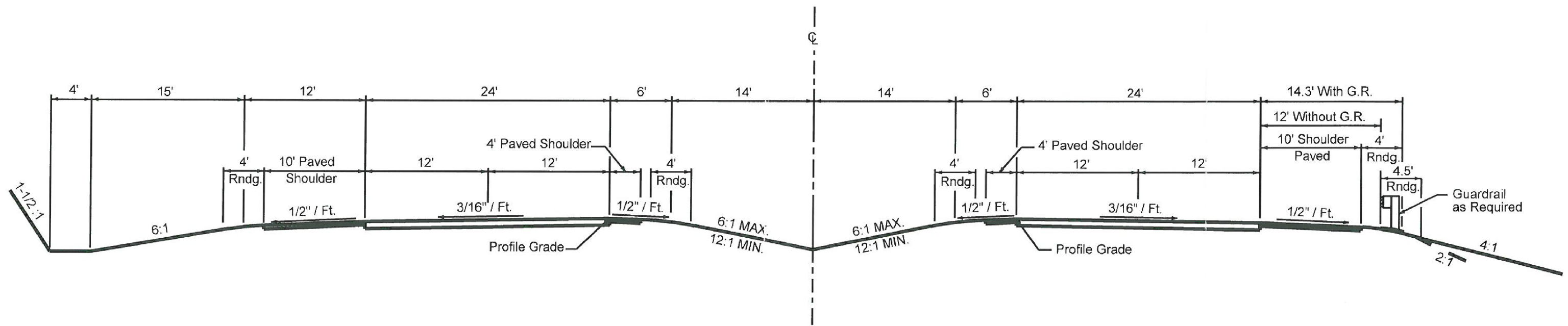
³ The project falls under MSAT Tier 2 for qualitative analysis. Vehicle Miles Traveled and fleet mix under each build alternate are similar therefore no appreciable difference is expected in overall MSAT emissions among the alternates. EPA initiatives on vehicle emissions standards and fuel regulations are projected to reduce annual MSAT emissions despite growth in VMT. Thus the alternates under consideration are given a “Low Potential” to affect MSAT.

⁴ The USFWS has made a “may affect but not likely to adversely affect” determination for the Madison Cave isopod.

⁵ Cost does not reflect relocation 12,500± linear feet of railroad.

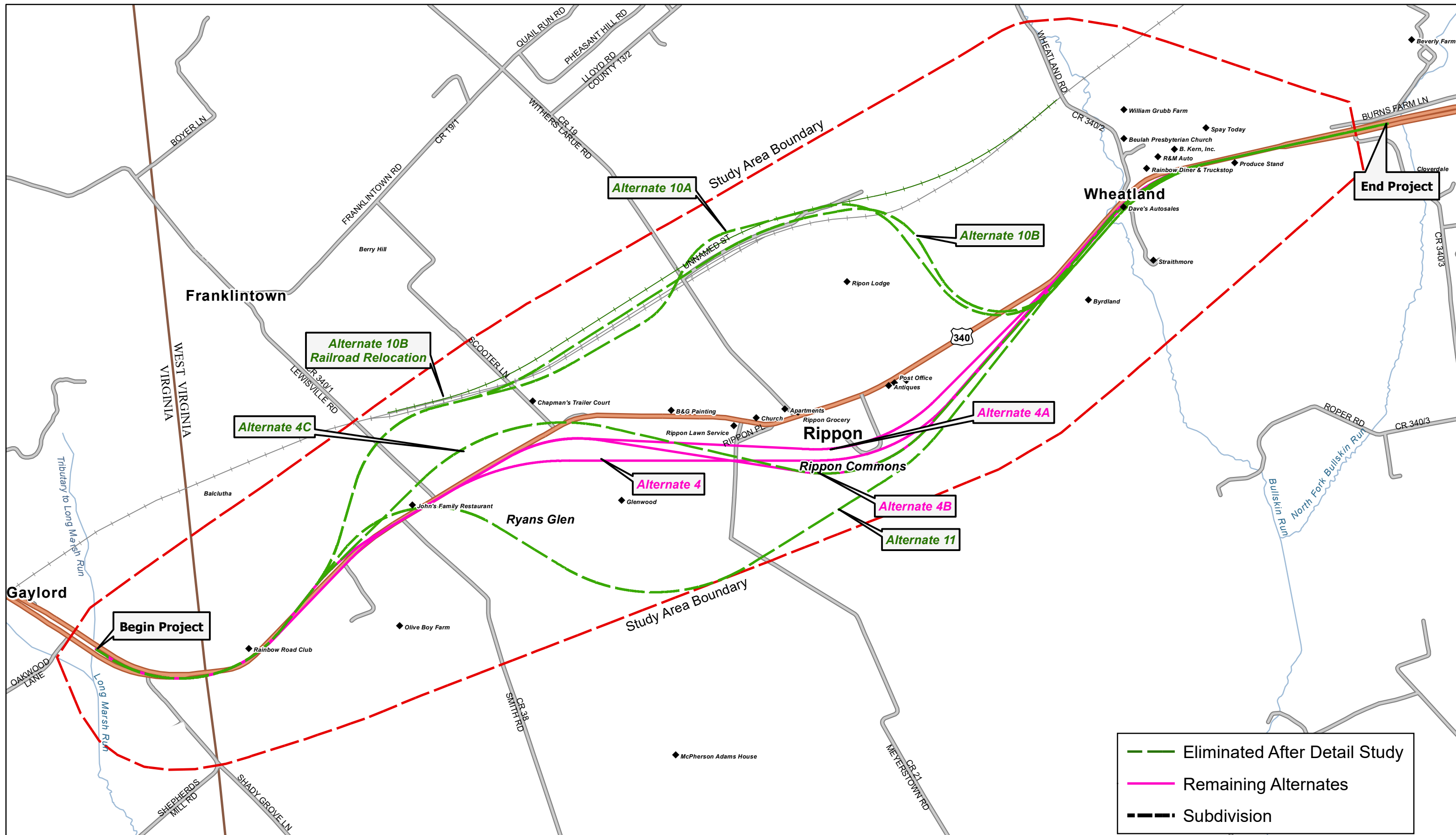
⁶ Due to overlapping boundaries between rural historic districts and individual historic properties, acreages shown may exceed the total right-of-way acreage required.

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**US 340
IMPROVEMENT
STUDY**

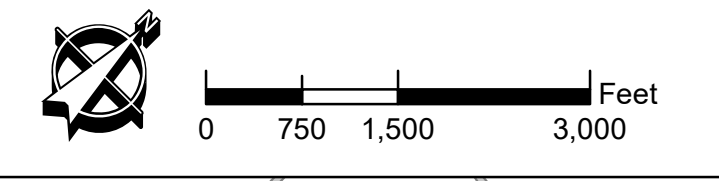
**Proposed
Typical Section**

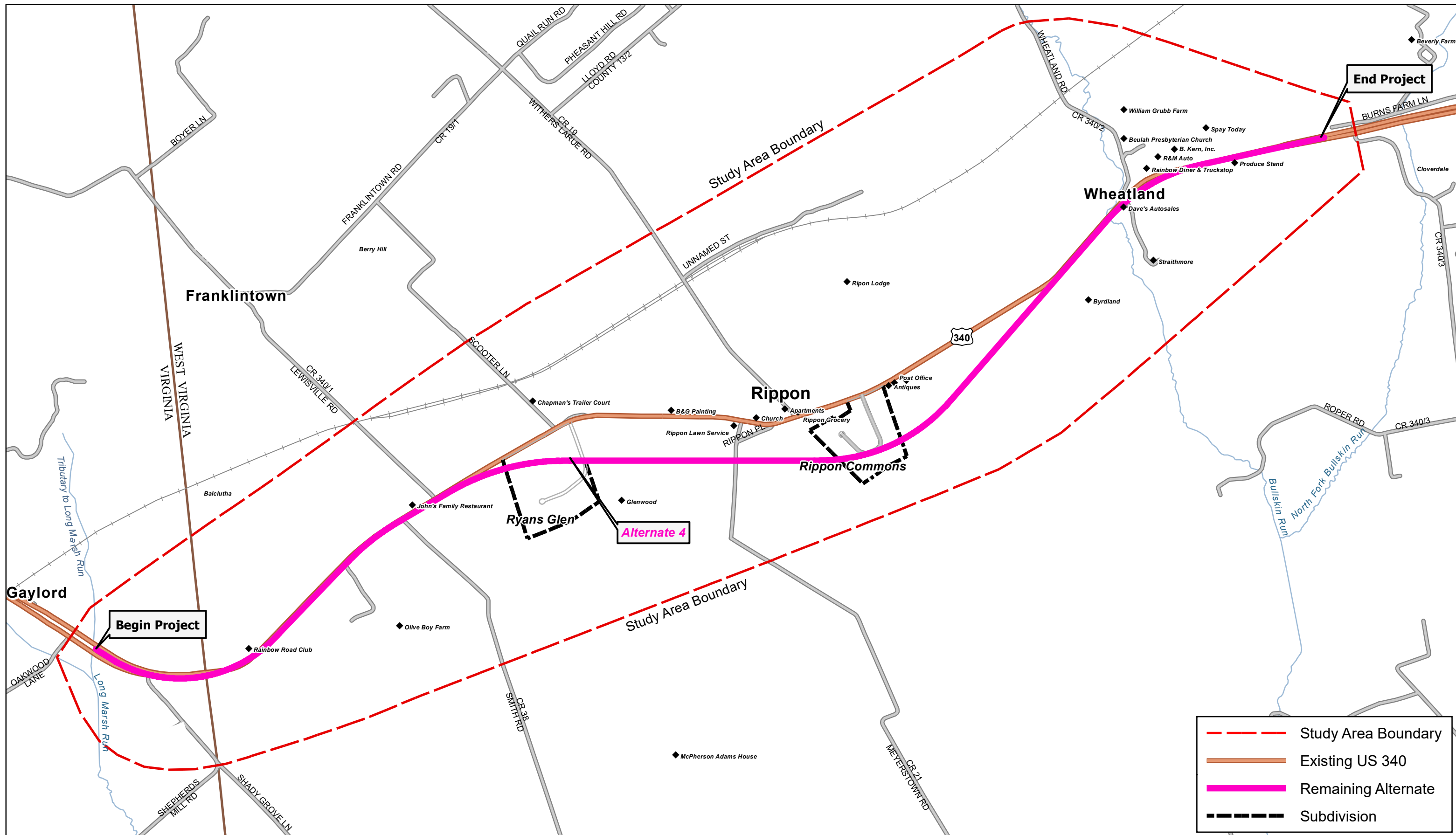


- Eliminated After Detail Study
- Remaining Alternates
- Subdivision

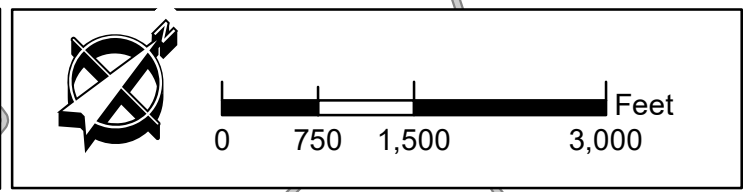
Build Alternate Locations

**US 340
IMPROVEMENT
STUDY**



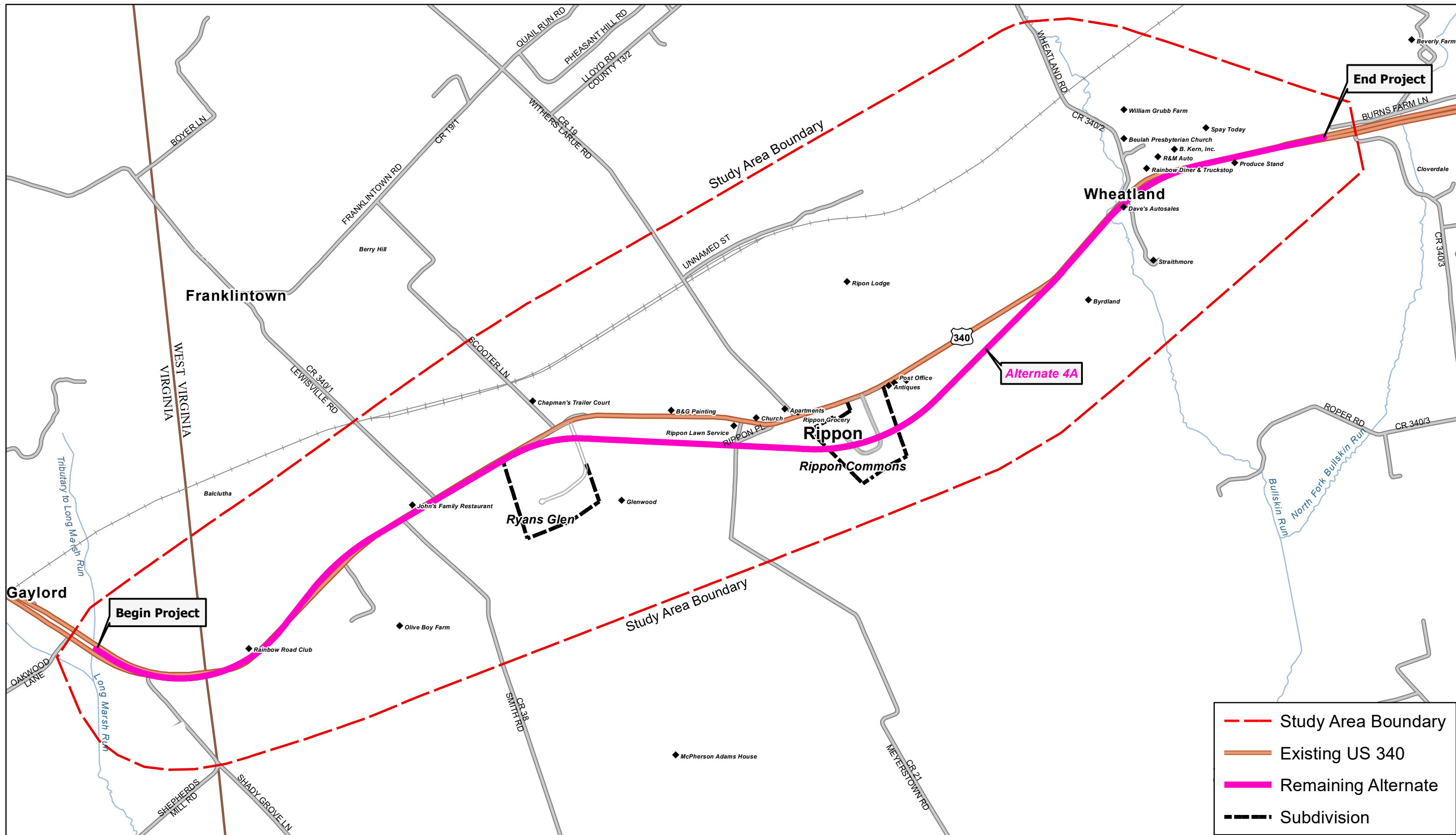


**US 340
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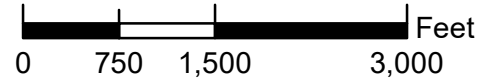


**Build Alternate 4
Location**

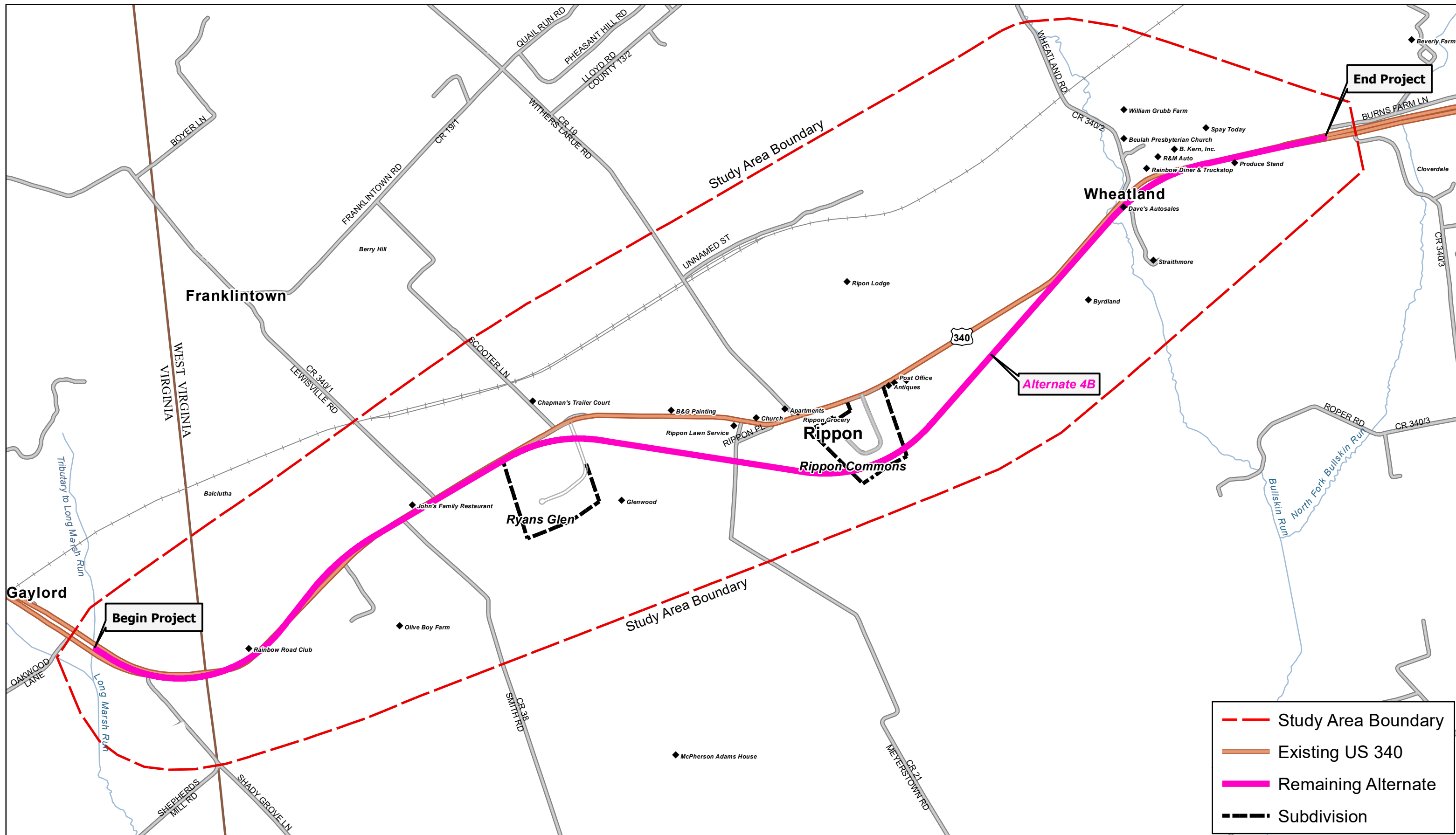
- - - - Study Area Boundary
- Existing US 340
- Remaining Alternate
- - - - Subdivision



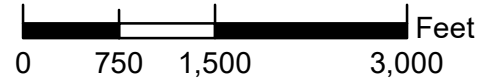
**US 340
IMPROVEMENT
STUDY**



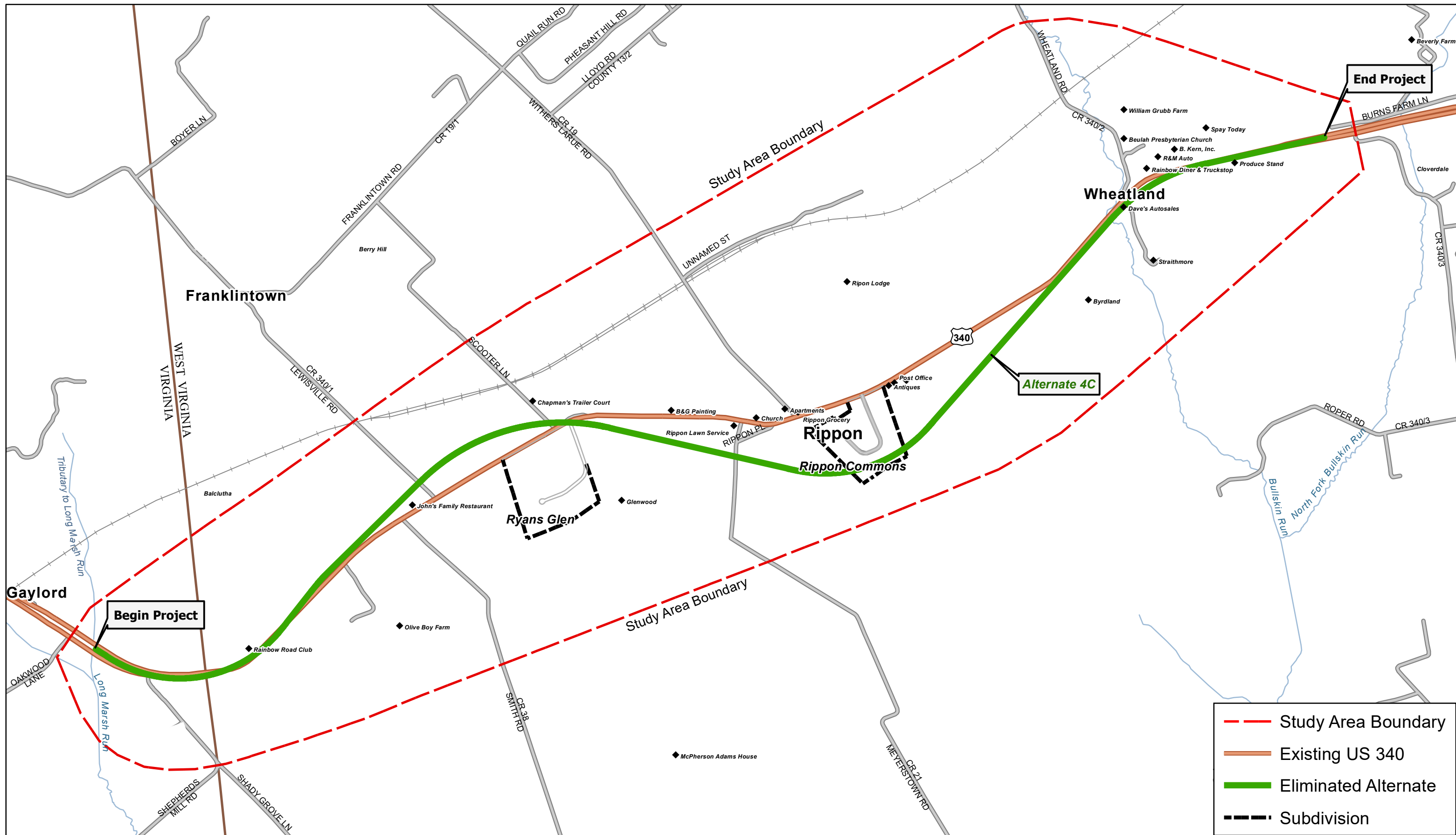
**Build Alternate 4A
Location**



**US 340
IMPROVEMENT
STUDY**



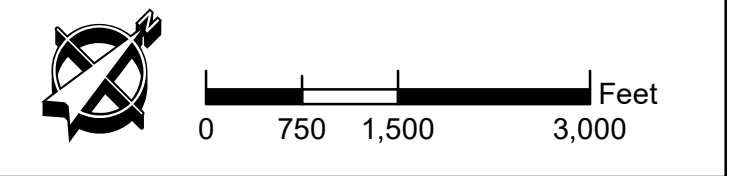
**Build Alternate 4B
Location**

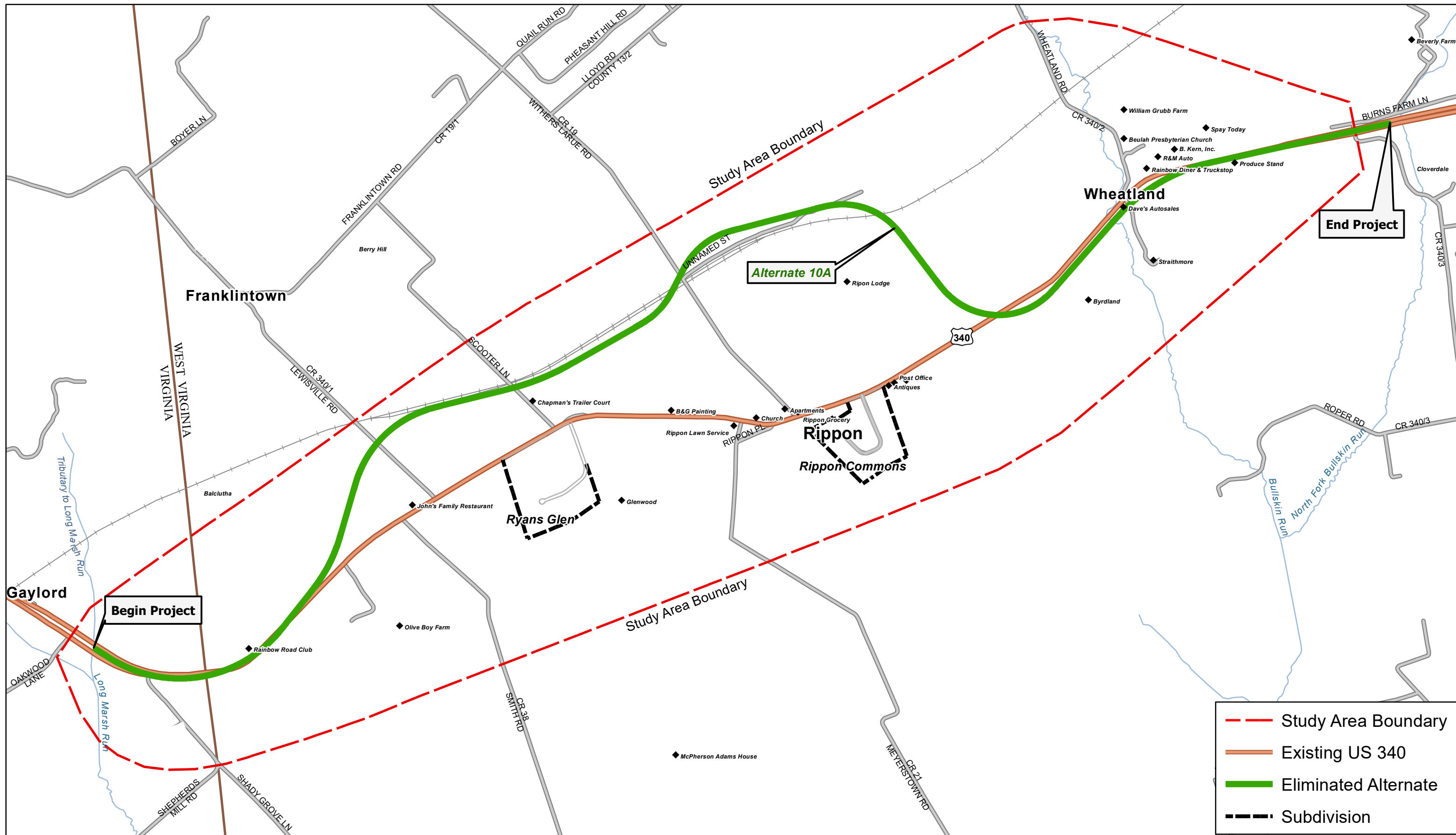


- - - Study Area Boundary
- Existing US 340
- Eliminated Alternate
- - - Subdivision

**Build Alternate 4C
Location**

**US 340
IMPROVEMENT
STUDY**

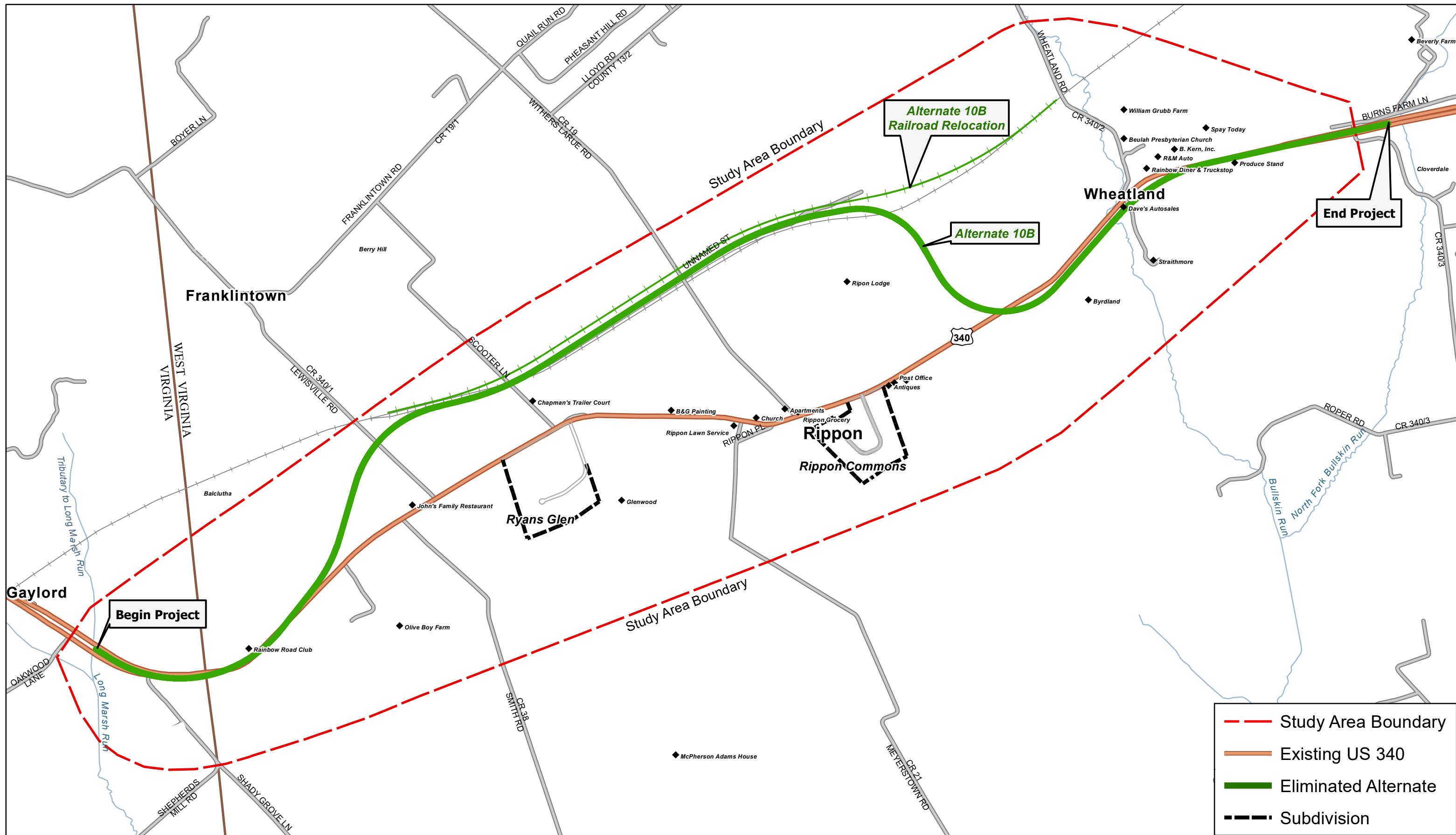




**US 340
IMPROVEMENT
STUDY**



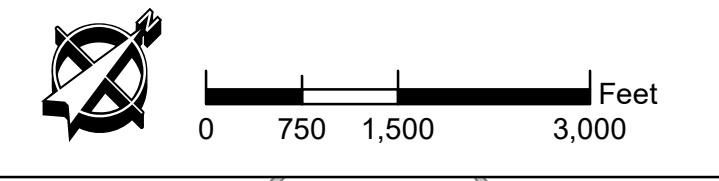
**Build Alternate 10A
Location**

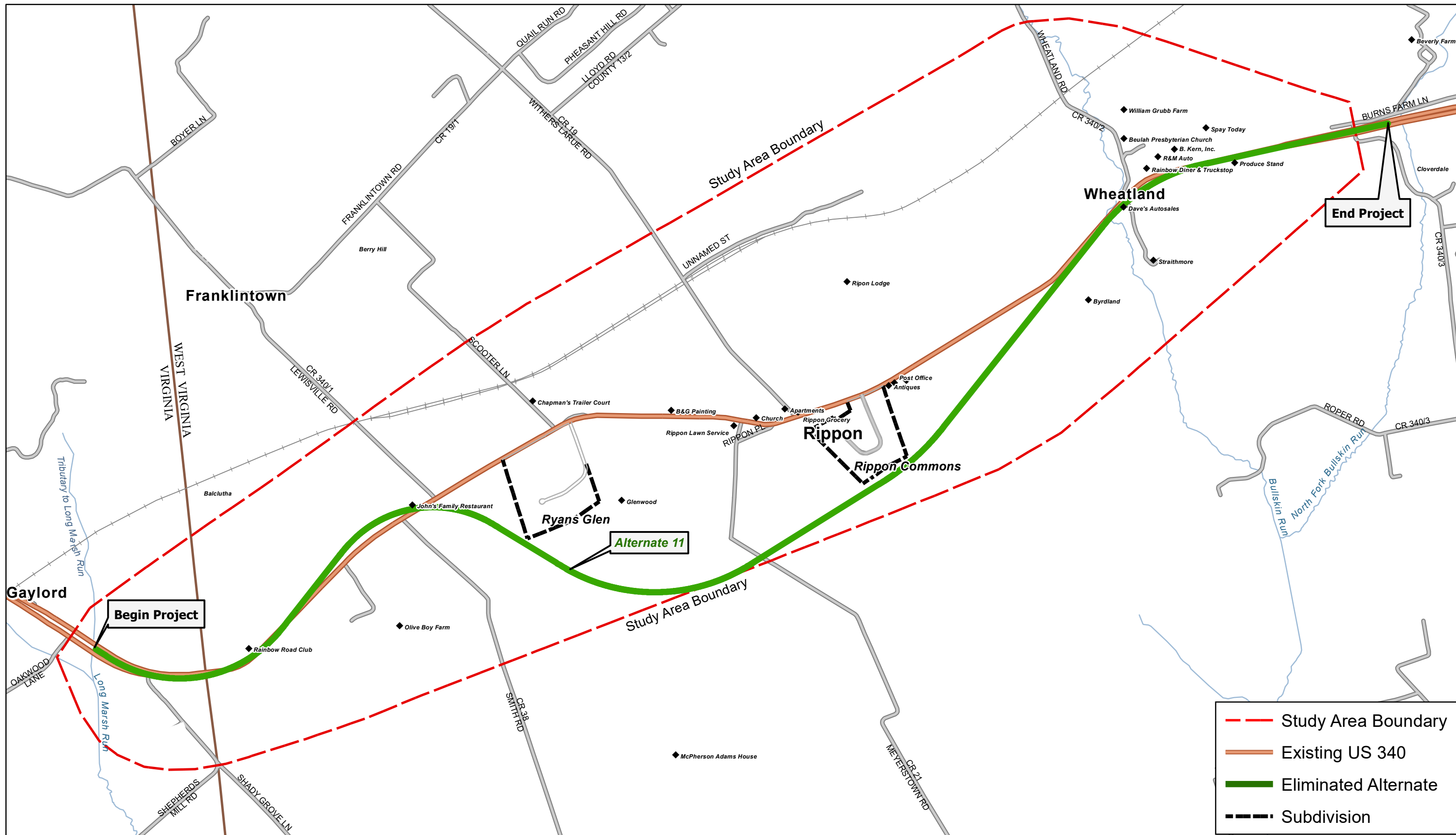


- - - Study Area Boundary
- Existing US 340
- Eliminated Alternate
- Subdivision

**Build Alternate 10B
Location**

**US 340
IMPROVEMENT
STUDY**

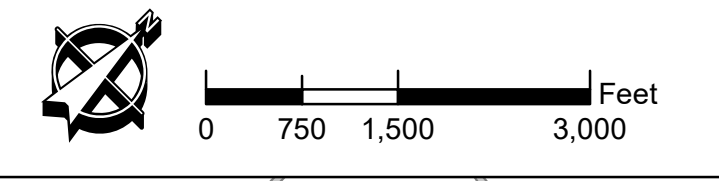




- - - Study Area Boundary
- Existing US 340
- Eliminated Alternate
- Subdivision

**Build Alternate 11
Location**

**US 340
IMPROVEMENT
STUDY**

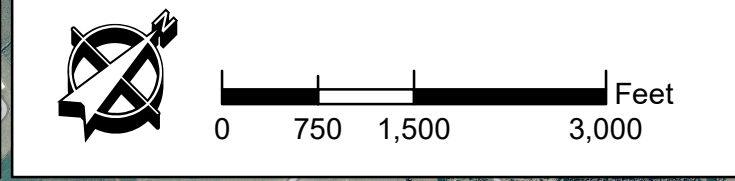




Legend

- Proposed Easement
- Proposed Right of Way
- Edge of Pavement
- Subdivision

**US 340
IMPROVEMENT
STUDY**



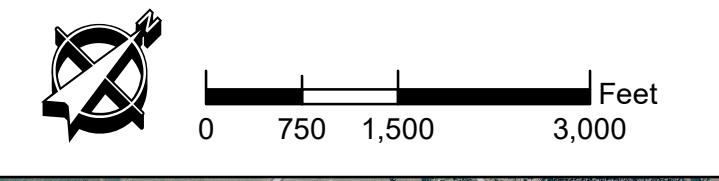
**Build Alternate 4A
Design**



Legend

- Proposed Easement
- Proposed Right of Way
- Edge of Pavement
- Subdivision

**US 340
IMPROVEMENT
STUDY**



**Build Alternate 4B
Design**