



Chapter 3

Alternatives Considered

The development of bridge location alternatives began with a broad examination of potential solutions to the identified transportation need. Concepts for initial consideration included the following:

- No Build Alternative
- Travel Demand Management (TDM) Alternative
- Transportation System Management (TSM) Alternative
- Transit Alternative
- Ferry Alternative
- Tunnel Alternative
- Bridge Rehabilitation Alternative
- Superstructure Replacement Alternative
- New Bridge on New Alignment Alternative

The TDM, TSM, transit, ferry, and tunnel strategies were dismissed because they did not satisfy the project purpose or would be cost prohibitive based on preliminary estimates. A short description of these alternatives appears in **Appendix A**.

Four strategies were identified to be carried forward in the NEPA process. Alternatives were suggested by representatives of a citizen Project Advisory Group (PAG), Section 106 consulting parties, local officials, and members of the public. Once the proposed alternatives were determined, potential river-crossing locations were screened to identify concepts that should be studied in more detail.

Based on current traffic volumes and projected growth rates, a two lane river crossing was determined to be capable of meeting the traffic demand through the 2030 design year and beyond. Therefore, a two lane cross-section was assumed for all build alternatives. Existing traffic volumes and future projections are discussed in Chapter 4 of the *Needs and Deficiencies Report*, available on the project website.

3.1 Range of Alternatives Identified

Four strategies were identified that could potentially meet the project purpose: No Build, Rehabilitation, Superstructure Replacement, and New Bridge at a New Location. The following sections describe these alternatives.

3.1.1 No Build

The No Build Alternative (Alternative 1) serves as a baseline for comparison between other alternatives. It includes minor routine maintenance on the bridge, such as frequent inspections and replacement of isolated members as the condition necessitates it. As a result of the 2008 inspection, the bridge is currently posted with a 15 ton weight limit. As the bridge continues to age, its condition would further deteriorate and it would be necessary first to permanently limit the weight of vehicles crossing and eventually to close the bridge to all traffic (estimated to occur by 2020-2025).

An in-depth inspection of the existing bridge was completed in August 2009; findings indicate that the truss members are generally in poor condition. The inspection identified a number of immediate priority repairs to maintain or restore structural integrity. It also identified several near term (6-12 months), and long term (within 2 years) repairs that should be made. The condition of the existing bridge is documented in the *Needs and Deficiencies Report*, available on the project website.

3.1.2 Rehabilitation

The Rehabilitation Alternative (Alternative 2) would extend the service life of the bridge while preserving its historically significant elements. In this alternative, the existing structure would be cleaned and repainted, key members would be repaired as needed, and the deck would be replaced. This alternative addresses structural deficiencies but does not address the safety concerns associated with the narrow width. Although this alternative would extend the service life of the bridge by an estimated 20 to 25 years, continuing steel deterioration would likely require that the bridge be closed to all traffic by 2045 based on previously published bridge inspection reports.

3.1.3 Superstructure Replacement

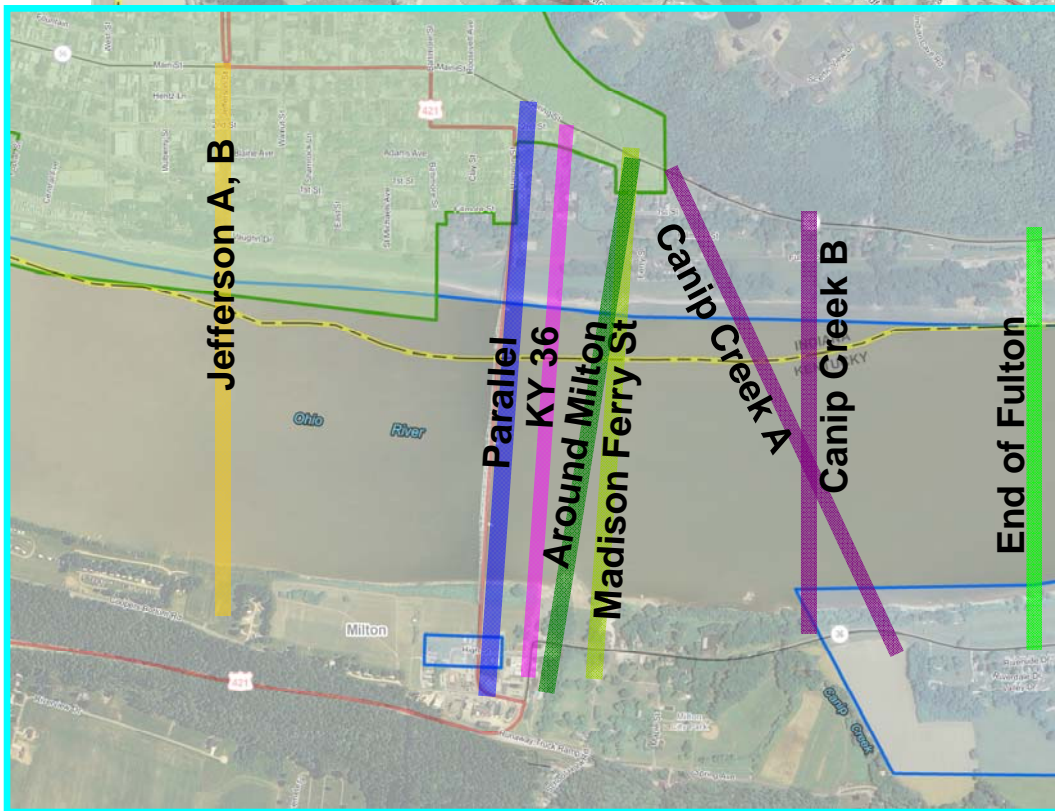
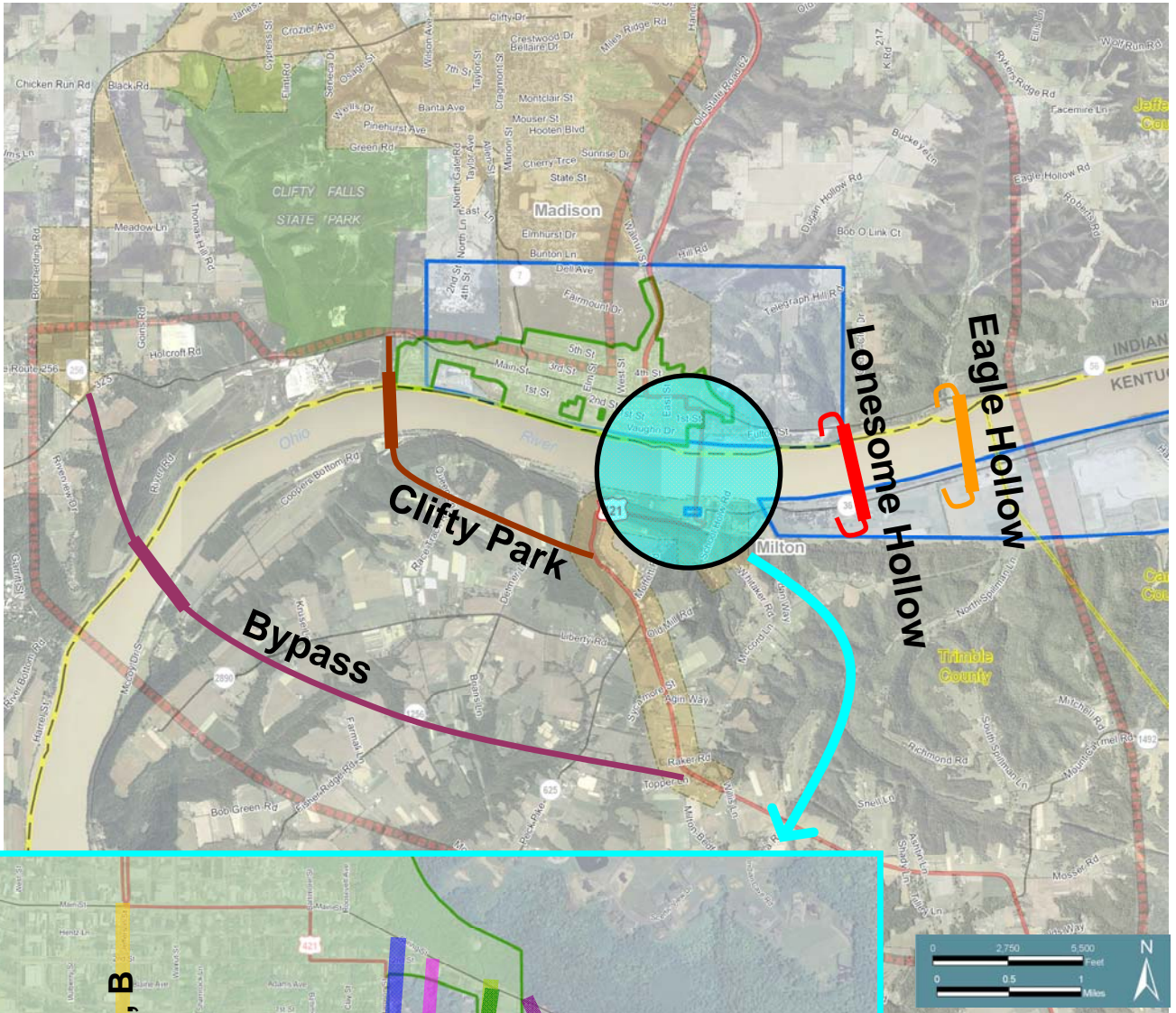
The Superstructure Replacement Alternative (Alternative 3) would build a new bridge using the existing piers. In this alternative, the existing truss superstructure would be removed, piers reinforced and widened to support a wider cross-section for traffic, and a new superstructure constructed atop the existing piers. A ferry service would maintain traffic between the two communities to preserve the cross-river connection during construction when the bridge is closed to traffic.

3.1.4 New Bridge at a New Location

Thirteen potential new crossing locations were suggested (shown in **Figure 3.1**) and are discussed briefly below. Additional information about the new location alternatives considered is presented in the *Initial Location Alternatives Screening Report*, available on the project website.

Building on a new alignment would allow the existing structure to continue moving traffic (vehicles less than 15 tons) across the river until the new bridge can be opened. However, KYTC/INDOT made a decision not to maintain more than one river crossing at this location.

Figure 3.1: Suggested New Location Alternatives



Therefore, following construction of a new river crossing, the old bridge would either be removed or its ownership would be transferred to another group that would assume associated maintenance responsibilities and costs, along with all liabilities for the structure. Any new river crossing location was assumed to provide adequate shoulder widths and a sidewalk connection between communities. From west to east, the new alignment alternatives include:

The Bypass Alternative (Alternative 4) would construct a new bridge west of Madison, lining up with SR 62 as a western bypass of the communities. Due to the terrain at this location, the bridge would span from hilltop to hilltop and the approach in Kentucky would require almost four miles of additional infrastructure to tie into US 421.

The Clifty Park Alternative (Alternative 15) would construct a new bridge connecting to SR 56 near the eastern boundary of Clifty Falls State Park in Madison. It would travel south across the river and up the ridge in Kentucky to connect to US 421 near the Riverview Drive intersection.

The Jefferson Street Alternatives would extend from Jefferson Street in Madison directly south into Kentucky. In Kentucky, Jefferson Street Alternative A (Alternative 5) would curve to the east on a section of viaduct and connect to KY 36 near Ferry Street in Milton. Jefferson Street Alternative B (Alternative 6) would connect directly into Coopers Bottom Road in Kentucky, requiring the elevation of this road to be raised 30-40 feet.

The Parallel Alternative (Alternative 7) would construct a new structure immediately east of the existing US 421 bridge. The approach would connect to US 421 at the base of Milton Hill¹.

The KY 36 Alternative (Alternative 8) would extend north from Ferry Street in Milton, passing above a western extension of KY 36. It would cross the river and connect directly into SR 56 in Indiana, approximately 400 feet east of the existing structure.

The Around Milton Alternative (Alternative 9) would extend northeast from the base of Milton Hill to pass over KY 36 between Milton's Ferry Street and School Hollow Road. It would cross the Ohio River at an angle and tie directly into SR 56 in Indiana near the eastern end of First Street.

The Madison Ferry Street Alternative (Alternative 10) would extend south from Ferry Street in Madison. From the north, it would cross the river, overpass KY 36 at the intersection with School Hollow Road, and connect into US 421 at the base of Milton Hill.

The Canip Creek Alternatives would construct a new bridge near Canip Creek, east of Milton. Canip Creek Alternative A (Alternative 11) would follow Spring Street from the base of Milton Hill through the city park, travel northwest across the Ohio River, and connect to SR 56 near the eastern end of First Street in Madison. Canip Creek Alternative B (Alternative 12) would tie into KY 36 with a flyover ramp east of Canip Creek then travel north to connect directly to SR 56 in a T-intersection.

The End of Fulton Alternative (Alternative 16) would construct a new bridge with a flyover ramp to SR 56 near the intersection of Fulton Drive east of Madison. In Kentucky, it would connect to KY 36 near Riverdale Drive with a second flyover ramp.

¹ Milton Hill is the local name for US 421 as it travels down the ridge parallel to the Ohio River, separating Upper Milton and Lower Milton while dropping over 300 feet in elevation.

The Lonesome Hollow Alternative (Alternative 13) would construct a structure approximately a mile east of the existing bridge with a flyover ramp connection to SR 56. The hollow would allow this alternative to make use of the natural topography for a future connection to the hilltop in Indiana. In Kentucky, the bridge would connect to KY 36 with a flyover ramp near the historic Richwood Plantation.

The Eagle Hollow Alternative (Alternative 14) would construct a new structure approximately 1.9 miles east of the existing bridge with a flyover ramp connection to SR 56. The hollow would allow this alternative to make use of the natural topography for a future connection to the hilltop in Indiana. In Kentucky, the bridge would connect to KY 36 with a second flyover ramp west of Canip Creek Road.

3.2 Screening of Alternatives

The sixteen alternatives described above were evaluated in a first level of screening to identify a smaller subset of reasonable alternatives. The entire range of alternatives identified was first screened against Purpose and Need performance measures to identify the reasonable range of alternatives. Then, the reasonable range of alternatives that satisfied the project purpose was screened against Secondary Considerations criteria to identify a subset of the best alternatives for detailed study. Both of these screening steps are described in the *Initial Location Alternatives Screening Report*, available on the project website.

3.2.1 Screening against Purpose and Need

The project Purpose and Need Statement describes what the project should accomplish. It forms the basis for the decision-making process: each alternative must meet the purpose and address each of the identified needs to be considered a viable solution. Of the sixteen alternatives initially defined, five alternatives were eliminated from further consideration because they do not satisfy the performance measures to fully address the Purpose and Need for the project. Performance measures were developed alongside the Purpose and Need Statement, reviewed by PAG members, Section 6002 agencies, and the public. Although the No Build Alternative does not satisfy the Purpose and Need, it has been carried forward for future consideration to serve as a baseline for comparison among other alternatives.

Purpose and Need Performance Measures

Improve or Replace Bridge

- Address functional obsolescence (lane widths)
- Address structural deficiencies – one structure maintained by KYTC and INDOT

Mobility/Connectivity

- Maintains or decreases travel times, costs, or distances from US 421-KY 36 to US 421-SR 56 (Main Street at Jefferson Street)
- Maintains linkage between Lower Milton and Lower Madison
- Anticipated lifespan of improvement
- Maintains or reduces number of turns required on approach roadways to connect to the regional road network
- Maintains or reduces number of substandard turning radii at approach intersections

Safety

- Meets design requirements for stopping sight distance on bridge and approaches
- Meets design requirements for horizontal alignment on bridge and approaches
- Maintains or improves intersections on approach roadways to allow truck turning movements
- Improves control of access points

The Rehabilitation Alternative (Alternative 2) would not address the existing geometric deficiencies of the US 421 bridge: it would not widen the travel lanes or provide adequate shoulder widths (functional obsolescence). The lifespan of this alternative would be less than other build alternatives. It would not meet current design standards for stopping sight distance or horizontal alignment on the bridge (safety). Therefore, it would not meet the first or third project purposes.

The Bypass Alternative (Alternative 4) would significantly increase travel times and distances between the KY 36-US 421 intersection and the SR 56-US 421-Jefferson Street intersection, would not maintain a community linkage, and would increase the number of turns along US 421 (mobility/connectivity). Therefore, it would not meet the second project purpose.

The Clifty Park Alternative (Alternative 15) would significantly increase travel times and distances between the KY 36-US 421 intersection and the SR 56-US 421-Jefferson Street intersection, would not maintain a community linkage, and would increase the number of turns along US 421 (mobility/connectivity). Therefore, it would not meet the second project purpose.

The Lonesome Hollow Alternative (Alternative 13) would increase travel times and distances between the KY 36-US 421 intersection and the SR 56-US 421-Jefferson Street intersection (mobility/connectivity). Therefore, it would not meet the second project purpose.

The Eagle Hollow Alternative (Alternative 14) would increase travel times and distances between the KY 36-US 421 intersection and the SR 56-US 421-Jefferson Street intersection and would not maintain a community linkage (mobility/connectivity). Therefore, it would not meet the second project purpose.

3.2.2 Screening against Other Considerations

The eleven alternatives that satisfy the Purpose and Need passed through a second screening component: evaluation against secondary considerations. These factors describe other values, issues, and concerns beyond the primary transportation needs that were considered. These considerations were developed alongside the Purpose and Need Statement, with input from agencies, Section 106 consulting parties, and the public.

Secondary Considerations included:

- Minimizing costs to build/maintain bridge
- Maintaining/enhancing quality of life
- Being sensitive to local resources
- Considering future hilltop connections
- Improving system reliability
- Improving traffic flow on connecting roadways
- Providing safe cross-river mobility for pedestrians and bicyclists
- Maintaining/improving safety on connecting roadways
- Providing for river navigation

During the decision-making process, these factors were balanced against one another to help define the best overall solution. Of the eleven alternatives evaluated, the following five alternatives were eliminated from further consideration based on their secondary impacts.

The Jefferson Street Alternatives (Alternatives 5-6) would have the largest footprint within the National Historic Landmark District and would have substantial impacts on resources in the heart of this landmark. This district was designated in order to protect “nationally significant historic places ... [that] possess exceptional value or quality in illustrating or interpreting the

heritage of the United States.”² Other bridge location alternatives exist that have fewer impacts on this resource. The connection in Kentucky back to US 421 would increase costs, affect historic resources, and require the displacement of between 5 to 20 homes and businesses in Milton, depending on the approach configuration. The Kentucky bridge approach would remain in the 100-year floodplain. Other alternatives exist which would provide a more direct, less costly approach in Kentucky with fewer impacts.

The Parallel Alternative (Alternative 7) would displace a large portion of downtown Milton. It would infringe on three of the four historic districts in the area: the National Historic Landmark District in Madison, the Madison National Register District, and the Third Street National Register District in Milton. The connection to US 421 south of the bridge would be complicated by topography; it would be difficult to provide a safe, cost-effective connection from Milton Hill to the bridge that does not force through traffic to stop. PAG members and local government officials strongly favor a continuous movement along US 421 in Kentucky. The Kentucky bridge approach would remain in the 100-year floodplain. Other alternatives exist that have fewer impacts on historic resources and on the community of Milton.

The KY 36 Alternative (Alternative 8) would displace the majority of development along the main street in Lower Milton. The US 421 southern approach would result in 5 to 10 residential and business displacements in Lower Milton. Routing KY 36 traffic through downtown Milton to access the bridge would lead to additional residential displacements. This alternative would infringe on the National Landmark and the Madison National Register District. Both approaches for this alignment could be constructed out of the 100-year floodplain. This alternative received support from local government officials in Trimble County because it would provide a continuous movement along US 421 in Kentucky and allow the existing bridge to carry traffic during construction. However, other alternatives also satisfy these objectives (e.g. Alternatives 9 and 12) with fewer relocations in Milton and without entering the Madison National Historic Landmark District.

The End of Fulton Alternative (Alternative 16) would reduce the number of required displacements in Madison, but would have sizeable costs and environmental impacts. The topography of the Indiana riverbank is too steep for the proposed bridge over the river to be able to meet the vertical clearance over the navigation channel required by the Coast Guard and still connect to SR 56 at ground level. Therefore, the bridge would have to cross over SR 56 with a flyover ramp. This would increase the length (and cost) of the bridge over the river. It would require an extremely large rock cut immediately north of SR 56 that would create a scar along the ridgeline. Visual and natural environmental impacts would result from this cut into the hillside; construction impacts from blasting into the ridge would also affect area residents. Both KY 36 and SR 56 at the tie down locations are within the 100-year floodplain. Other alternatives exist that would have fewer impacts on historic resources and on the human and natural environment.

The results of this level of screening are documented in the *Initial Location Alternatives Screening Report*, available on the project website. The alternatives eliminated from further consideration because of their secondary impacts would result in significantly greater impacts to historic resources (the National Historic Landmark or historic elements within Lower Milton) or the environment (community cohesiveness within Milton, natural elements along SR 56) than the remaining alternatives.

² Based on National Park Service definition, available online at www.nps.gov/history/nhl/

Based on the results of the Level 1 screening, four alternatives were carried forward for detailed development and additional evaluation: No Build, Superstructure Replacement, Tiber Creek (a hybrid of Alternatives 9 and 10), and Canip Creek (a hybrid of Alternatives 11 and 12). **Figure 3.2** shows the corridor footprints for these build alternatives.

Six variations of these alternatives – No Build, Superstructure Replacement with Full Approaches, Superstructure Replacement with Minimal Approaches, Tiber Creek A, Tiber Creek B, and Canip Creek were evaluated against key environmental factors. Detailed descriptions of the alternatives and results of the screening analysis are discussed in the *Alternatives Selection Report*, available on the project website.

3.2.3 Screening against Section 4(f)

The remaining six alternatives were screened against Section 4(f) resources. Section 4(f) of the Department of Transportation Action protects publicly owned parks, recreation areas, wildlife refuges, and historic sites. By law, a Section 4(f) property may be converted to a transportation use only if there is no prudent and feasible alternative and if the project includes all possible planning to minimize harm to the resource. Section 4(f) resources are discussed further in **Chapter 8** of this document.

Generally, use of a Section 4(f) resource occurs when land from a resource is acquired for conversion to a transportation use, there is an adverse temporary occupancy of a property, or proximity effects are great enough to substantially impair use of the property. Temporary impacts may occur during construction and might include impacts to air quality, noise, vibration, water quality, viewsheds, or transportation access. Temporary occupancy of a property is generally considered adverse unless

- the duration of occupancy is less than the construction period for the project;
- there is no change in ownership;
- the nature and magnitude of changes to the Section 4(f) resource are minimal;
- there are no anticipated permanent adverse physical changes;
- there is no interference with recreational activities (temporary or permanent);
- the land is restored to the original condition or better; and
- the agencies with jurisdiction agree to the conditions above.

Appendix B contains a description of the Section 4(f) resources near each of the alternatives that could potentially be impacted by the proposed transportation corridors or construction activities.

The No Build Alternative may ultimately result in the removal of the existing bridge when its condition deteriorates to an unsafe level. This would lead to a long term reduction in access for both communities. In the short term, the bridge would be subject to inspections, repairs, and routine maintenance. No Section 4(f) uses would result from this alternative.

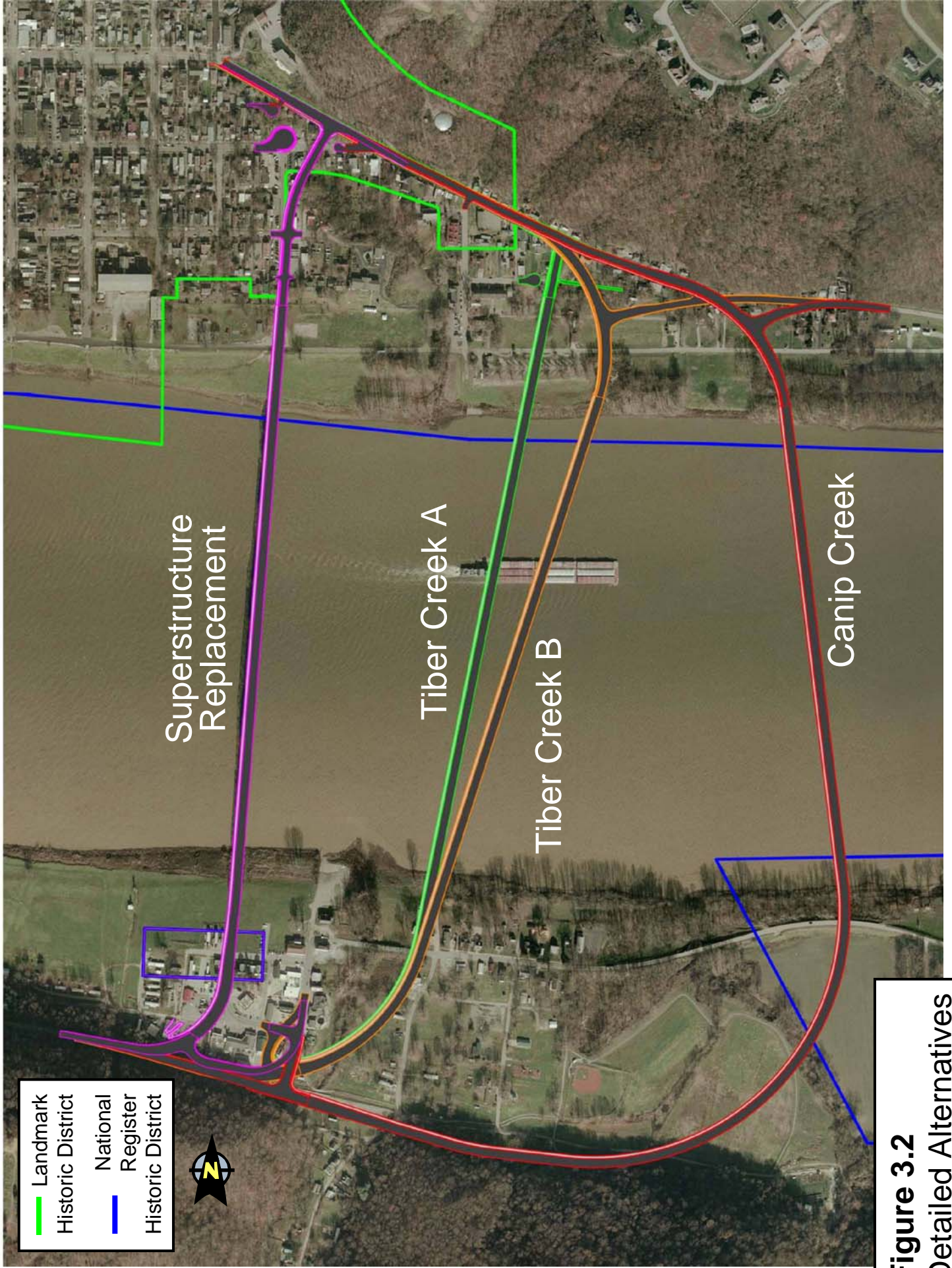


Figure 3.2
Detailed Alternatives

The Superstructure Replacement with Full Approaches Alternative would result in Section 4(f) uses within the Madison National Historic Landmark District, the Madison Historic District, the Third Street Historic District in Milton, and for the US 421 Bridge itself. Uses of historic properties are documented in **Appendix C**. This alternative would result in the displacement of eight individually eligible or contributing historic structures, plus partial takes for eight additional parcels containing historic resources (in addition to the bridge). Each of these displacements and partial takes would constitute a Section 4(f) use. The Milton Boat Ramp is a public recreational resource protected by Section 4(f) and would be converted to a ferry landing in this alternative, temporarily unavailable for public recreational use. The Madison City Campground is a public recreational resource protected by Section 4(f) and would be used as a ferry queuing area in this alternative, temporarily unavailable for public recreational use. The Jaycee Park in Madison is a public recreational resource protected by Section 4(f); portions of Jaycee Park would likely be used as a construction staging area. **Chapter 8** contains a discussion of Section 4(f) findings for impacts to these resources.

The Superstructure Replacement with Minimal Approaches Alternative would result in a Section 4(f) use for the US 421 Bridge itself. Uses of historic properties are documented in **Appendix C**. As in the Superstructure Replacement with Full Approaches Alternative, the public boat ramp in Milton and Madison City Campground would be converted to ferry landings, temporarily unavailable for public recreational use. Portions of Jaycee Park would likely be used as a construction staging area. The campground would result in a net benefit Section 4(f) use; the park and boat ramp would result in a *de minimis* Section 4(f) use.

The Tiber Creek Alternative A would result in Section 4(f) uses within the Madison National Historic Landmark District and the Madison Historic District. If ownership of the bridge were not taken over by a third party, removal of the 1929 structure would result in a Section 4(f) use of this property. Uses of historic properties are documented in **Appendix C**. This alternative would result in the displacement of five individually eligible or contributing historic structures, plus partial takes for 20 additional parcels containing historic resources (in addition to the bridge). Each of these displacements and partial takes would constitute a Section 4(f) use. The proposed structure would pass above the publicly owned Madison City Campground and adjacent to the Milton City Park. In this alternative, the Madison City Campground would be displaced, unavailable for public recreational use. Although the structure would lie beyond the footprint of the Milton City Park, the proximity impacts would have the potential to impair use of the park as a recreational resource.

The Tiber Creek Alternative B would result in Section 4(f) uses within the Madison National Historic Landmark District and the Madison Historic District. If ownership of the bridge were not taken over by a third party, removal of the 1929 structure would result in a Section 4(f) use for this property. Uses of historic properties are documented in **Appendix C**. This alternative would result in the displacement of eight individually eligible or contributing historic structures, plus partial takes for 22 additional parcels containing historic resources (in addition to the bridge). Each of these displacements and partial takes would constitute a Section 4(f) use. The proposed structure would pass adjacent to the publicly owned Madison City Campground (potentially disturbing the eastern access point) and alongside the Milton City Park. Although the structure would be beyond the footprint of the Milton City Park in this alternative, the proximity impacts have the potential to impair use of the park as a recreational resource.

The Canip Creek Alternative would result in Section 4(f) uses within the Madison National Historic Landmark District, the Madison Historic District, and the Hunter's Bottom Historic District. If ownership of the bridge were not taken over by a third party, removal of the 1929 structure would result in a Section 4(f) use of this property. Uses of historic properties are documented in **Appendix C**. This alternative would result in the displacement of nine individually eligible or contributing historic structures, plus partial takes for 24 additional parcels containing historic resources (in addition to the bridge). Each of these displacements and partial takes would constitute a Section 4(f) use. The City Park in Milton is a public recreational facility protected by Section 4(f). The proposed structure would bisect the Milton City Park in this alternative. Right-of-way acquisition within the park area would be required, resulting in a Section 4(f) use; however, coordination with the city could potentially maintain the multi-use trail beneath the elevated structure.

Table 3.1 compares the impacts to Section 4(f) resources for each of these alternatives. As a result of this screening, four alternatives were eliminated from further study because of their impacts on Section 4(f) resources. The No Build and Superstructure Replacement with Minimal Approaches Alternatives are the remaining prudent and feasible alternatives which are discussed in the following chapters. A detailed description of the Superstructure Replacement with Minimal Approaches Alternative (i.e. the Proposed Action for the Project) is included in **Appendix D**.

Table 3.1 – Adverse Findings on Section 4(f) Resources

	No Build ¹	Superstructure Full	Superstructure Minimal	Tiber A	Tiber B	Canip
Permanent conversion of land to a transportation use						
National Historic Landmark	No	Yes	No	Yes	Yes	Yes
Madison Historic District	No	Yes	No	Yes	Yes	Yes
Third Street Historic District	No	Yes	No	No	No	No
Hunter's Bottom Historic District	No	No	No	No	No	Yes
US 421 Bridge	No	Yes	Yes	Potential ²	Potential ²	Potential ²
Number of other historic structures beyond districts directly affected	No	No	No	Yes (2)	Yes (3)	Yes (2)
Jaycee Park, Madison	No	Potential Temporary Use ³	Potential Temporary Use ³	No	No	No
Madison Campground	No	Temporary Use ⁴	Temporary Use ⁴	Yes	Yes	No
Milton Boat Ramp	No	Temporary Use ⁴	Temporary Use ⁴	No	No	No
Milton City Park	No	No	No	No	Yes	Yes

¹ No Build does not meet project purpose

² In the Tiber A, Tiber B, and Canip Alternatives, the existing bridge could be taken over by a third party. If no third party is identified to assume ownership responsibilities, the existing bridge will be demolished following construction of the new structure.

³ Potential use of resource for construction staging area, to be determined by contractor

⁴ Potential use of resource for ferry operation