



**Kickoff Meeting
Red River Gorge Transportation Planning Study
Powell, Wolfe, & Menifee Counties
March 3, 2022 at 1 PM**

A hybrid kickoff meeting was held on March 3, 2022 to discuss the scope of work and seek input from the local leaders for the Red River Gorge (RRG) Transportation Planning Study. The following individuals participated:

Raymond Banks	Wolfe County Judge/Executive
Rick Stiltner	Menifee County Judge/Executive
James D. Anderson Jr.	Powell County Judge/Executive
Tim Eling	USFS
Eric Dodd	USFS
Beth Niemann*	KYTC CO Planning
Dave Heil*	KYTC CO Planning
Jason Blackburn	KYTC D10
Aric Skaggs*	KYTC D10
Steve De Witte*	KYTC CO Planning
Connor Ouellette	KYTC DEA
Rebecca Thompson	Qk4
Tom Springer	Qk4

* = virtual

Following introductions, Rebecca provided a study overview, including a handout and general study schedule. The study will gather an inventory of existing conditions, focusing on peak weekend traffic and drainage/pavement concerns. Depending on the findings, a selection of potential improvement concepts will be examined to develop costs and benefits/disbenefits to inform future decision-making. The objective of the meeting is to hear the top concerns from the local Judge/Executives. Future outreach will engage with other local officials, agencies, and the public.

Jason stated the scope of improvements focuses on today's problems, independent of a future year scenario, (i.e., it will not address the potential resort center.) The study will examine state-maintained roads in RRG, not the state park, forest, or other surrounding network elements.

Following this overview, the team held an informal conversation about their concerns.

Powell Co. Judge/Executive Anderson mentioned the following:

- Ditching, drainage, and overall road maintenance are the biggest concerns.
- Drainage is an issue throughout; drainage pipes are broken and shoulders are missing. Long term costs to add curbs/gutters should be weighed against annual costs for repairs and maintenance.
- KY 77 hill must be addressed, or it will drop and there will be no access to/from Menifee Co.
- Any one-way concept will not be supported locally.
- A traffic signal at the tunnel could be supported; solar powered options reduce utility costs compared to traditional signal requirements discussed previously.
- An alternative way to approach the tunnel is needed—e.g., along North Fork Road from Stanton.
- Regarding any build option, effects on residents need to be studied, not just impacts on visitors. Covid-19 increased RRG traffic/visitors in 2020 and 2021, but 2022 could see a decrease as people adjust their travel patterns with the improving health situation.
- Funding from USFS would be welcome. The region needs to find a way to leverage some of the new federal infrastructure funding. Staff and funding at the county level is extremely limited

Menifee Co. Judge/Executive Stiltner mention the following:

- The 6-mile section of North Fork Road (a.k.a. Forest Road 23 adjoining KY 613 in Powell County) in Menifee County should be taken over by the KYTC.
- Leadership is highly opposed to a one-way RRG loop scenario.

- If a traffic signal is proposed at the tunnel, it should not delay motorists unless it is busy. This is a peak season weekend problem (e.g., 8 days a year) so keep that in mind when suggesting changes. A shorter term solution could position flaggers at either entrance during busy weekends.
- RRG is becoming more of a year-round attraction than seasonal.
- Maintenance should be prioritized over expansion.
- Leadership supports a new road and interchange with the Mt. Parkway east of the park to divert KY 77 traffic and increase access to camping areas in the vicinity.
- West of the tunnel, KY 77 can have some serious drainage issues, overtopping the road.
- Seasonal closures lead to complaints from locals trying to access popular spots near Chimney Top and/or Indian Creek. It consolidates traffic problems onto other facilities. Increased coordination/communication is needed to publicize closures/durations.

Wolfe Co. Judge/Executive Banks noted they have fewer issues than the lower lying sections but the big hill near Sky Bridge is very steep.

Tim Eling noted that while there is no dedicated roadway maintenance funding for Forest areas, funding for pull offs has come from the Federal Land Access Program (FLAP). Most of the RRG loop is part of a [National Scenic Byway](#). There are no dedicated funds for such roads, but it could help with a grant application.

One of the proposed improvements to consider is a shuttle service. Shuttle services have been successfully launched in the area, with potential to expand. However, parking lots will require giving up some land. A master plan for regional parking is needed.

- Jason noted parking cannot include the Slade rest area as it is intended to serve parkway traffic, including truck parking for required resting times.
- Qk4 will be looking at parking options with cost estimates.
- Several areas have been disturbed that could be hardened and used for overflow parking. This also helps maintain existing infrastructure if it keeps people from pulling off the road.

Getting approvals to work on federal land has caused delays in the past—including archaeological concerns at the Wolf Pen Branch culvert. Tim noted that USFS could create road agreements and easements with KYTC to help streamline environmental clearances and permitting.

Recent daily traffic volumes are noted on the study area map, showing low traffic volumes (less than 1,000). KYTC counts are typically conducted spring through fall on weekdays, which do not necessarily capture peak recreational traffic flows. Data collection efforts for this study include tube counts for a two-week period in April plus connected camera-based turning movement counts at key intersections and the tunnel during the busiest weekend hours. In late October (peak foliage), the exercise will be repeated. Other popular weekends include Labor Day and the 4th of July.

- Tim noted USFS has weekend counts with three times the volume. He will provide data.

A concept to change some roads to pedestrian or bike only was not supported by the Judges because any changes would have an adverse effect on the larger population and travel patterns. State maintenance of the facilities was considered critical to maintain a state of good repair. Reliable, efficient access for emergency responders is critical.

The region needs stringent reviews/guidance on any access permits, especially for undersized culverts at entrances to adjacent properties. When those are undersized, it backs up water onto the main roadway and its drainage structures. The past few years have been wetter than most.



**Project Team Meeting
 Red River Gorge Transportation Planning Study
 Powell, Wolfe, & Menifee Counties
 June 27, 2022 at 1 PM**

A hybrid project team meeting was held on June 27, 2022 to discuss the existing inventory/data collection efforts for the Red River Gorge Transportation Planning Study. The following individuals participated:

Tim Eling*	USFS
Jon Kazmierski*	USFS
Jason Blackburn	KYTC D10
Darren Back*	KYTC D10
Steve De Witte*	KYTC CO Planning
Beth Niemann*	KYTC CO Planning
Dave Heil*	KYTC CO Planning
Jared Jeffers*	KYTC CO Planning
Eunice Holland	KRADD
Alex Sergent*	BGADD
Ben Hamm*	Gateway ADD
Rebecca Thompson	Qk4
Tom Springer	Qk4
Evan Dick*	Qk4
Deanna Miller*	Qk4

* = virtual

Jason opened the meeting, introducing attendees. Rebecca provided a study overview, which will gather an inventory of existing conditions, focusing on peak weekend traffic and drainage/pavement concerns. A selection of potential improvement concepts will be examined to develop costs and benefits/disbenefits to inform future decision-making. Later this year, outreach will engage with other local officials, agencies, and the public.

Evan discussed the drainage structures identified in the field. A map and spreadsheet have been developed with recommendations to either replace or clean. There were several structures filled in with debris, and some with filled ditches leading up to the structure. Field work was conducted in dry conditions; USFS is not aware of any locations where water overtops the roadway. If this becomes a project, upsized pipes should be considered to provide climate resiliency.

Deanna reviewed pavement conditions: there are areas where resurfacing is needed and erosion should be addressed. T-rail, cribbing, gabion baskets, and other treatments could be effective. There are areas where the trees block sunlight, resulting in cracking. In several locations, the ditching needs to be redefined. D10 stabilization efforts seem to be working. Jason noted a section of KY 77 is scheduled for patching and the KY 715 with poor IRI scores is on the District's list for resurfacing. USFS noted they've encountered vehicles stuck in deep ditches.

KY 715 and KY 77 comprising the "loop" are rural major collectors and part of a larger scenic byway. HIS data shows 8- to 9-foot-wide lanes, minimal paved shoulders, and substandard curves/grades. While these are not ideal for a typical roadway, the sensitive environmental context is critical and limits the footprint of concepts considered.

Traffic data was collected during April 2022, with tube counts collecting data for two weeks following Lexington's spring break and Miovision cameras at key intersections during weekends. Saturdays showed the highest traffic volumes (1,400 vehicles per day) with the most consistently busy peaks during 2—4 PM. Intersection turning movement counts show adequate capacity for observed volumes.

Two 12-hour Saturday recordings at either entry to the tunnel were reviewed to measure delay. Volumes are higher eastbound in the AM and westbound in the PM. Data shows over 50% of cars were able to proceed through the tunnel without waiting for oncoming traffic to clear. Regarding platoons, 50 to 60% experienced no wait, ~15% waited one minute or more, and ~5% waited two minutes or more. The maximum wait was 7 minutes. It should be noted that the distribution of traffic volumes versus delay times is inherently unpredictable—that is, the busiest peaks did not necessarily experience the highest wait times.

The traffic data collection activities will be repeated in September/October, coordinated with holidays and weather to anticipate the busiest fall weekends for comparison.

Crashes during 2017-2021 were queried and analyzed. There were 71 crashes in five years, including one fatality (motorcyclist in angle collision at KY 15/KY 77) and 16 injury collisions. The majority of crashes involved a single vehicle (63%) or were categorized as roadway departures (70%). Weekends showed the highest distribution in crashes, as did the months of May and September. Overall, 20% of crashes involved motorcyclists, 21% occurred in wet weather, and 15% were at nighttime. Crashes are geographically distributed along the “loop” with concentrations at the Slade interchange and a stretch of curves east of the tunnel.

Besides safety, USFS is also concerned with the perceived visitor experience. As it impacts tourism, these perceptions are also a concern for the county judges. Increased parking opportunities and/or shuttle services may help address concerns; Jason offered the former resident engineer’s office at Slade (opposite Subway) as a potential staging/parking area for a future shuttle.

Rebecca reviewed other project concepts in the area: minor widening along KY 15 in the FY 2022-2028 Highway Plan, CHAF IP20200034 to realign the tunnel approach, and measures in the USFS EA/FONSI for “proactive and adaptive management...to address visitor use and protect resources.” Identified measures include designated campsites, trails, increased parking lots, shuttle service, restrooms, and more. Recommendations are group by management area but specific sites have not been determined. No funding is identified for implementation though USFS hopes to begin work on the Tunnel Ridge area as early as next summer. Findings from FHWA’s 2020 FLAP study were also reviewed.

The team discussed the value in anticipating future traffic demands. This study is intended to focus on existing needs, independent of any future developments. The existing highways provide adequate capacity, even assuming some background growth; for a high-growth scenario, more detailed analysis is warranted, beyond the current scope. To accommodate increased traffic, the narrow/steep KY 715 hillside in Wolfe County would need to be addressed—either widening/benching (significant environmental impacts) or converting to one-way operations (opposed by judges).

Next steps include developing concepts (i.e., maintenance needs, tunnel traffic control, one-way operations, and shuttle service) with costs and benefits/disbenefits quantified. Following September/October data collection, the team will engage with the public. Jason will confirm if an interim briefing for the judges is needed.

Project Team Meeting
Red River Gorge Transportation Planning Study
Powell, Wolfe, & Menifee Counties
January 4, 2023 at 1:30 PM

A hybrid project team meeting was held on January 4, 2023, to discuss the fall data collection efforts and range of improvement concepts considered for the Red River Gorge Transportation Planning Study. The following individuals participated:

Tim Eling*	USFS
Jon Kazmierski*	USFS
Eric Dodd*	USFS
Darren Back	KYTC D10
Aric Skaggs*	KYTC D10
Jason Blackburn	KYTC CO Planning
Steve De Witte*	KYTC CO Planning
Jared Jeffers	KYTC CO Planning
Scott Melton*	Kentucky River ADD
Alex Sergent*	Bluegrass ADD
Ben Hamm*	Gateway ADD
Rebecca Thompson	Qk4
Tom Springer	Qk4
Eunice Holland	Qk4
Deanna Miller*	Qk4

* = virtual

Jason opened the meeting providing a review of the first team meeting and introducing attendees new to the project. Rebecca provided an overview of the study elements and existing conditions.

Fall traffic data collected was collected during October 2022, with tube counts collecting data for two weeks and cameras at key intersections during weekends. Saturdays showed the highest traffic volumes (2,400 vehicles per day) with the most consistently busy peaks during 1—4 PM. Intersection turning movement counts show adequate capacity for observed volumes. October weekend volumes were nearly double April weekends.

Video feeds at Nada tunnel showed about half the cars approaching the tunnel can proceed through with no wait. About 25% of platoons waited a minute or more and 8% waited for 2+ minutes. The longest wait time on the busiest Saturday was 8.9 minutes, measured from when the first car pulled up and stopped. Since the Gorge is a unique setting, public input on reasonable wait times can help define if this represents a “mobility issue” moreso than applying standard level of service thresholds. Empirical data is important to balance out anecdotal complaints. The team generally agreed wait time at the tunnel seems reasonable and will be useful when responding to complaints from the public.

Rebecca presented improvement concepts considered, with key group discussions noted for each.

- **Drainage Structure Repairs.** Maintenance for 118 pipes/culverts are estimated at \$1.1 million for repairs plus \$1.8 million for resurfacing. Without documented right-of-way, the assumption defines top of cut to bottom of fill as right-of-way. Anything beyond this prism would require more intensive environmental investigations, moreso if increasing footprints or impacting historic elements. Proposed work includes mostly minor repairs and in-kind replacements for small metal pipes under the existing highways; in the past, the Wolf Pen culvert was an issue with the historical significance of the area. Both KYTC and USFS want to see the roads maintained in a state of good repair. Tom requested information on the Gorge National Register Historic District as the nomination form has not been digitized on the national database.

- **Pavement Repairs.** Spot improvements were proposed to address poor pavement condition areas observed in the field, totaling \$7.3 million. Tree canopy plays a huge role in retaining moisture, leading to pavement cracking. USFS suggested a closer look at specific areas for tree/limb clearing, working with a silviculturist to define a desired condition and context-sensitive approach. Public involvement will be critical; the extent of clearing affects the level of environmental clearance/timeline. Clear explanations and good visuals can help communicate measures to the public.
- **Nada Tunnel Traffic Delay.** Several options were considered to improve traffic flow at the tunnel, ranging in costs and the extent of impacts. The No-Build option is also viable.
 - Temporary signals or flaggers—similar to what KYTC would use to maintain two-way traffic through a single lane construction zone—would increase delays for most motorists. Measured average wait times were 27-36 seconds on the busiest October Saturdays; signals or flaggers would have to run on ± 200 -second cycles to introduce enough time to clear the tunnel, increasing delay for more motorists. It is assumed the system would only be deployed during peak seasonal weekend hours. Enforcement is a concern, particularly if it's not busy when a driver approaches a red light. Signal units are battery powered, recharging via solar, which could last several weeks running only part time.
 - Advance warning signage would add value at a low cost, similar to recommendations in the 2020 FLAP study. More innovative ITS systems could also work, like the dynamic lights/horns to warn of oncoming traffic when visibility is limited. With limited satellite connections, this could require running cable through the tunnel; technology can malfunction but would just revert to the existing situation.
 - Realigning the Slade-side tunnel approach would improve visibility; Qk4 presented a range of alignments to estimate footprints. Cutting back the hillside would have a visual impact; thorough geotechnical and environmental investigations would be required. Construction provides an opportunity to address existing drainage issues that traffic control/signage alone would not address.
 - Widening the tunnel to facilitate two-way traffic would also require thorough geotechnical and environmental investigations. Costs are estimated at \$10 million or more, which are difficult to define until expert investigations begin. The tunnel is historic and a character-defining feature of the area; even with context-sensitive aesthetic treatments, public opposition is likely. However, this is the only option considered to facilitate two-way traffic flow, which provides an “ultimate” solution for possible future mobility concerns.
- **Other Loop Operations.** A few other options were considered to improve traffic flow for the larger KY 77/KY 715 loop.
 - Converting the loop for one-way traffic increases travel times/distances for most users. Without stopping, it takes ± 50 minutes to complete a full one-way loop. Restricting only a small portion (near Sky Bridge) to one-way could minimize these impacts. This option was not supported at the kickoff discussions. The one-way option has been used in other national parks/forests to build character and provide a unique experience.
 - A shuttle system could reduce the number of vehicles on the loop and help with parking concerns. The former Slade resident engineer's office (opposite Subway) was discussed as a possible off-site parking option; USFS and KYTC will coordinate further on a use permit. USFS designated several potential shuttle stops in their 2022 Final EA/FONSI, supplemented with several other stop options from Qk4.

- A long-term “ultimate” minor widening/spot improvement scenario—similar to the Tail of the Dragon at Deal’s Gap, NC—balances needs of the natural environment, highway safety, and visitor experience/tourism. The intent is to improve the roadway to a consistent typical section with two 10-foot lanes, 1-foot paved shoulders, and consistent striping. This addresses highway safety concerns but could change the character of the Gorge, particularly for the steep section near Sky Bridge. Public input would be critical. Any changes beyond 100 feet of the centerline in the wilderness area would require an act from Congress.

Next, the team discussed an approach for presenting study elements to local officials and the public. Recent USFS outreach efforts have shown a strong preservation attitude toward the Gorge. Attendees agreed all concepts considered should be presented. Jason will set up a meeting with the county judges in late January, to be held at the Slade visitor center. Qk4 will develop draft materials and build a public-facing website/survey, providing drafts to the project team in advance of meeting dates. The survey questions were reviewed with no changes. Tim will check the availability of Gladie visitor center to host a Saturday public meeting in early March.



Groundbreaking by Design.

MEETING MINUTES

Project: Red River Gorge Transportation Study

Purpose: Local Officials/Stakeholders Meeting 2

Meeting Date: January 26, 2023

Prepared By: Qk4

In person:	Jason Blackburn	KYTC Planning, Project Manager
	Aric Skaggs	KYTC, District 10
	Corbett Caudill	KYTC, District 10
	Rebecca Thompson	Qk4 Project Manager
	Tom Springer	Qk4
	Jon Kazmierski	USFS, DBNF
	Patrick McCoy	Powell County Road Dept.
	Eddie Barnes	Powell County Judge/Executive
	Raymond Banks	Wolfe County Judge/Executive
	Rick Stiltner	Menifee County Judge/Executive
Online:	Steve De Witte	KYTC Planning
	Darren Back	KYTC, District 10

Jason provided an overview of the study and the objective of this meeting, which is to present traffic data and improvement concepts to local officials prior to holding a public meeting March 11, 2023 (Gladie Visitor Center, 1:00 to 4:00 PM).

Rebecca provided an overview of the planning process and the existing conditions data. Fall weekend traffic was nearly double Spring peaks. Average delay at the tunnel in October was 60 seconds or less. The study is intended to present costs, benefits, and impacts to inform future decision-making rather than to recommend one or more solutions. Three types of improvement concepts were considered:

Repairs/Maintenance

- Drainage structures
- Pavement condition

Tunnel Delay Options

- No-Build
- Temporary signal
- Peak flaggers
- Additional signage
- Realign approach
- Widen Tunnel

Other Operational Options

- No-Build
- One-way loop
- Shuttle Service
- Minor widening

Group discussion followed:

The explanation about maintenance items—tree trimming/clearing specifically—should address why such measures are important.

A temporary signal at the tunnel would increase delay for most motorists, raises concerns for pedestrians, and could be an enforcement issue when it's not busy. A one-page infographic to clearly communicate the facts about a traffic light would be very helpful. Judges and USFS would like to have a concise handout they can share with people who call in or email.

Costs and impacts for the approach realignment seem reasonable and would solve most of the tunnel delay issues. Consider a family photo spot with the tunnel in the background. The tunnel itself is historic, iconic, and a tourism draw.

Judge Barnes requested "no large trucks" signs to prevent semi-trucks from getting to the tunnel and having to turn around, which can take hours.

KY 77 is the shortest connection from Menifee County to jobs in Powell County; locals will oppose making this section one-way.

The minor widening ultimate solution seems reasonable, improving safety and mobility while being sensitive to the environment. Attendees concurred tourism will only go up in this area and the current roadways could be improved with minor impacts to improve safety.

The project team will provide materials for attendees to help promote the upcoming public engagement effort.

End of Minutes

MEETING MINUTES

Project: Red River Gorge Transportation Planning Study
Powell, Menifee, and Wolfe Counties

Purpose: Public Meeting

Place: Gladie Visitor Center
3451 Sky Bridge Road, Stanton

Meeting Date: March 11, 2023
1:00-4:00 PM

A public meeting for the Red River Gorge Transportation Planning Study was held on Saturday, March 11, 2023, at Gladie Visitor Center. The meeting had no formal presentation and was laid out in station format. The project website (RRGStudy.com) contained mirror information and survey questions to the in-person meeting for those who preferred not to or couldn't attend in person. The public meeting and accompanying survey were promoted via District 10 social media accounts, media releases, the study website, and posted flyers in the counties. A member of the project team was at each station to discuss the project with members of the public and answer any questions. In total, 19 individuals attended the meeting.

- The sign in table and initial station provided paper copies of the survey, giving the public the opportunity to provide feedback on the concepts presented and some other suggestions or concerns.
- Boards presented existing conditions, concepts, tunnel delay options and other operational options.
- A final table provided detailed signal option information for the Nada Tunnel.

End of Minutes



**Project Team Meeting
Red River Gorge Transportation Planning Study
Powell, Wolfe, & Menifee Counties
May 23, 2023 at 1:30 PM**

A hybrid project team meeting was held on May 23, 2023, to discuss improvement concepts considered for the Red River Gorge Transportation Planning Study. The following individuals participated:

Tim Eling*	USFS
Jon Kazmierski*	USFS
Eric Dodd*	USFS
Darren Back	KYTC D10
Aric Skaggs	KYTC D10
Jason Blackburn	KYTC CO Planning
Steve De Witte*	KYTC CO Planning
Jared Jeffers	KYTC CO Planning
Catherine Davis*	KYTC CO Planning
Alex Sergent*	Bluegrass ADD
Ben Hamm*	Gateway ADD
Rebecca Thompson	Qk4
Tom Springer	Qk4
Eunice Holland	Qk4
Kate Sautel	Qk4

* = virtual

Jason opened the meeting and welcomed attendees. Rebecca provided an overview of the study elements, community input, and build concepts. The purpose of the meeting is to reach consensus on recommendations for the final report.

Qk4 conducted extensive existing conditions analyses, examining seasonal weekend traffic, tunnel delays, drainage and pavement inventories, crash trends, and more. Earlier this spring, the team reached out to the three County Judge/Executives to present build concepts, followed by an online survey and public meeting in March. Survey responses were received from 69 individuals, detailing perceptions about the visitor experience and support/opposition for build concepts.

Two maintenance options were considered, both recommended to advance and likely processed as KYTC minor project Categorical Exclusions.

Drainage Structure Repairs. Maintenance for 118 pipes/culverts are estimated at \$1.1 million for repairs plus \$1.8 million for resurfacing. Without documented right-of-way, the assumption defines top of cut to bottom of fill as right-of-way. Anything beyond this prism would require more intensive environmental investigations.

- Jon will follow-up on an earlier request for information on the Gorge National Register group as the nomination form has not been digitized. Conversations with KYTC DEA indicate Wolf Pen culvert may be the only roadway feature identified as contributing to the historic group.

Pavement Repairs. Spot improvements were proposed to address poor pavement condition areas observed in the field, totaling \$7.3 million. Types of measures identified include curve widening, resurfacing, vegetation clearing, repairing ditches, adding cribbing, installing gabions, and replacing guardrail. Most spots are 500 feet in length or less and contained within KYTC’s assumed right-of-way.

- USFS is more concerned about larger projects that would impact aesthetics/character beyond the existing roadway. Work within KYTC right-of-way would not require specific USFS coordination.

- Where feasible, context-sensitive measures like guardrail patina and surface treatments consistent with the naturally occurring sandstone color palette should be incorporated.
- If gabion baskets are proposed in the Red River past Gladie (not currently), coordination under Section 7 of the Wild and Scenic Rivers Act will be necessary.
- Did any of the spot improvements look at the 73 pull-off parking spots? No, these focus on the roadway lanes/shoulders specifically.

Several options were considered to improve traffic flow at the tunnel, ranging in costs and the extent of impacts. The No-Build option is also viable. Additional signage and realigning the eastbound approach are recommended to advance.

Temporary signals. Similar to what KYTC would use to maintain two-way traffic through a single lane construction zone, signals would increase delays for most motorists. Measured average wait times were 27-36 seconds on the busiest October Saturdays; signals would have to run on ± 200 -second cycles to introduce enough time to clear the tunnel, increasing delay for more motorists. It is assumed the system would only be deployed during peak seasonal weekend hours. Enforcement is a concern, particularly if it's not busy when a driver approaches a red light. Signals were widely favored by public surveys and meeting comments though they do not meet KYTC warrants and were not favored by the Judges.

- The team discussed (and dismissed) deploying a signal short-term to test the concept. A one-page flyer with additional information about signals was prepared to be shared with USFS and the Judges.

Temporary flaggers. This option is similar to a signal, but with increased expenses and exposure to have personnel staff the positions. Flagger would also increase delays for most motorists.

Advance warning signage would add value at a low cost, similar to recommendations in the 2020 FLAP study. Specific recommendations were identified, along with adding a "One Lane Tunnel" warning to the existing sign at the KY 77/KY 715 intersection. Total costs are estimated at \$35,000.

Realigning the west tunnel approach would improve visibility. Qk4 presented a range of alignments to estimate footprints with construction costs ranging from \$400,000 to \$1 million. Cutting back the hillside would have a visual impact; thorough geotechnical and environmental investigations would be required. Construction provides an opportunity to address existing drainage issues. Public opinion was evenly split between support and opposition for the realignment.

- Aesthetics are a concern for USFS, particularly the color palette and potential for graffiti on any retaining wall. A vegetated slope may be more appropriate than a wall given the scale.
- Construction would require short-term closure of this stretch of roadway, which could be coordinated to occur in the off-season.

Widening the tunnel to facilitate two-way traffic was considered but is not recommended. Costs, impacts, and public opposition would be high.

Beyond No-Build, three other options were considered to improve traffic flow for the larger KY 77/KY 715 Loop.

One-way Loop. Converting the Loop for one-way traffic increases travel times/distances for most users. Without stopping, it takes ± 50 minutes to complete a full one-way loop. Restricting only a small portion (e.g., near Sky Bridge) to one-way could minimize these impacts but forces additional traffic through bottlenecks like the tunnel. This option was not supported at the kickoff discussions; public opposition far outweighed support in the survey effort.

Shuttle service could reduce the number of vehicles on the Loop and help with parking concerns. Public survey support was favorable. The concept was included in USFS' 2022 EA/FONSI, intended to be operated by a third-party vendor. No costs or additional effort from KYTC is expected, beyond a generalized statement of support in

this study. USFS designated several potential shuttle stops in their 2022 Final EA/FONSI, supplemented with several other stop options from Qk4.

- Improvements are assumed to include a 10 x 30 accessible concrete pad, as described in the EA/FONSI. Site-specific designs will be needed but were beyond the scope of this planning effort.

Minor widening. A long-term “ultimate” minor widening scenario balances needs of the natural environment, highway safety, and visitor experience/tourism. The intent is to improve the roadway to a consistent typical section with two 10-foot lanes, 1-foot paved shoulders, and consistent striping. Total costs are estimated at \$42 million, recommended to be considered when/if future traffic volumes demonstrate an increased need/priority.

- The hillside near Sky Bridge was examined in more depth to understand disturb limits and earthwork requirements. Any changes beyond 100 feet of the centerline in the wilderness area would require an act from Congress.
- USFS noted this level of widening is a significant impact and would require extensive study.

The team discussed other measures suggested by members of the public.

- One comment noted a legislative policy employed in Italy (<https://www.cnn.com/travel/article/italy-tourist-restrictions-alto-adige/index.html>) that caps the number of tourist lodgings and overnight visitors for a region to restrict capacity. KYTC cannot create policy to limit the number of users on a highway. USFS’ current management plan contains measures to limit capacity at or near current visitor levels. If the KY 715 section was closed to thru traffic, USFS could better manage visitor levels, improve enforcement, and maintain the Gorge. Transferring KY 715 to USFS ownership would provide more flexibility to make these changes, though Judge/Executives were not initially supportive of this concept.
- A secondary connection via KY 613 is an interesting concept, potentially more valuable if the tunnel approach is closed for realignment.
- An upcoming KYTC study will look at scenic byways statewide. A new federal grant opportunity is available for these routes.
- USFS is working with KYTC and other Commonwealth agencies to define a shared stewardship MOU for the forest.

Qk4 will submit a draft report to KYTC for grammatical review, to be published later this summer.