The use of the Current River for boating and fishing is a legitimate use of the river and construction activities that restrict river access should be avoided. Navigation along the river should be maintained to the maximum extent possible. The selected project should avoid the acquisition of park land for highway right-of-way if possible.

3.6 Aesthetic Considerations

The existing arch profile of the bridge over the Current River can be viewed from the north approach roadway as the road descends and curves onto the bridge presenting a dramatic view of the existing structure. The elevation of the arched bridge can be viewed by boaters on the river as well as from Carr's Store and adjacent river access area. The existing bridge is a filled arch and therefore has a heavy, massive appearance. In addition to the general aesthetic of the filled arched bridge, the Current River Bridge contains some specific architectural elements including a geometric relief on the upstream and downstream face of each pilaster between the arches, an open spindle bridge rail with heavy posts and a curving approach barrier at the bridge ends.

The existing open spandrel arch bridge over Spring Valley can be viewed from the NPS service road leading to the ranger station and Round Spring Cave. The bridge can also be viewed from the parking lot and trail to Round Spring. The existing bridge presents a slender open arch and the offset arch placement due to the 45 degree skew adds visual complexity to the elevation view of the bridge. The spans approaching the arch have a curved bottom flange adding visual interest as the bridge crosses the NPS service road. Additional architectural elements include small decorative features at the tops of both thrust blocks and an open spindle rail with heavy posts.

4 Conceptual Alternatives Studied

The general description of the alternatives considered are presented below. Descriptions of specific sub-alternatives are also included. Descriptions of the alignments and profiles as well as the bridge types and configurations considered are included in the following sections. Details of the alignments, profiles and bridge configurations can be seen in Appendix A. Prior to the design charrette, Alternatives 3 and 4 were subdivided to include a possible retrofit of the existing highway bridge for reuse as a pedestrian crossing. These options would only be possible if the NPS was willing to take ownership of the bridge after construction. During the design charrette it was made clear that the NPS was not willing to take ownership of the existing bridge and further consideration of these options was halted and those options are not included in the final study report.

Alternatives 1 and 2 at the Current River that stay on alignment can use either a two lane or a single lane temporary bridge. The alternatives with a two lane temporary bridge are designated with an "A" suffix while the single lane alternatives use a "B" suffix. Additionally, the two lane temporary bridge can be placed on two different alignments show in the details as Option 1 which removes the existing pedestrian bridge and Option 2 located downstream of the pedestrian bridge. Similarly, the offset alignment Alternatives 3 & 4 can be placed on two different alignments and Option 1 removes the existing pedestrian bridge while Option 2 is located downstream of the pedestrian bridge. The Current River Bridge rehabilitation shown in Alternative 5 considers only a two lane temporary bridge,

the suffixes “A” and “B” are shown for differing construction sequences as described in Section 6.6. The alternatives at Spring Valley that include either a new or rehabilitated concrete arch main span could be built with either concrete girder approach spans or haunched steel plate girder approach spans. The concrete girder approach span alternatives include an “A” suffix while the haunched steel plate girder approach spans use a “B” suffix.

Alternative 1 – In-Kind Bridge Replacement on Alignment

This alternative would carry traffic on a temporary bridge on an offset alignment. The existing highway bridges would be replaced with similar but wider structures in their existing locations. Temporary roadway alignments would be designed for speeds as low as 20 MPH. Permanent roadway work would be minimized with this alternative but it would require construction of two bridges at each site.

Current River Alternative 1A – Option 1 includes a two lane temporary bridge in place of the existing pedestrian bridge and Alternative 1A – Option 2 includes a two lane temporary bridge downstream of the pedestrian bridge. Current River Alternative 1B includes a single lane temporary bridge in place of the existing pedestrian bridge to be converted to a permanent mixed use path (MUP) at the completion of the project. Spring Valley Alternative 1A includes new concrete girder approach spans while Alternative 1B includes haunched steel plate girder approach spans.

Alternative 2 – Girder Bridge Replacement on Alignment

This alternative is similar to Alternative 1 but would replace the existing bridge with a new, wider haunched steel girder bridge instead of a bridge similar to the existing concrete arch structure.

Current River Alternative 2A – Option 1 includes a two lane temporary bridge in place of the existing pedestrian bridge and Alternative 2A – Option 2 includes a two lane temporary bridge downstream of the pedestrian bridge. Current River Alternative 2B includes a single lane temporary bridge in place of the existing pedestrian bridge to be converted to a permanent mixed use path at the completion of the project.

Alternative 3 – In-Kind Bridge Replacement on Offset Alignment

This alternative would carry traffic on the existing bridge while a new bridge similar to the existing bridge but wider is constructed on an offset alignment. Speed limits as low as 35 MPH would be allowed, but other roadway design standards would not be reduced for this option since traffic would not be carried on a temporary roadway. This option would create the greatest amount of roadway work and impact on the area surrounding the bridges but it would only require construction of one bridge at each site.

Spring Valley Alternative 3A includes new concrete girder approach spans while Alternative 3B includes haunched steel plate girder approach spans.

Alternative 4 – Girder Bridge Replacement on Offset Alignment

This alternative is similar to Alternative 3 but would replace the existing bridge with a new haunched steel girder bridge instead of a bridge similar to the existing concrete arch

structure. Continuous steel girders are assumed for all spans so no suffix modifiers are included at Spring Valley.

Alternative 5 – Rehabilitation of Existing Bridges

At the Current River, there are two options to this alternative. Alternative 5A would be a phased rehabilitation and widening of the existing bridge that would carry the current single lane of traffic on the existing or widened structure and therefore would not require a temporary bridge. In a multi-phase rehabilitation most of the existing bridge fill could not be removed limiting the ability to perform an inspection and a complete rehabilitation of the existing concrete. Similar to Alterative 1A, Alternative 5B would carry traffic on a two lane temporary bridge on an offset alignment. The existing highway bridge would be rehabilitated to correct deterioration and widened to account for current highway design criteria. Temporary roadway alignments would be designed for speeds as low as 20 MPH. A single phase of rehabilitation with the traffic shifted to a temporary bridge would permit the removal of the existing bridge fill allowing for inspection and rehabilitation of the buried components of the existing bridge. In both options, permanent roadway work would be minimized with this alternative but it may require construction of a temporary bridge and a substantial remediation and modification project that is likely to have impacts in the streambed similar to the construction of a new bridge. A rehabilitated bridge over the Current River would result in a new concrete deck that would receive a condition rating of 8 while the superstructure and substructure would be rehabilitated to a condition rating of at least 6 and likely 7 depending on the extent of the rehabilitation selected.

The configuration of the bridge over Spring Valley provides only two lines of support (either concrete girders or arches) over the length of the structure. This configuration does not allow for a phased rehabilitation and only a single phase rehabilitation is presented. Similar to Alternative 1, a temporary bridge on an offset alignment will be required but permanent roadway work will be minimized. The rehabilitation of the existing bridge would create impacts to the surroundings similar to the construction of a new bridge. Spring Valley Alternative 5A includes new concrete girder approach spans while Alternative 5B includes haunched steel plate girder approach spans. Similar to the Current River Bridge, a rehabilitation of the bridge over Spring Valley would result in a new concrete deck that would receive a condition rating of 8 while the superstructure and substructure would be rehabilitated to a condition rating of at least 6 and likely 7 depending on the extent of the rehabilitation selected.

Alternative 6 – Phased In-Kind Replacement of Existing Bridge

This alternative only applies to the bridge over the Current River, the bridge over Spring Valley cannot be replaced in phases. A phased replacement with a new concrete arch structure could be built resulting in a slight offset of the permanent alignment. This alternative would carry traffic on either the existing bridge or the widened bridge and would not require a temporary bridge. Permanent roadway work would be greater than the on alignment options but less than a fully offset bridge. Bridge costs would increase due to the phased construction, but a temporary bridge is not needed.

Alternative 7 – Phased Girder Bridge Replacement of Existing Bridge

Similar to Alternative 6, this alternative also only applies to the bridge over the Current River. A phased replacement with a girder bridge could be built resulting in a slight offset of the permanent alignment. This alternative would carry traffic on either the existing bridge or the widened bridge and would not require a temporary bridge. Permanent roadway work would be greater than the on alignment options but less than a fully offset bridge. Bridge costs would increase due to the phased construction, but a temporary bridge is not needed.

Study Alternatives Summary

The following tables summarize the various aspects of the studied alternatives for each site.

Table 4-1. Current River Studied Alternatives Summary

Alternative Studied	On Alignment	Offset Alignment	New Concrete Filled Arch Bridge	New Haunched Steel Girder Bridge	Rehab. Bridge	Phased Construction	2-Lane Temp. Bridge	1-Lane Temp. Bridge	Temp. Bridge near Exist.	Temp Bridge Downstream of Ped.	Remove Ped. Bridge
Alternative 1A, Option 1	X		X				X		X		X
Alternative 1A, Option 2	X		X				X			X	
Alternative 1B	X		X					X			X
Alternative 2A, Option 1	X			X			X		X		X
Alternative 2A, Option 2	X			X			X			X	
Alternative 2B	X			X				X			X
Alternative 3, Option 1		X	X								X
Alternative 3, Option 2		X	X								
Alternative 4, Option 1		X		X							X
Alternative 4, Option 2		X		X							
Alternative 5A	X				X	X					
Alternative 5B, Option 1	X				X		X		X		X
Alternative 5B, Option 2	X				X		X			X	
Alternative 6		X	X			X					
Alternative 7		X		X		X					

Table 4-2. Spring Valley Studied Alternatives Summary

Alternative Studied	On Alignment	Offset Alignment	New Concrete Spandrel Arch Bridge	New Haunched Steel Girder Bridge	Rehab. Bridge	Concrete Girder Approach Spans	Haunched Steel Girder Approach Spans	2-Lane Temp. Bridge
Alternative 1A	X		X			X		X
Alternative 1B	X		X				X	X
Alternative 2	X			X				X
Alternative 3A		X	X			X		
Alternative 3B		X	X				X	
Alternative 4		X		X				
Alternative 5A	X				X	X		X
Alternative 5B	X				X		X	X

5 Alignment Alternatives Studied

All offset alignments over the Current River, both temporary and permanent, contain a shift to the east of the existing highway or downstream of the existing bridge. The proximity of Carr's Store and a known archeological site west of the highway limits the ability to shift the alignment to the west and was not further considered in this study. Similarly, all offset alignments over Spring Valley, both temporary and permanent, contain a shift to the west of the existing highway or upstream of the existing bridge. Round Spring is located east of the highway and just north of the existing Spring Valley Bridge and limits the ability to shift the alignment east and was not considered further in this study. Additionally, all new temporary or permanent alignments offset from the existing roadway will require clearing the land and will impact trees and vegetation in the area. Restoration of the area after construction can be included in the project but will take several years to match the existing condition.

5.1 Existing Roadway Conditions

The existing Route 19 highway is a two-lane rural highway classified as a Minor Arterial. The existing highway has two 11 foot lanes with 2 foot shoulders. Current traffic volume along Route 19 through the study area is approximately 400 AADT, with approximately 15% trucks. The highway has a posted speed limit of 45 MPH through the study area. There are four horizontal curves located within the study area. Two of the curves have approximately 450-foot radii, one curve has a radius of approximately 400-feet and the northernmost curve has a radius of approximately 500 feet. None of these existing horizontal curves meet the design criteria for 45 MPH. In addition, no warning signs of an approaching sharp curve with advisory speed plaques are in place in advance of any of