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# US 522 Realignment Study

## Phase 1 Summary Findings Report: Preferred Alternative Selection

PREPARED FOR

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NSVRC/WinFred MPO  
400 Kendrick Lane, Suite E  
Front Royal, VA 22630  
540.636.8800

PREPARED BY

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1775 Greensboro Station Drive  
Suite 200  
Tysons, VA 22102  
703.847.3071

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## Study Background

The signalized intersection of US 522 (Front Royal Pike) at US 17/50 (Millwood Pike) and the northbound entrance to I-81 is located in Frederick County, VA, just east of downtown Winchester. The relocation of US 522 along a new alignment incorporating Prince Frederick Drive was among the ancillary network improvements identified in the planning and development of the I-81 Exit 313/US 50 improvements to mitigate existing congestion and accommodate future development. Relocation of US 522 was included in the 2035 Frederick County Comprehensive Plan and was also included in the Vision Plan for the Winchester Frederick County Metropolitan Planning Organization (WinFred MPO) 2040 Metropolitan Transportation Plan.

With traffic volumes at this intersection projected to exceed capacity in the near future, Northern Shenandoah Valley Regional Commission (NSVRC) initiated a study in 2020 to explore options for relocating the connection of US 522 at US 17/50 and thus reduce traffic volumes at this intersection. The purpose of this phase of the study is to explore planning-level realignment alternatives for US 522 south of US 17/50, building from previous studies and through a limited public participation process, to confirm that any future alignment is supportive of both transportation and economic development priorities. The intended outcome of this study phase is a viable alternative developed in accordance with the MPO planning process to advance for further analysis in a subsequent study phase. Figure 1 shows a map of the study area for the US 522 Realignment Study.

**Figure 1: Study Area Map**



This report presents the findings from the first phase of the study, which identified a preferred alternative for the future alignment of a relocated US 522 connection to US 50 through a limited assessment and stakeholder input. As part of Phase 1, the study team conducted the following activities:

- › identified a preliminary set of alignments for the relocated section of US 522;
- › developed high-level cost estimates for each alignment;
- › assessed the preliminary alignments as part of a screening process that resulted in the elimination of alignments deemed infeasible and yielded three viable candidate alternatives;
- › conducted public outreach through a digital survey; and
- › selected a preferred alternative based on findings from impacts analysis, team workshops, survey findings, and input from partner agencies.

The second phase of the US 522 Realignment Study will advance the preferred alternative through capacity assessment, preliminary roadway design, phasing, and working with the nearby Winchester Regional Airport to codify the preferred alternative.

The US 522 Realignment Study team was comprised of representatives from NSVRC, Frederick County, the Virginia Department of Transportation (VDOT), and the consultant, VHB. Throughout the first phase of the study, the study team coordinated with the Winchester Regional Airport, Federal Aviation Administration (FAA), and the Virginia Department of Aviation (VDOA) to assess potential impacts to the airport resulting from any proposed roadway realignment scenarios. The City of Winchester also participated in the process.

At the start of the project, the study team identified the following goals for the US 522 Realignment Study:

- › Divert traffic to reduce congestion at the existing intersection of US 522, US 17/50, and I-81 northbound ramp
- › Limit or avoid impacts to Winchester Regional Airport, including the airport's protection areas
- › Provide alignment alternatives that support future land-uses
- › Solicit public feedback to raise awareness about the study, develop a viable alternative vetted through the MPO planning process, ultimately yielding a community-supported alternative.

## Planning Considerations

Three elements in the study area were particularly important factors in the evaluation of candidate alternatives and selection of a preferred alternative for the relocation of the US 522 connection at US 50.

- › **Future Land Use.** Per the study goals, the team identified alternatives that had the potential to enhance access in the study area and were supportive of development or redevelopment.
- › **Winchester Regional Airport.** This general aviation facility located just southeast of the study area is a key consideration in the viability of any future roadway connection.
- › **Crossover Boulevard.** Currently under construction, Crossover Boulevard will provide an additional east-west connection across I-81 and has significant implications for connectivity in the study area.

### Future Land Use

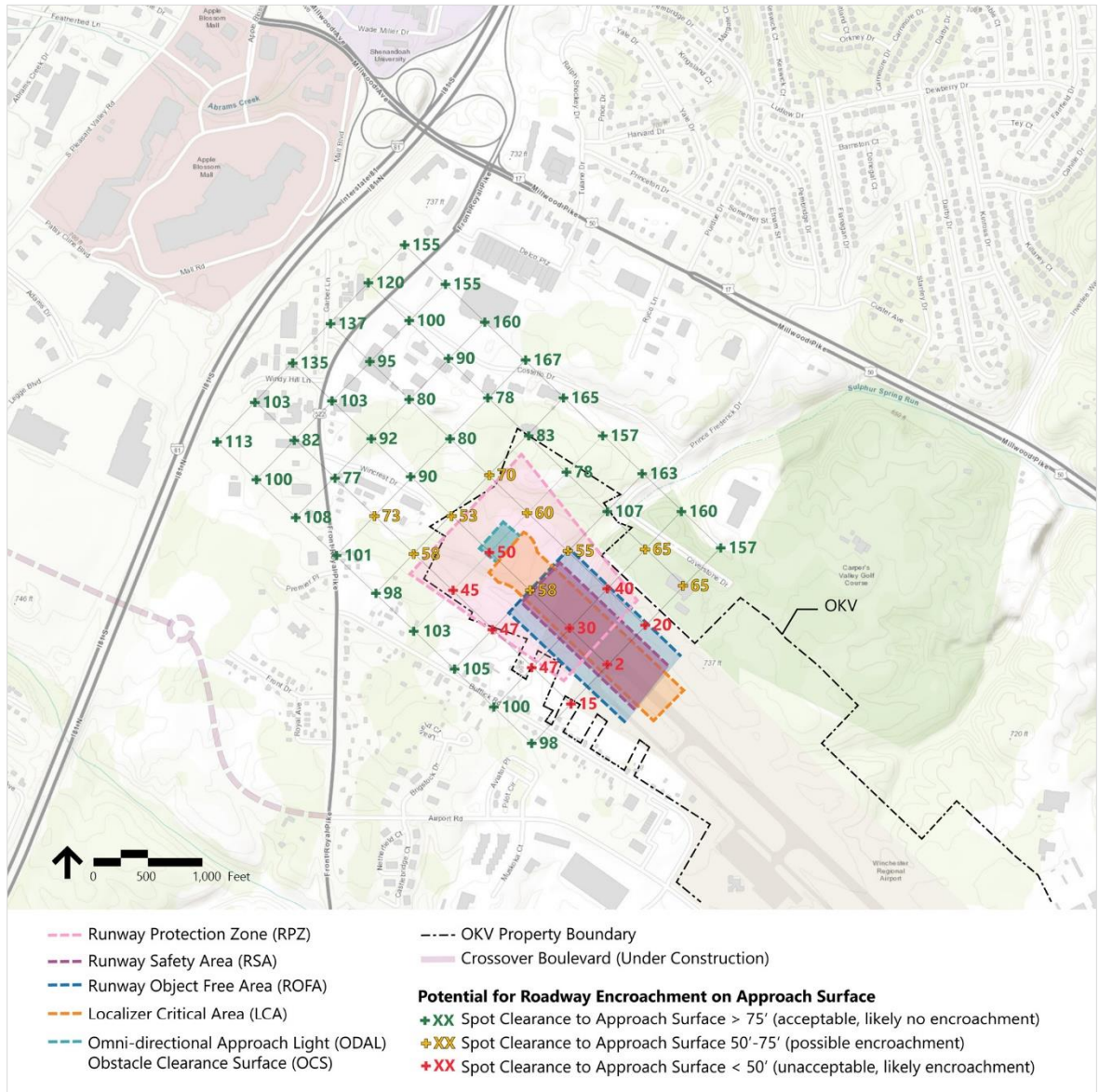
While the northwest corner of the study area is developed, much of the remaining study area has little or no active uses. The 2035 Frederick County Comprehensive Plan envisions increased activity in the area in alignment with the Plan's goals related to office and industrial development that seeks to leverage the county's key highway, air, rail, and inland port assets. Some building turnover and shift of uses has occurred in recent years and redevelopment, along with new development, is likely. While the primary focus of the study was on the new, realigned US 522, it was important to Frederick County that any future roadway be supportive of future land uses within the study area.

The study team focused on configurations and new connections which allow for more moderately sized blocks, compared with the current superblock and limited connectivity which exists in the area today. The team recognizes that many or all of these connector roads may be built by developers, but that identifying them as part of the alternatives ensures that the future network will offer cohesive mobility and circulation.

### Winchester Regional Airport

Winchester Regional Airport is a general aviation facility located approximately a half-mile southeast of the existing intersection of US 522 and US 17/50. The airport itself is approximately 370 acres in size, with additional protection areas that may not be impinged upon for safety and security purposes. For planning purposes as they relate to this study, the most essential of these protected areas is the Runway Protection Zone (RPZ), which is a two-dimensional land use area intended to enhance protection of people and property on the ground. The RPZ may be crossed by a roadway facility but doing so requires justification and FAA approval. Additional protected areas – the Runway Safety Area (RSA), Runway Object Free Area (ROFA), and the Localizer Critical Area (LCA) – may not be impinged upon. Lastly, there is a three-dimensional Approach Surface which must be maintained clear of obstructions. Figure 2 shows a map of the Winchester Regional Airport's protection areas.

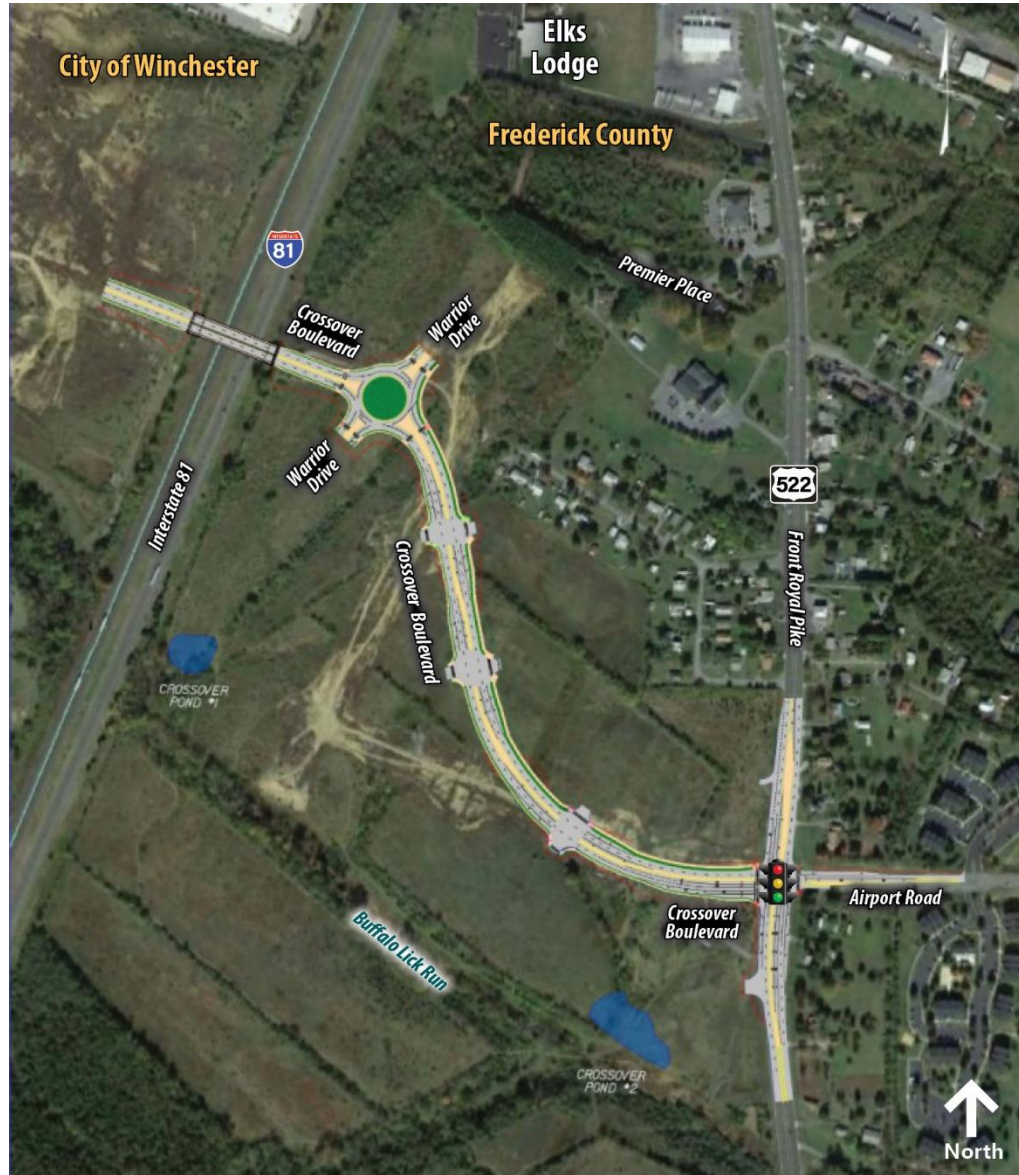
**Figure 2: Winchester Regional Airport Protection Areas**



### Crossover Boulevard

Crossover Boulevard is a new major collector roadway, currently under construction, that will provide critical east-west connectivity across I-81 in the southern portion of the US 522 Realignment Study area. Crossover Boulevard will intersect US 522 at the existing intersection at Airport Road. A roundabout just east of I-81 on Crossover Boulevard is designed to facilitate a future additional connection to US 522, though is subject to development plans. Figure 3 shows the alignment of Crossover Boulevard, including the potential second connection labeled as Warrior Drive.

**Figure 3: Crossover Boulevard Alignment**



In the first phase of this study, the team considered alternatives which included this second connection and its alignment with the new US 522 and those without. To provide long-term flexibility of the concepts, the Study Team ultimately decided that all new US 522 alignments should support a connection to Crossover Boulevard, intersecting US 522 between Premier Place and the Elks Lodge. The cross section of this connector (Warrior Drive) will be determined in the future.



## Preliminary Alignments Screening

The project team identified seven alignments for consideration as part of the preliminary screening process. Through a series of workshops and with the Study Team, each of the seven preliminary alignments were assessed for feasibility, alignment with project goals, and potential fatal flaws. Based on the results of this preliminary screening, three alignments were advanced for further consideration as candidate alternatives. Following is a description of the preliminary alignments and the screening results for each.

**Alignment A.1: US 522 Spur to Tulane Drive.** This alignment shifts the US 522 / US 50 connection approximately 950 feet to the southeast to tie into the existing intersection at Tulane Drive and US 50. This alignment was eliminated from consideration due to the lack of a direct connection to Crossover Boulevard.



**Alignment A.2: US 522 Intersection to Tulane Drive.** As with Alignment A.1, this alignment shifts the US 522 / US 50 connection to tie into the existing intersection at Tulane Drive and US 50; it also features a new intersection at the existing US 522 alignment to provide a direct connection to Crossover Boulevard. This alignment was **retained for further consideration** as a candidate alternative.



**Alignment B.1: US 522 Spur to Ryco Lane.** This alignment shifts the US 522 / US 50 connection approximately 1,850 feet to the east to tie into the existing intersection at Ryco Lane and US 50. This alignment was eliminated from consideration due to the magnitude of potential impacts to private property and lack of a direct connection to Crossover Boulevard.



**Alignment B.2: US 522 Intersection to Ryco Lane.** As with Alignment B.1, this alignment shifts the US 522 / US 50 connection to tie into the existing intersection at Ryco Lane and US 50; it also features a new intersection at the existing US 522 alignment to provide a direct connection to Crossover Boulevard. This alignment was eliminated from consideration due to the magnitude of potential impacts to private property.



**Alignment C: Bufflick to Prince Frederick Drive.** This alignment establishes a direct north-south connection between Bufflick Road and Prince Frederick Drive, though with the connection to US 522 undefined. This alignment was eliminated from consideration due to encroachment on multiple airport protection areas, limited development potential, and limited congestion relief benefits.



**Alignment D: US 522 Intersection to Prince Frederick Drive.** This alignment shifts the US 522 / US 50 connection approximately 3,000 feet to the southeast to tie into the existing intersection at Prince Frederick Drive and US 50, with a new intersection at the existing US 522 alignment to provide a direct connection to Crossover Boulevard. This alignment was retained for further consideration as a candidate alternative.



**Alignment E.1: US 522 Intersection to Sulphur Springs Road.** This alignment shifts the US 522 / US 50 connection approximately 1.5 miles to the southeast to tie into the existing intersection at Sulphur Springs Road and US 50, with a new intersection at the existing US 522 alignment to provide a direct connection to Crossover Boulevard. This alignment was eliminated from consideration due to the magnitude of potential impacts to private property and the exceedingly circuitous realignment.



**Alignment E.2: US 522 Intersection to Inverlee Way.** This alignment shifts the US 522 / US 50 connection approximately one mile to the southeast to tie into the existing intersection at Inverlee Way and US 50, with a new intersection at the existing US 522 alignment to provide a direct connection to Crossover Boulevard. This alignment was retained for further consideration as a candidate alternative.



# Candidate Alternatives Assessment

## Candidate Alternatives Descriptions

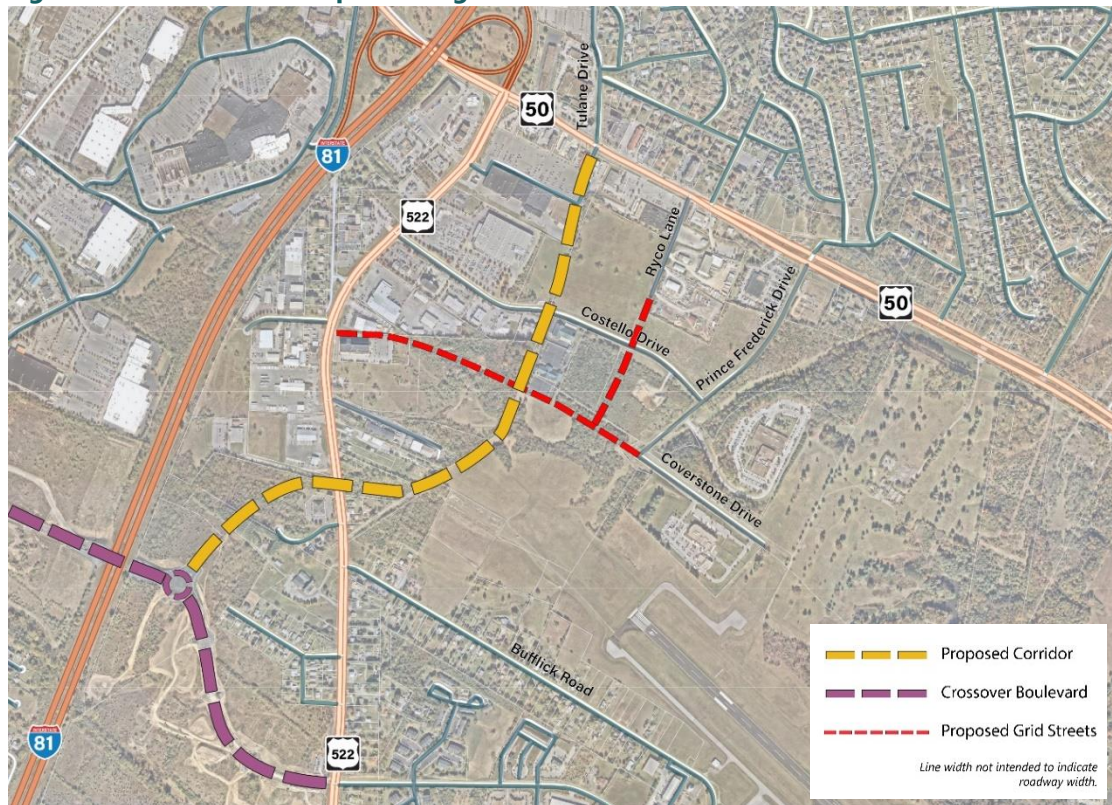
This section summarizes the three alignments that were advanced beyond the screening process for further consideration.

As part of this process, preliminary planning-level costs were developed. These costs were developed using the VDOT TMPD tool to estimate a cost per mile, in 2020 dollars. After discussion with the study team, a planning cost of \$30 million per mile was assumed to construct a four-lane median facility, which includes preliminary engineering and basic utilities. In order to reflect right of way impacts, price per square foot of right away, as well as existing structures, was estimated for each of the three alternatives. Costs do not include construction or right-of-way for grid streets.

### Alternative 1: US 522 Intersection to Tulane Drive

Alternative 1 (Alignment A.2 in the preliminary screening) shifts the US 522 / US 50 connection approximately 950' east to tie into the existing intersection at Tulane Drive and US 50 and features a direct connection to Crossover Boulevard. Figure 4 shows the proposed alignment of Alternative 1.

**Figure 4: Alternative 1 Proposed Alignment**



Alternative 1 completely avoids Winchester Regional Airport property and the RPZ and all associated permitting requirements, although it would impact existing private development which would increase right-of-way acquisition costs. The alignment would enhance network connectivity, as Tulane Drive crosses under I-81 north of the study area and provides access

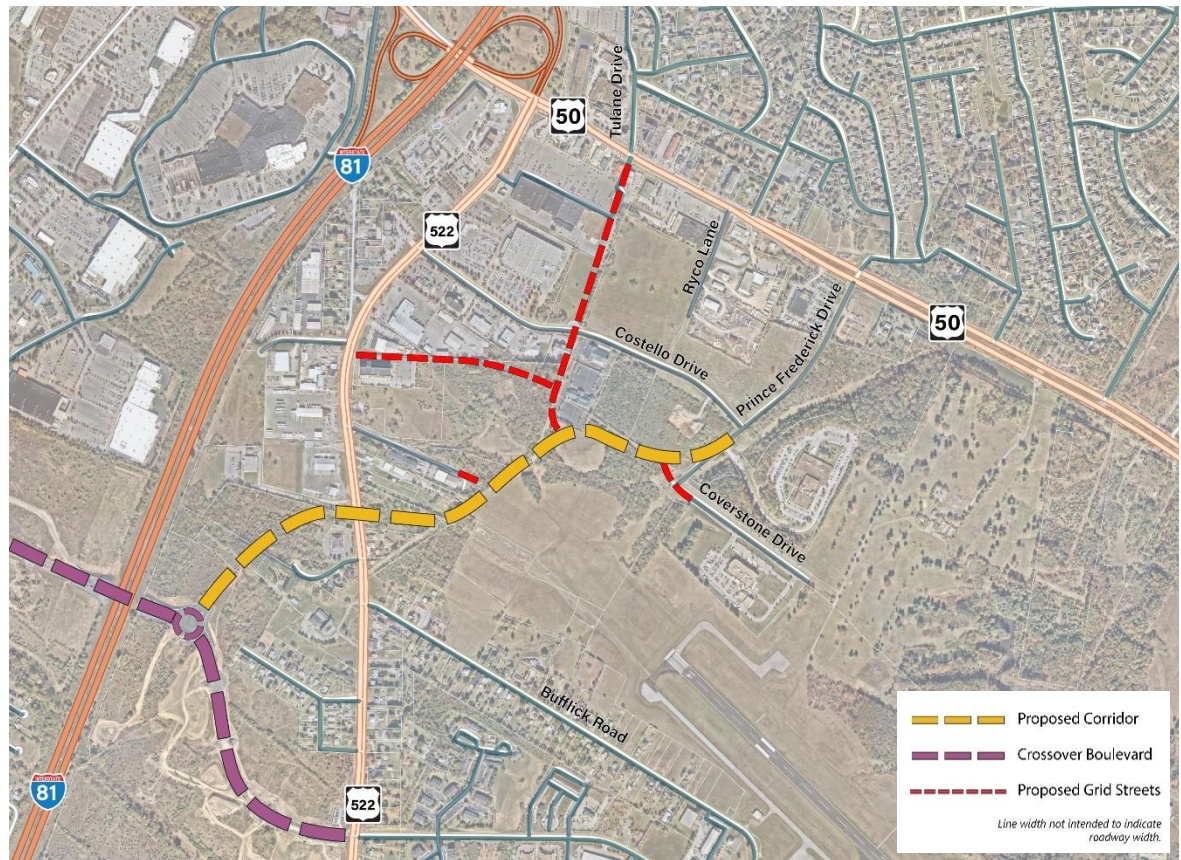
to the City of Winchester; however, the close spacing between the existing US 522 / US 50 intersection and the Tulane Drive / US 50 intersection could limit the project’s congestion relief. Alternative 1 would allow for development along the primary US 522 corridor.

Alternative 1 Length: 5,600'
Planning-Level Cost (4-lane cross-section): \$31.8 million
Right-of-Way Acquisition: \$6.0 million
Total Planning-Level Cost: \$37.8 million

### Alternative 2: US 522 Intersection to Prince Frederick Drive

Alternative 2 (Alignment D in the preliminary screening) shifts the US 522 / US 50 connection approximately 3,000 feet southeast to tie into the existing intersection at Prince Frederick Drive and US 50 and features a direct connection to Crossover Boulevard. Figure 5 shows the proposed alignment of Alternative 2.

**Figure 5: Alternative 2 Proposed Alignment**



Alternative 2 features adequate intersection spacing on US 50 to realize congestion reduction benefits and a relatively shorter project length given its use of the existing Prince Frederick Drive right-of-way. The alignment would marginally encroach on Winchester Regional Airport property and the RPZ, which would require additional permitting coordination and justification with the FAA. Development potential along the relocated US

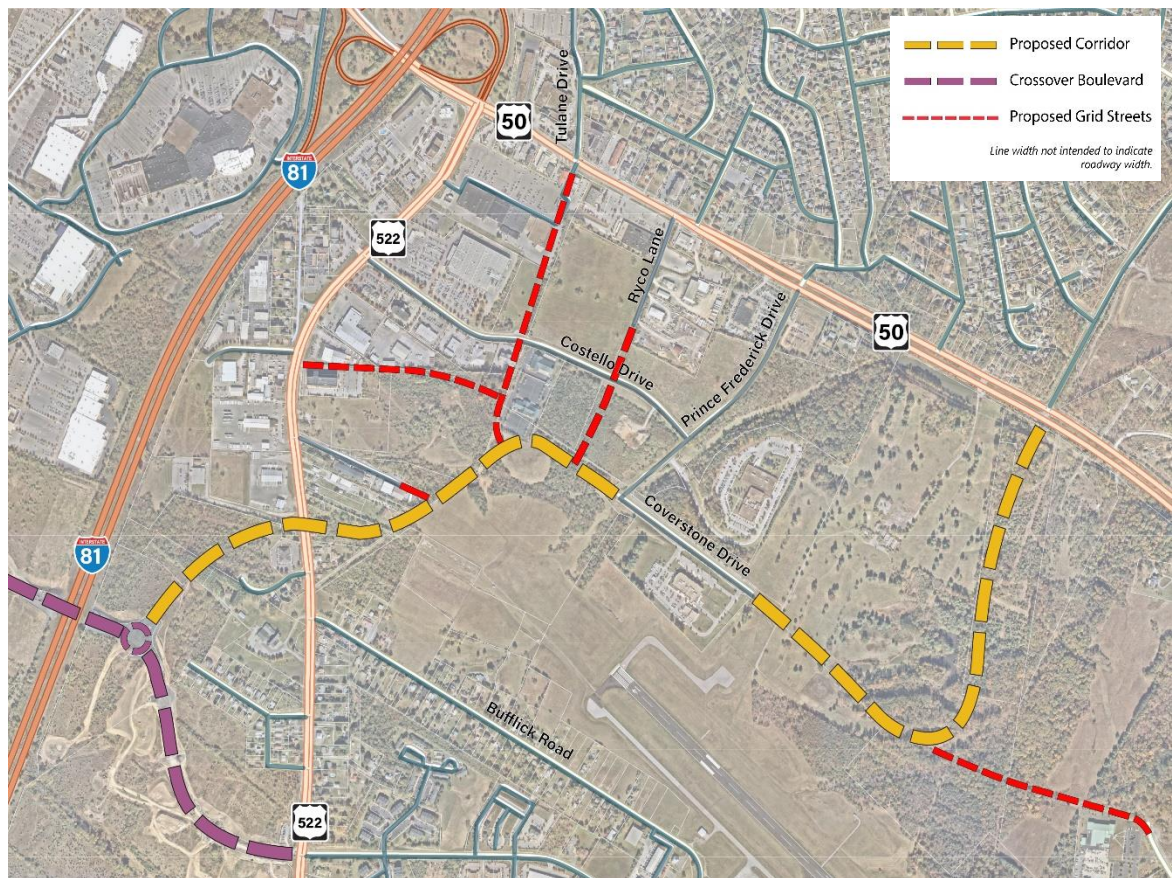
522 corridor is uncertain. Alternative 2 entails the lowest estimated costs of the three candidate alternatives. The cost below also includes upgrades to the existing Prince Frederick Drive; these costs were developed in the same manner as the new location costs (as described above) and estimated at \$15 million per mile.

Alternative 2 Length: 4,700'
Planning Cost (4-lane cross-section): \$31.0 million
Right-of-Way Acquisition: \$2.6 million
Total Planning Cost: \$33.6 million

### Alternative 3: US 522 Intersection to Inverlee Way

Alternative 3 shifts the US 522 / US 50 connection approximately one mile to the southeast to tie into the existing intersection at Inverlee Way and US 50 and features a direct connection to Crossover Boulevard. Figure 6 shows the proposed alignment of Alternative 3.

**Figure 6: Alternative 3 Proposed Alignment**



Alternative 3 is consistent with the alignment shown in the 2035 Frederick County Comprehensive Plan and features adequate intersection spacing on US 50 to realize congestion reduction benefits; however, its length and distance from the I-81 interchange may discourage rerouted trips along its entirety, with the potential for trips to divert to

Prince Frederick Drive. The alignment would marginally encroach on Winchester Regional Airport property and the RPZ, which would require additional permitting coordination and justification with the FAA. Development potential along the relocated US 522 corridor is uncertain. Alternative 3 entails the highest estimated costs of the three candidate alternatives.

Alternative 3 Length: 9,000'  
Planning Cost (4-lane cross-section): \$51.1 million  
Right-of-Way Acquisition: \$4.3 million  
Total Planning Cost: \$55.4 million

## Public Engagement and Survey Findings

The study team solicited public input through a digital survey conducted using MetroQuest, an online public engagement tool. The survey was available to the public from June 10 to July 10, 2020. A total of seven respondents completed the survey during that period.

Survey questions sought input on three components: respondents' priorities for the US 522 study area; preferences on the three candidate alternatives; and feedback on potential reuse of the disused portion of US 522 once realignment is implemented.

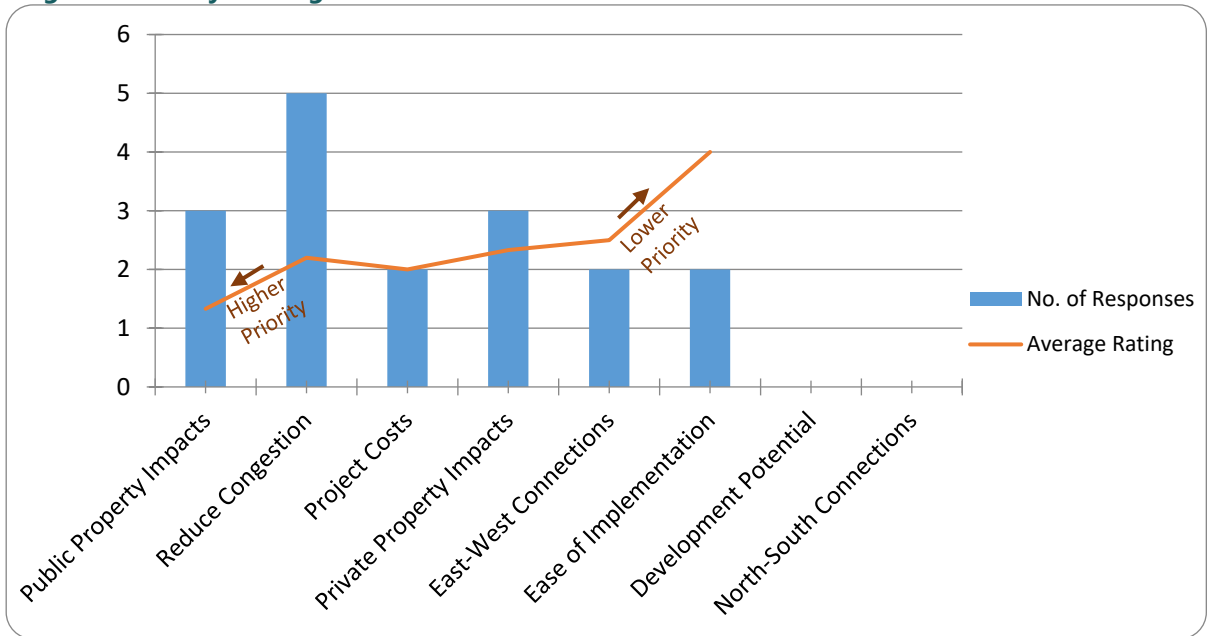
### Priorities for US 522

Respondents were asked to select up to five items from among eight options provided and rank them in order of priority to indicate their preferences for the future of US 522 in the study area:

- › Development Potential
- › Ease of Implementation
- › East-West Connections
- › North-South Connections
- › Private Property Impacts
- › Project Costs
- › Public Property Impacts
- › Reduce Congestion

Results of the priority ranking are summarized in Figure 7, with lower average ratings indicating higher ranking and, correspondingly, higher respondent preference.

**Figure 7: Survey Findings – US 522 Priorities**



*Note that the highest rating is 1, so a lower average rating indicates higher preference*

The results indicate that congestion reduction was the leading priority for those who took the survey. “Reduce Congestion” was selected as a priority and rated as the highest priority by more respondents than any other option.

Impacts to property – both public and private – were also relatively high priorities among respondents. Public property impacts appear to be of somewhat greater concern than private property impacts, as “Public Property Impacts” was ranked no lower than second among those respondents who selected it as a priority. This suggests that a subset of respondents have substantial concerns about potential impacts to Winchester Regional Airport property.

It is worth noting that two response options – “Development Potential” and “North-South Connections” – were not selected as priorities by any respondents.

## Alternatives Ranking

Respondents were presented with graphical and textual information about each of the three candidate alternatives for the US 522 Realignment project and were asked to indicate their preferences for each alternative using a star-rating scale of 1 to 5, with 1 indicating strong disfavor and 5 indicating strong preference.

Respondents indicated a preference for Alternative 1, which received an average rating of 4.1 out of 5 stars. Both Alternative 2 and Alternative 3 received middling support, with average ratings of 2.75 and 2.5, respectively. The higher ratings for Alternative 1 may be explained by its avoidance of impacts to airport protected zones; however, the high ratings do not necessarily align with the stated preference for congestion reduction, as Alternative 1 may have relatively less benefit to congestion reduction given its close intersection spacing in the vicinity of the new connection at US 50.

## “Old” US 522

This portion of the survey asked for feedback on options for the disused portion of US 522 – or “Old” US 522 – following realignment. Respondents were asked to weigh tradeoffs related to roadway width and the connection of “Old” US 522 at US 50, using a sliding scale to indicate intensity of preference.

Results indicate that a majority of respondents prefer a narrower cross-section for “Old” US 522 in the future to slow traffic, improve safety, and provide a more hospitable pedestrian environment. Respondents’ input on the existing connection of US 522 at US 50 suggests that they would like to see changes to that location to limit congestion and delay while retaining some connection between “Old” US 522 and US 50.



## Preferred Alternative

Following the public engagement portion of the study, the study team assessed the relative merits of each candidate alternative based on alignment with study goals, cost, feasibility, input from partner aviation agencies, and survey findings. Table 1 provides a screening matrix summarizing each alternative’s performance against a number of key considerations.

**Table 1: Candidate Alternatives Screening Matrix**

	Alternative 1	Alternative 2	Alternative 3
Congestion Relief	Limited	Substantial	Moderate
Connection to Crossover Blvd.	Yes	Yes	Yes
Development Potential	High/Moderate	Moderate	Moderate
Airport Impacts	Low	Moderate	Moderate
Private Property Impacts	Moderate	Low	Low
Public Preference	High/Moderate	Moderate	Moderate
Cost	Moderate	Moderate	High
Alignment with Comp Plan	Partial	Partial	Full

- › Alternative 2 likely will provide the greatest congestion relief of the three alternatives due to adequate intersection spacing on US 50 as well as a relatively direct connection that will encourage rerouted trips from the existing alignment of US 522. While Alternative 2 does entail impacts to airport property and the RPZ, the study team determined that these impacts can be addressed through coordination with the FAA, VDOA, and Winchester Regional Airport and that such coordination does not pose a significant barrier to implementation.
- › Alternative 1, while well-received among survey respondents, does not appear likely to provide sufficient congestion relief to justify the relocation project and therefore does not meet one of the key goals for the realignment project.
- › Alternative 3 is estimated to be more costly than the other alternatives. More importantly, the alignment’s long connection raises doubts about the extent to which rerouted trips would use its full length, with concerns about spillover effects from trips diverting to Prince Frederick Drive.

**Based on these assessments, the study team selected Alternative 2 (Figure 8) as the preferred alternative for the US 522 Realignment Study.**

**Figure 8: Preferred Alternative Alignment**



The Study Team recognizes that the preferred alignment, as selected, reflects first and foremost the end point connections and general connections to additional streets or “grid streets” (new or proposed). In particular, as this is a planning study, specific property impacts are unknown at this point. Subsequent design work will explore such impacts, seeking to minimize impact to private and public property while satisfying regulatory requirements.

## Next Steps

Through 2021, the study team will advance the preferred alternative to Phase 2 of the study. Phase 2 will include capacity assessment to determine whether a 4-lane cross-section is needed for part or all of the proposed corridor; preliminary design to more precisely determine roadway alignment and cross-section, right-of-way needs, and potential utility and environmental impacts; and order-of-magnitude construction cost estimates. The study team also will continue to coordinate with the FAA, VDOA, and the Winchester Regional Airport to further assess impacts to airport property and the RPZ and identify potential permitting solutions or other mitigations for future consideration.