

ZION CANYON (PARK) MULTI-MODAL CONNECTIVITY ANALYSIS AND RECOMMENDATIONS



The existing Pa' rus Trail



Canyon Junction shuttle stop facing north

Section Overview

This section introduces potential options for additional pedestrian and bicycle access and connectivity improvements in the Zion Canyon (canyon) portion of Zion National Park.

Objective of Analysis

The objective of this analysis was to inventory the existing pedestrian and bicycle network and to identify potential options for additional multi-use opportunities in the park (this included potential options for extending the Pa' rus Trail and creating additional connections between trailheads, shuttle stops, and pedestrian pathways). The potential to extend the Pa' rus Trail through all or portions of the upper canyon has been an important focus of this analysis. This trail would provide visitors the option to experience the canyon from a new perspective, minimizing the need to ride the shuttle. It is anticipated that improvement of pedestrian and bicycle connectivity and mobility throughout the canyon could help relieve pressure on the shuttle system during peak visitation periods, particularly as ridership continues to increase in the future.

Analysis Approach

Concurrently with the shuttle system ridecheck and other field analysis, team members conducted a thorough review of the general conditions along the Floor of the Valley Road corridor throughout the Zion Canyon portion of Zion National Park. Team members walked and bicycled the corridor multiple times, recorded existing conditions in writing at regular intervals, measured the cross section of the roadway prism at regular intervals, and surveyed conditions and features at each shuttle stop location.

Following the field analysis, team members studied aerial photographs and topographic

maps and further consulted with Zion National Park staff on existing conditions in the canyon and perspectives related to the potential to extend the Pa' rus Trail corridor.

The analysis was based on field observations, aerial photo and GIS information, as well as park staff knowledge of visitor usage patterns and related opportunities and challenges associated with topographic conditions.

Observations and Findings

Overall it appears that there are long stretches of the canyon floor where an extension of the Pa' rus Trail could be implemented. However, there are some segments that are extremely challenging due to topography and space limitations. In these areas, a trail extension may not be constructible or would require creative structural solutions (such as a cantilevered platform off the side of the roadway). Some segments would require bridges to cross the Virgin River and others may require seasonal analysis due to risk of damage from flash floods. In addition, given the sensitive historical



The Virgin River is a constant feature visible throughout the canyon.

characteristics of the floor of the valley road the following recommendations are made with the intent to retain the road's historical and cultural landscape character.

Please note that for some segments multiple options are shown. Further analysis will be required to determine the best options to implement.

More detailed observations and findings are described in Figures 5-15 and 5-16.

Recommendations

Recommendations related to the potential for extending the Pa' rus Trail are organized by segment and presented within the framework of Opportunities and Challenges detailed in Tables 5-1 through 5-6. These segments have been identified as specific stretches of the corridor between shuttle stops. The varying condition of the land requires resolution of different types at various segments. While some segments offer opportunities for multiple trail alignment options, other segments have only one viable alignment option or shared road use.

Recommendations for pedestrian and bicycle mobility throughout each segment of the trail are illustrated in Figures 5-1 and 5-2. Identified opportunities and challenges associated with each segment are further illustrated in Figures 5-3 through 5-16.

Four multi-modal connectivity configurations are proposed for the corridor, as referenced throughout the recommendations. These configurations are defined below.

Configuration A: Riverside Trail - A single lane, multi-use trail that runs alongside the river-trail width may vary per segment. This trail would not be connected to the road, but would make use of available land adjacent to the river.

Configuration B: Shared Road - Expansion of the existing roadway to facilitate pedestrian and bicycle use with shuttle traffic, this includes designated bicycle lanes for north and south bound bicyclists as well as north and south bound lanes for shuttles. A separate lane for pedestrian use could be placed along the west side of the road.

Configuration C: Trail Conversion – There are existing trails that can be converted to accommodate a multi-use trail. Some of these trails are currently in use, while others would need restoration.

Configuration D: Shuttle - In areas where space for trail alignment becomes limited due to slope, landslide, or flood areas it may be necessary for pedestrians and bicyclists to use the shuttle (or they could share the road in these areas). Shuttles that have the capacity to transport large quantities of bicycles between shuttle stops could be well used on this stretch of road. Advanced bicyclists would still have the option to share the road with shuttle traffic.

Additional Recommendations and Considerations

Additional recommendations and considerations related to the potential for enhanced multi-modal access and connectivity in the canyon are provided below.

- If the park determines to move forward with the potential expansion of the Pa' rus Trail, preliminary design/engineering and detailed environmental analysis would be the next step. This analysis could provide more conclusive detail and recommendations, particularly related to some of the most constrained areas. With ongoing alternatives analysis, it may be determined that moving forward with certain segments of improvements as a first phase would be the best solutions. Washington State University Landscape Architecture student, Sharlene Sherwood, will be completing her senior project on Zion Canyon multi-modal opportunities analysis, which will advance the work of this report to the next level of planning. Ms. Sherwood's work will become available to the park in Spring 2009 for its reference and use.
- The intent of expanding the Pa' rus Trail would be to relieve congestion on the shuttle system during peak periods and offer visitors another means of access within the canyon, thereby enhancing their experience. In the segment noted above, greater weight is given to a trail opportunity that is separated from

the road. Enhancing the visitor experience through the use of a multi-model access opportunity and providing the safest alignment are important factors. However, improvements of a separated trail system may also create the need for increased management and resource protection in the canyon, and it may put additional pressure on the shuttle system at certain locations as an unintended consequence.

- As part of ongoing analysis, the park should consider strategies for managing visitation if an in-flux of visitors is attracted to the canyon with the expanded trail system. For example, additional visitors may be attracted to trailheads and areas in the canyon, requiring more management and resource protection. With more visitors in the canyon, it may put more pressure on the shuttle system (particularly the final runs of the day) to carry visitors in and out of the park.

Visitor management strategies could include:

- Encouraging visitors to access the Pa' rus Trail from specific locations.
- Encouraging visitors to access the shuttle from specific locations (that are not as crowded).



Tandem cyclists on the Pa' rus Trail

- Increasing shuttle service during the tail end of the day, particularly during peak visitation periods to catch end-of-day cyclists and hikers.
- Visitor education and communication encouraging visitors to stay on the trail and avoid off trail activities.
- Providing facilities at key points along the trail, such as benches for resting, water, shade/shelter, access to restrooms (existing restrooms at trailheads), interpretive panels, trash receptacles, etc. and to draw more visitors to specific areas.

Trail Surfacing and Design Treatments

It will be important for the design of the Pa' rus Trail and any related amenities and facilities to be highly context sensitive – visually cohesive with the park setting and ecologically friendly. For example, the surface should be colored to blend in with the surroundings, such as through the use of red colored concrete (as is done on the current length of the Pa' rus Trail). It may also be possible to pave the path pervious concrete materials or through crushed fines heavily compacted or bound well through the use of a naturally derived soil cement product. Native plants and landscaping should be installed along the trail to rehabilitate any disturbed areas.

Zion Canyon Trail – A Regional Opportunity

Regional interests are moving forward with plans to develop the Zion Canyon Trail System. A connection between Rockville and Springdale is currently in the planning stages. A linkage between this trail and the Pa' rus Trail and its possible extension up canyon will greatly increase regional recreational opportunities and also make it possible for visitors staying in hotels and accommodations in Springdale to bicycle or walk all the way to the park as an alternative to driving or riding the shuttle. Increasing transportation choices will help to relieve traffic congestion, especially during peak periods.

Visual Simulations of the Potential Pa' rus Extension

Four visual simulation images of the potential extension of the Pa' rus Trail in Zion Canyon have been created to illustrate how the trail might appear as it works its way through areas of the park.

Visual Simulation 1 shows the concept of a shared path along the Floor of the Valley Road inside the park, designed sensitively to fit the historic roadway character. This image depicts conditions in the vicinity of the Canyon Junction shuttle stop.

Visual Simulation 2 shows an area where the trail would be separated from the road in the park. This trail would be located on the west side of the Virgin River directly across from Canyon Junction shuttle stop.

Visual Simulation 3 shows the conversion of the existing horse concession trail to a multi-use pathway that could accommodate bicyclists (as an extension of the Pa' rus Trail). This segment is located between the Court of the Patriarchs shuttle stop and the Zion Lodge shuttle stop.

Visual Simulation 4 shows a separated multi-use trail in an area between Weeping Rock and Big Bend, where the river drops below grade.





Visual Simulation 1



Visual Simulation 3



Visual Simulation 2



Visual Simulation 4

Table 5-1. Options for Extending the Pa' rus Trail – Segment 1

Segment 1 – Canyon Junction to Court of the Patriarchs		
Configuration A: Riverside Trail	Opportunities	Challenges
	<p>The existing trail along west side of river could be extended from Canyon Junction to slide area. The existing vehicular bridge would be shared use to move bicyclists and pedestrians from the existing Pa' rus terminus to start of new trail. See location Photo 1A.</p> <p>Educational panels on cultural resources could be installed on west side of the river such as Crawford Gifford ditch.</p> <p>A new bike/pedestrian bridge at slide area to cross the river providing access to the road.</p>	<p>Alignment would require crossing and sharing the existing vehicular bridge to access the west side of the river.</p> <p>Landside areas prevent the option of a trail continuing north on the west side of the river.</p> <p>If trail originates on west side of the river the construction of a bridge would be required to cross to the east side of the river before the landslide area. See location Photo 1B.</p>
	<p>The roadway could potentially be widened or lanes could be reconfigured to accommodate trail on road shoulder. Roadway sections in this segment vary from 26-28 feet wide; with pull offs 40 feet wide and greater.</p> <p>Vehicles, bicyclists, and pedestrian traffic would share the road with shuttles and cars.</p> <p>Restripe road to add bike lanes.</p>	<p>Engineering to create a cantilevered path may be an option for a roadside trail through narrow stretches of the corridor.</p> <p>Landslide areas become very narrow making it difficult to widen road to accommodate additional multi-use lane.</p> <p>Pinch points occur at portions of the road where there is an incline. These uphill climbs slow down the bicyclist and therefore slows down the shuttle traffic since they are not permitted to pass the bicyclist.</p>
	<p>Direct bicyclists to use road and suggest family bicyclists/pedestrians to shuttle through this segment of the trail.</p> <p>Use of an additional shuttle or van with capability to transport a given number of bicycles at a time, this may improve segment.</p> <p>Wayfinding tools would be an essential component to improving the section of the trail.</p>	<p>Not applicable</p>

See Figures 5-4 through 5-7 for annotated maps of Segment 1



Pa' rus Trail Extension Options – Segment 1 Locations



1A. Vehicular bridge leading to potential Pa' rus Trail extension, facing down canyon



Existing road bed east of the Virgin River, facing north



1B. Potential site for bridge for crossing from west side of river, facing east



Floor of the Valley Road just north of Canyon Junction shuttle stop, facing north

Table 5-2. Options for Extending the Pa' rus Trail – Segment 2

Segment 2 – Court of the Patriarchs to Zion Lodge		
Configuration C: Trail Conversion	Opportunities	Challenges
	<p>The existing horse concession trail could be converted to accommodate a multi-use trail. Approximately six to eight feet in width. See photo 2A.</p> <p>Existing paths from the north end of the horse concession trail to the Zion Lodge could be improved to accommodate a multi-use trail.</p>	<p>Converting the horse concession trail to a multi-use trail may require alternative arrangements for horse concession use if space width could not accommodate both.</p>
Recommendations	<p>Improve the concession trail for a multi-use option with appropriate signage and connections to the shuttle stop, Zion Lodge, and Zion Lodge shuttle stop.</p> <p>Add crosswalks at shuttle stops and lodge access point to promote use and safe crossing opportunities to access the trail.</p>	

See Figures 5-8 and 5-9 for annotated maps of Segment 2

Pa' rus Trail Extension Options – Segment 2 Locations



Court of the Patriarchs shuttle stop, facing northeast



2A. Existing horse concession trail, facing northwest



2B. Existing pedestrian path to Zion Lodge

Table 5-3. Options for Extending the Pa' rus Trail – Segment 3

Segment 3 – Zion Lodge to The Grotto		
Configuration	Opportunities	Challenges
B & C: Shared Road/ Trail Conversion	<p>The area between the road and river is very wide and provides opportunities for trail extension. This area was the former location of the old Bridle Path, which could be brought back to use. See location Photo 3A.</p> <p>The old bridle path could be used to transition an improved multi-use bridle path into bridle path multi-use trail extension located between the road and river.</p> <p>The road section averages 26 feet wide plus shoulders but land is available to widen for a bicycle/pedestrian lane. This length of the road is flat and could be shared. See location Photo 3B.</p>	<p>Over time, natural deterioration of the revetment and natural hydro-geomorphic forces could cause the river to widen and/or shift, creating less room for a trail extension. The ability to develop a trail will become more problematic in areas where the available land becomes narrower.</p> <p>Currently, there are areas where the river creates pinch points as it meanders closer to the road, and these areas are more constrained physically.</p>
Configuration C: Trail Conversion	<p>The existing Grotto Trail could be improved to function as a multi-use path.</p>	<p>There are topographical challenges on the Grotto Trail that would require engineering to widen the path in some areas.</p> <p>Elevation changes along the Grotto Trail would be a challenge for maintaining the Pa' rus as an ADA accessible trail.</p>

See Figures 5-10 and 5-11 for annotated maps of Segment 3

Pa' rus Trail Extension Options – Segment 3 Locations



Connection between the lodge and the entrance to The Grotto Trail



3B. The Grotto Trail



The Grotto picnic area on the east side of the road



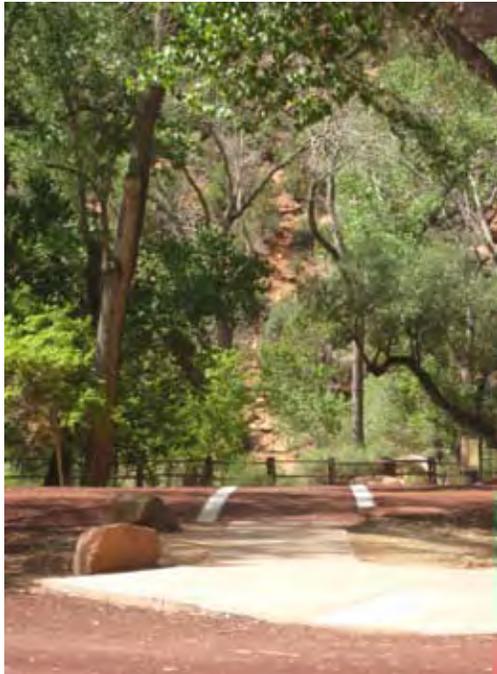
3A. Open area between the road and river. Possible connecting area from Lodge to the Grotto

Table 5-4. Options for Extending the Pa' rus Trail – Segment 4

Segment 4 – The Grotto to Weeping Rock		
Configuration A: Riverside Trail	Opportunities	Challenges
	<p>The trail could extend across the road at existing shuttle stop location. Improve the existing trail on west side of the road that leads to other park trails. The improved trail could serve to transition a new multi-use path located between the road and the river. See location Photo 4A.</p> <p>The trail could extend between the road and the river in areas with sufficient room. See location Photo 4B.</p>	<p>Over time, natural deterioration of the revetment and natural hydro-geomorphic forces could cause the river to widen and/or shift, creating less room for a trail extension. The ability to develop a trail will become more problematic in areas where the available land becomes narrower.</p> <p>Currently, there are areas where the river creates pinch points as it meanders closer to the road, and these areas are more constrained physically .</p>

See Figures 5-12 and 5-13 for annotated maps of Segment 4

Pa' rus Trail Extension Options – Segment 4 Locations



4A. Crosswalk from The Grotto to cross to the west side of the road



4B. Potential area for Pa' rus trail extension from The Grotto to Weeping rock on the west side of the road



Weeping Rock shuttle stop facing down canyon

Table 5-5. Options for Extending the Pa' rus Trail – Segment 5

Segment 5 – Weeping Rock to Big Bend		
Configuration A: Riverside Trail	Opportunities	Challenges
	<p>The trail could be aligned with the river in this area, which drops well below the road. See location Photo 5A.</p> <p>A middle connection from trail to road could be added at the existing parking pull off.</p>	<p>Dropping the trail below the road would require a large elevation climb to get to the Big Bend Shuttle Stop. See location Photo 5B.</p> <p>Placing the trail next to the river could pose threats during floods. This may require the use of bridges or boardwalks to minimize the risk.</p>
Configuration B: Shared Road	<p>The trail could stay in alignment with the road. This would require widening the road or reconfiguring lanes. See location Photo 5C.</p>	<p>On average, roadway sections are only 26 feet in width.</p>

See Figure 5-14 for annotated map of Segment 5

Pa' rus Trail Extension Options – Segment 5 Locations



5A. Area adjacent to the river dropping below the road grade



5C. Road from Big Bend to Weeping Rock shuttle stop, facing east



5B. Elevation change between the road and river between Big Bend and Weeping Rock shuttle stops



Big Bend shuttle stop, facing north

Table 5-6. Options for Extending the Pa' rus Trail – Segment 6

Segment 6 – Big Bend to Temple of Sinawava		
Configuration A: Riverside Trail	Opportunities	Challenges
	The trail could continue along the river to the Temple of Sinawava. There is ample space for a trail along the river particularly nearest the Temple of Sinawava. See location Photo 6A.	There are major pinch points between the river and road near Big Bend which limit the potential for locating a trail in some areas. See location Photo 6B. Potential wearing of the revetment could cause the river to widen leaving less space for the Pa' rus trail extension. See location Photo 6C.
Configuration B: Shared Road	The trail could be continued along the road. Road expansion or lane reconfiguration may be required.	Road section narrow to 25 feet wide in places, with not much room for widening.

See Figures 5-15 and 5-16 for annotated maps of Segment 6

Pa' rus Trail Extension Options – Segment Locations



Photo 6A. Potential site for Pa' rus trail extension near the Temple of Sinawava



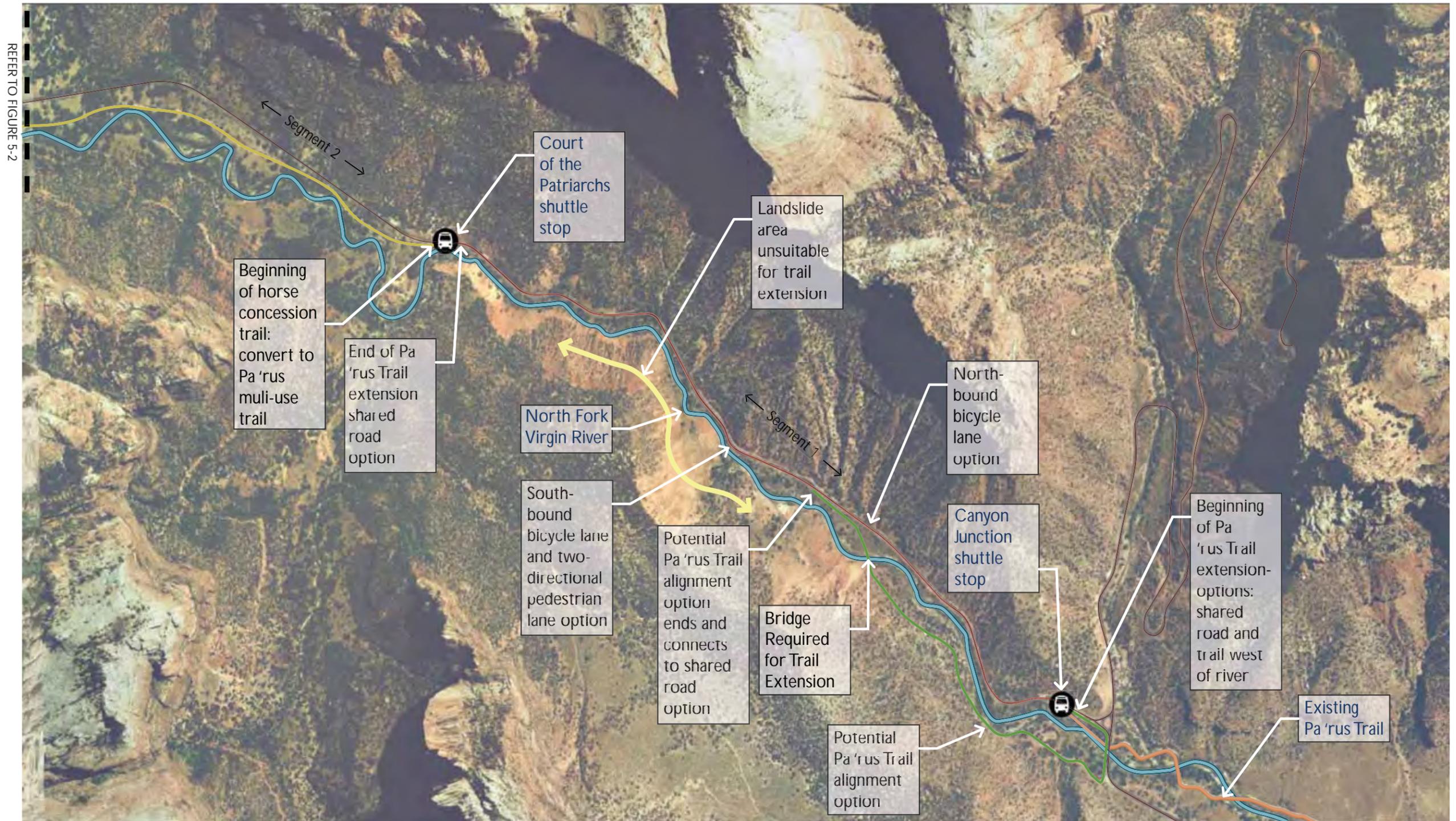
6B. Narrow area along the river near Big Bend



6C. River revetment near the Temple of Sinawava



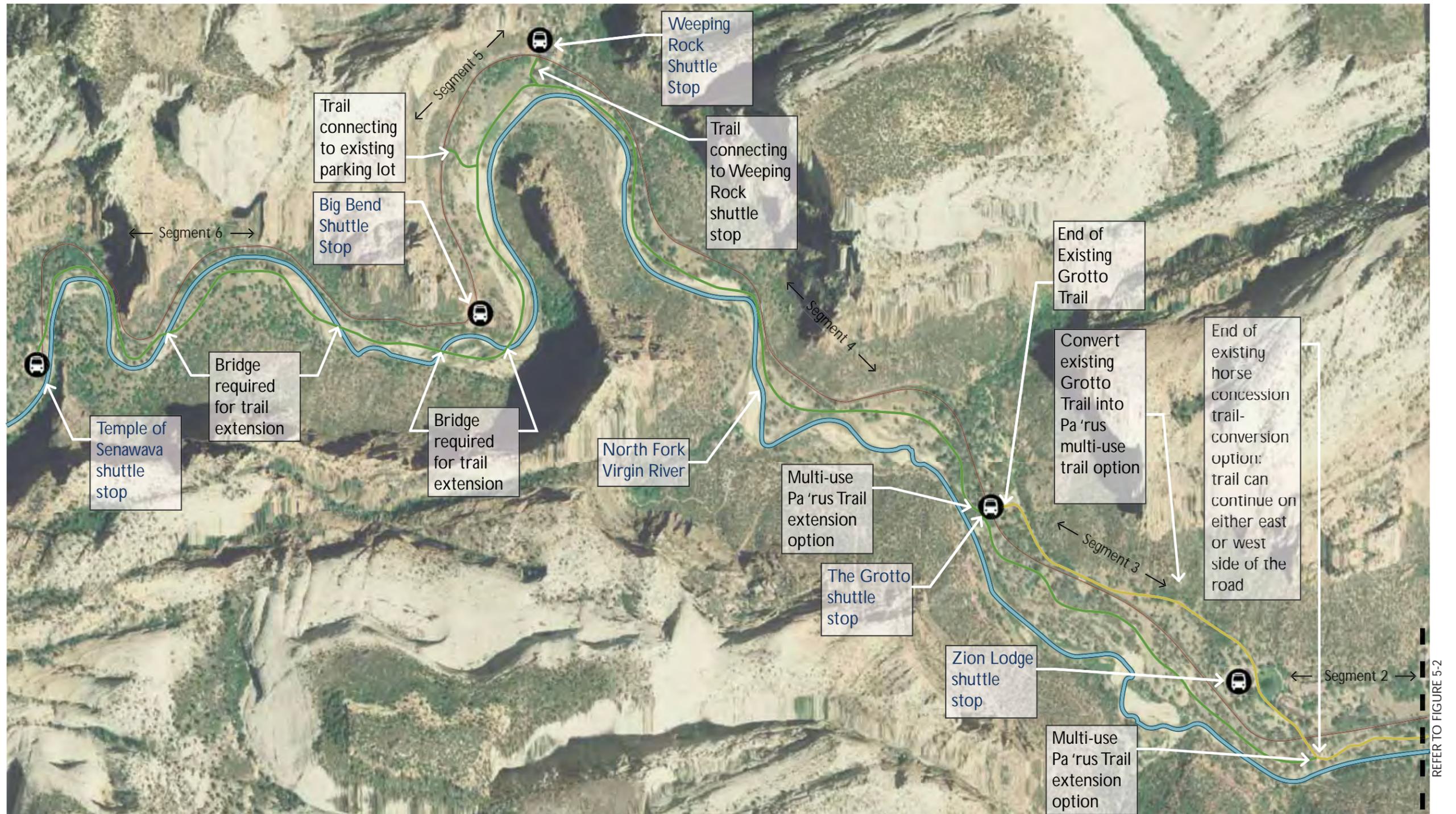
Temple of Sinawava shuttle stop at the end of the canyon



Legend

- Existing Pa'rus Trail
- Proposed One-Directional Shared Road Option
- Proposed Riverside Option
- Proposed Trail Conversion Option
- North Fork Virgin River
- Floor of the Valley Road
- Matchline
- Bridge
- 🚌 Shuttle Stop
- 🧭 NORTH
- 0 450 900 1800

Figure 5-1. Pa'rus Trail Extension Alignment Options: Canyon Junction to Court of the Patriarchs



Legend

- Existing Pa'rus Trail
- Proposed Riverside Option
- Proposed Trail Conversion Option
- Proposed One-Directional Shared Road Option
- North Fork Virgin River
- Floor of the Valley Road
- Matchline
- Bridge
- Shuttle Stop
- NORTH
-

Figure 5-2. Pa'rus Trail Extension Alignment Options: Zion Lodge to Temple of Sinawava

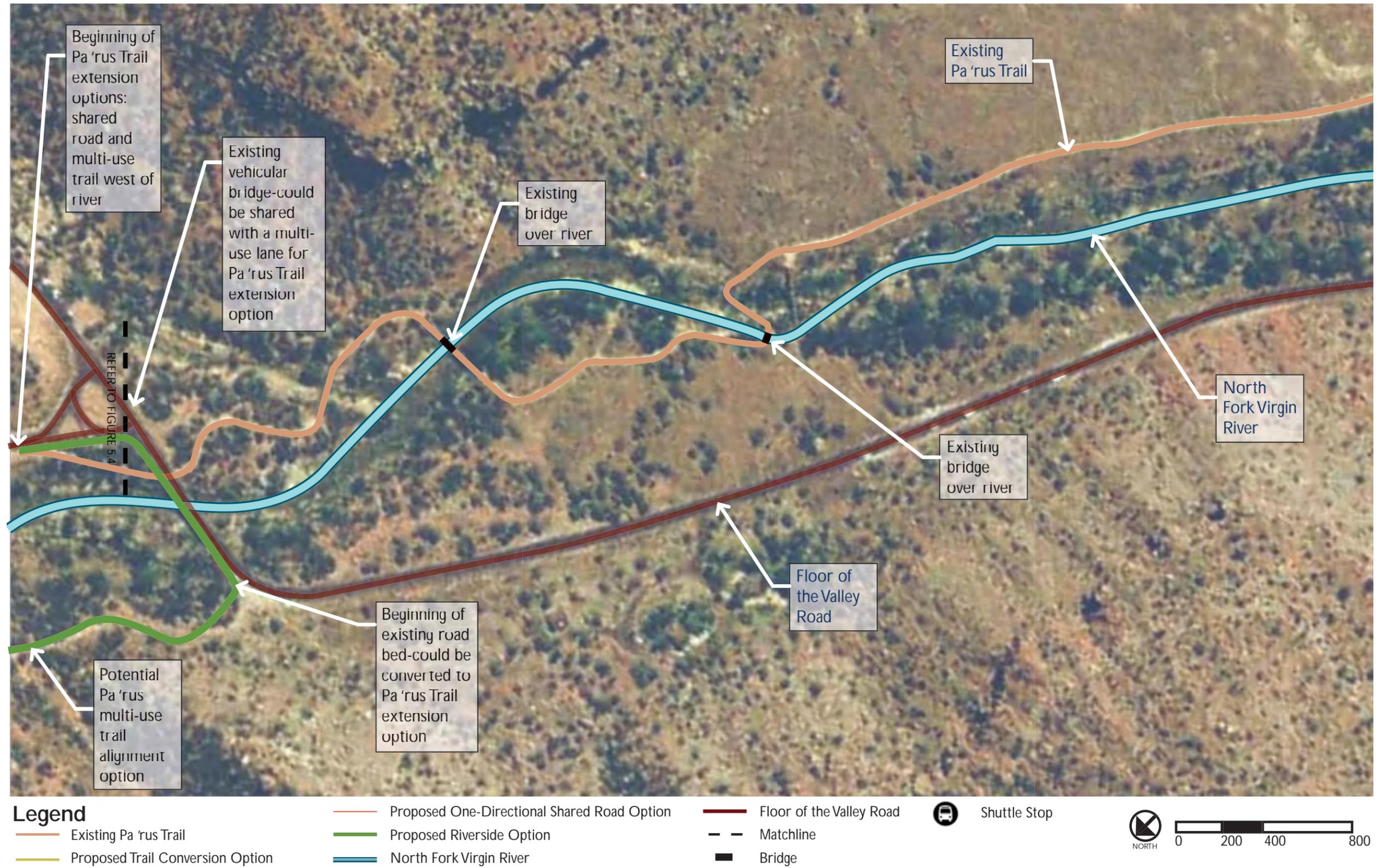


Figure 5-3. Pa'rus Trail Extension Alignment Options: Existing Pa'rus Trail to Canyon Junction