

Biological Assessment

Milton-Madison Bridge
Trimble County, KY and Jefferson County, IN
KYTC Item 5-135.00

Prepared for
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Executive Summary

The Milton-Madison Bridge (US 421), connecting Trimble County, Kentucky with Jefferson County, Indiana, is to be demolished. A new wider bridge will be constructed in its place. The proposed action, "Superstructure Replacement with Minimal Approaches" calls for demolishing Pier 5 while the three remaining in-river piers – 6, 7, 8 – will be widened at the top and re-used. Scour mitigation structures will be placed around the base of each of these piers. These structures will require some dredging and are expected to extend approximately 50 feet in all directions from each pier. Traffic will remain open during pier work.

Upon completion of the piers, the existing bridge truss will be demolished. Demolition is expected to involve a combination of piece-by-piece removal and explosive demolition. Pieces of the bridge dropped into the Ohio River during demolition will be removed with a barge-mounted crane.

Once the existing bridge has been removed the new, wider bridge will be constructed in its place. To facilitate construction activities, two staging areas – one on the Kentucky side, one on the Indiana side – are expected to be located immediately downstream of the US 421 bridge. The bridge will be closed to traffic during this stage of construction. During this period a ferry will be used to transport vehicles across the river between two ferry landings. The new bridge will use existing approaches.

As of 2008, the United States Fish and Wildlife Service (USFWS) lists eight federally threatened or endangered species that have the potential to occur in the project area. The listed species include the following:

- orangefoot pimpleback (*Plethobasus cooperianus*)
- pink mucket (*Lampsilis abrupta*)
- ring pink (*Obovaria retusa*)
- clubshell (*Pleurobema clava*)
- fanshell (*Cyprogenia stegaria*)
- rough pigtoe (*Pleurobema plenum*)
- Indiana bat (*Myotis sodalis*)
- running buffalo clover (*Trifolium stoloniferum*)

A mussel survey was conducted on the Ohio River from June 23 to 25, 2009. Habitat for Indiana bat and running buffalo clover was delineated on June 22, 2009.

A total of 30 individuals representing 10 species were collected during the mussel survey. Approximated mussel densities were very low, ranging from .0008 to .03 mussels per square meter. Pink heelsplitter and threeridge were the dominant species collected. Twelve specimens were collected during the survey of the initial three bank to bank transects. Of the 12 specimens collected from these transects, seven were found in a strip of gravel and sand approximately 30 to 60 meters off the right descending bank. The dominant substrate observed in this band was approximately 90% small gravel and 10% sand. Habitat outside of this band ranged from 100% sand, to 50% gravel/50% cobble, to a mix similar to that observed within the band. No juvenile mussels were observed during the field survey. Zebra mussels were present and rather abundant in some areas.

A pair of nesting peregrine falcons (*Falco peregrinus*) were observed during the field survey. Peregrine falcons are a United States Species of Management Concern. The pair has reliably nested at an artificial nest box on pier 8 since 2002. Construction activities may affect this species if the nest box on pier 8 is

disturbed. If possible, activities that may result in nest destruction or disturbance should be conducted outside of the species' nesting season (*i.e.*, typically late February through July). If the nest box is removed during construction of the new US 421 bridge, KDFWR recommends re-installing a nest box at a safe nesting location as soon as possible. Questions concerning peregrine falcons should be directed to Kate Heyden (KDFWR avian biologist).

No endangered species were encountered during the field survey. The mussel survey found very low mussel densities and marginal to poor mussel habitat in and adjacent to the proposed action area. Additionally, densities were lower in transects closest to existing US 421 bridge. Based on the results of the mussel survey, construction activities are "not likely to adversely affect" the listed mussel species. Approach work for the bridge is minimal and expected to stay within the existing right-of-way.

Additionally, no Indiana bat or running buffalo clover habitat was observed in, or immediately adjacent to, the right-of-way. The project will have "no effect" on these species.

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APPENDIX

Appendix A – Existing Bridge Profile

I. PROJECT DESCRIPTION

The Milton-Madison Bridge, connecting Trimble County, Kentucky with Jefferson County, Indiana, was originally constructed in 1929 and rehabilitated approximately 10 years ago. At that time, it was determined that the bridge would need to be reevaluated in 10 to 20 years to determine whether the bridge should undergo further rehabilitation or be replaced altogether. After analysis of several alternatives, the "Superstructure Replacement with Minimal Approaches" is the proposed action. Of the four alternatives reviewed, the proposed action will have the least environmental impact due to its utilization of existing piers and minimal approach work.

A new bridge will be constructed in place of the existing US 421 bridge (shown in Appendix A). Of the 16 piers supporting the existing US 421 bridge, four (Piers 5, 6, 7, and 8) are anchored in the Ohio River. Pier 5 is to be demolished and will not be replaced. The tops of Piers 6, 7 and 8 will be widened to accommodate the width of the new bridge. Scour mitigation structures will be placed around the base of each pier. These structures will require some dredging and are expected to extend approximately 50 feet in all directions from each pier. The bridge will remain open to traffic during pier work. Upon completion of the piers, the existing bridge truss will be demolished. Demolition is expected to involve a combination of piece-by-piece removal and explosive demolition. Non-explosive demolition methods will be used at and adjacent to the newly retrofitted piers. Explosive demolition will be applied to various degrees between piers. Pieces of the bridge dropped into the Ohio River during demolition will be removed with a barge-mounted crane. Once the existing bridge has been removed the new, wider bridge will be constructed in its place using the existing approaches. To facilitate construction activities, two staging areas – one on the Kentucky side,

one on the Indiana side – are expected to be located immediately downstream of the US 421 bridge. Staging areas will be used for barge mooring, truss assembly and equipment storage. Temporary bents will be installed during construction of the new superstructure. The bridge will be closed to traffic during this stage of construction. During this period a ferry will be used to transport vehicles across the river between two ferry landings. The new bridge will use existing approaches.

II. ACTION AREA

The action area for this biological assessment includes the Ohio River directly beneath the existing US 421 bridge, as well as 100 feet upstream and 150 feet downstream of the structure. Two staging areas and two ferry landings – one on the Kentucky side, one on the Indiana side – are also included. The staging areas are located immediately downstream of the bridge, while the ferry landings are located upstream of the bridge. The bridge will utilize existing approaches. The approaches and their associated right-of-way are included in the action area.

The project location on aerial and topographic mapping is shown on Exhibits 1 and 2, pages 2 and 3.

III. IDENTIFICATION OF LISTED SPECIES

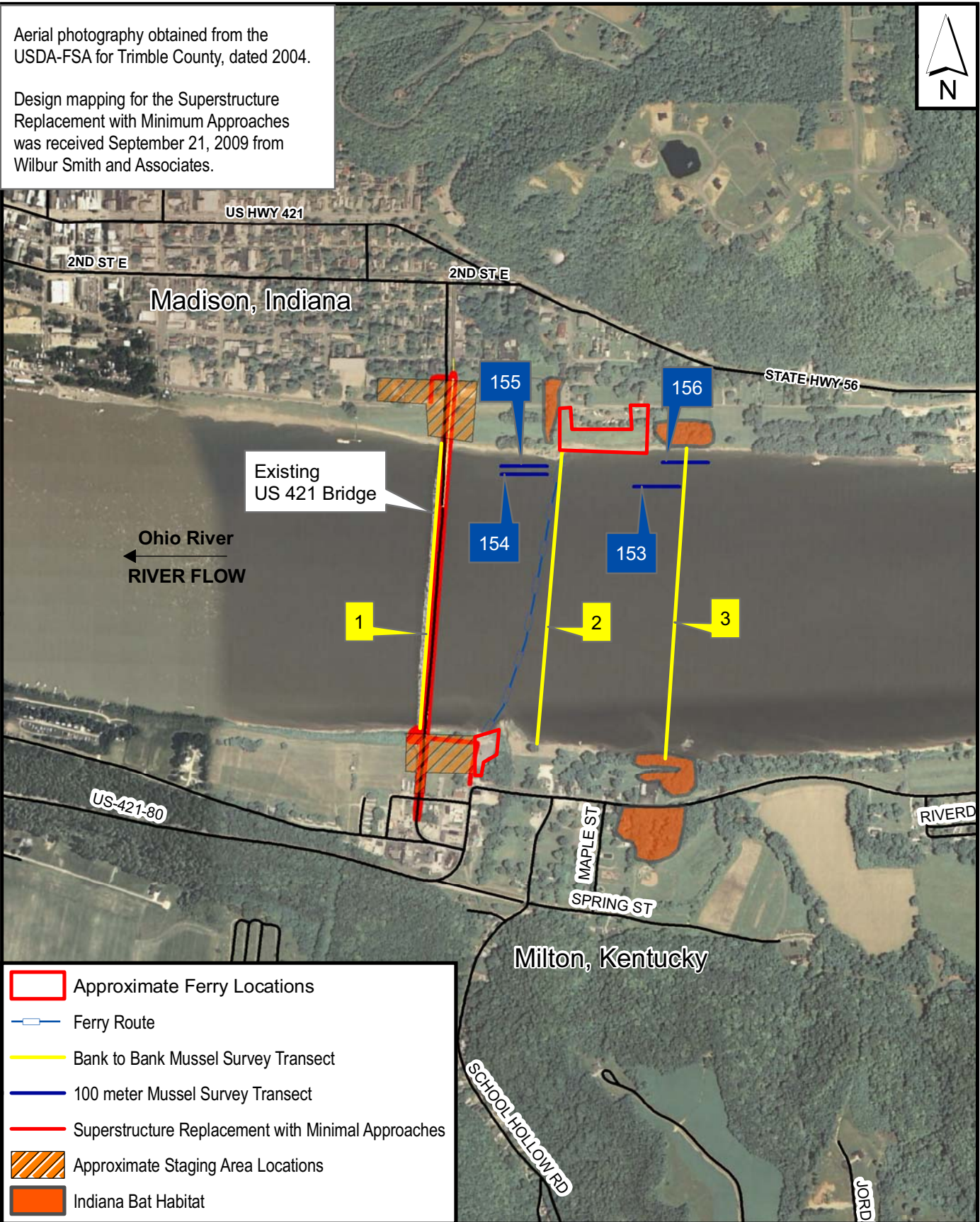
The United States Fish and Wildlife Service (USFWS) lists eight federally threatened or endangered species that have the potential to occur in the project area. The listed species include the following:








Aerial photography obtained from the USDA-FSA for Trimble County, dated 2004.

Design mapping for the Superstructure Replacement with Minimum Approaches was received September 21, 2009 from Wilbur Smith and Associates.



Map Document: (P:\Project_Files\Kentucky\5-135_Trimble_BL07\Mapping\GIS\BA_Exhibits\Exhibit1_Aerial.mxd) 10/1/2009 -- 10:21:51 AM WCO



-  Approximate Ferry Locations
-  Ferry Route
-  Bank to Bank Mussel Survey Transect
-  100 meter Mussel Survey Transect
-  Superstructure Replacement with Minimal Approaches
-  Approximate Staging Area Locations
-  Indiana Bat Habitat

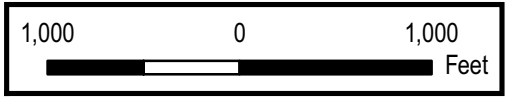
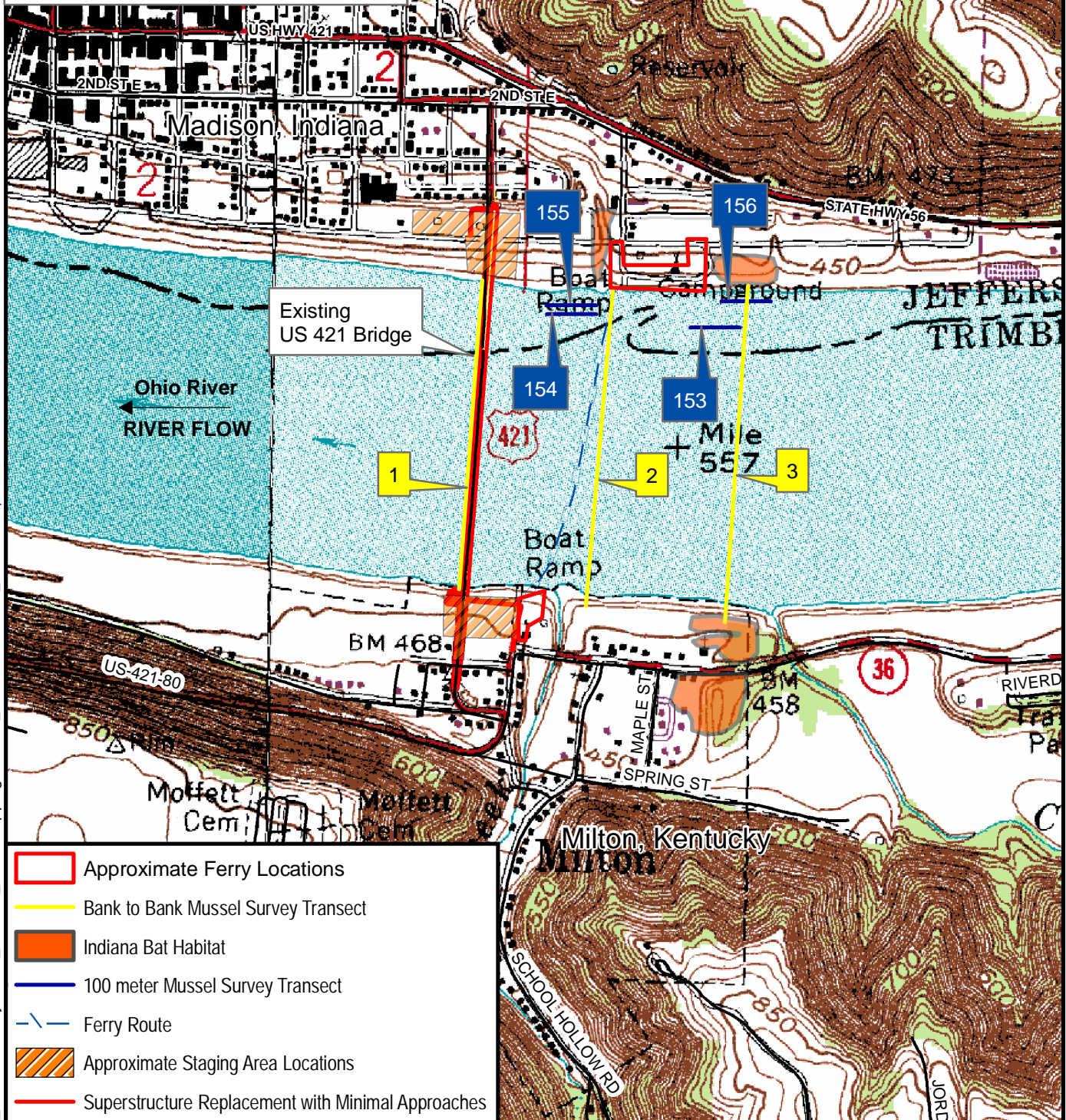


Exhibit 1
Project Limits (Aerial)
Milton Madison Bridge Project
Trimble County, Kentucky and
Jefferson County, Indiana

USGS topographic mapping was obtained from the Kentucky Geologic Survey for the Madison West and Madison East 7.5' quadrangles.

Design mapping for the Superstructure Replacement with Minimum Approaches was received September 21, 2009 from Wilbur Smith and Associates.



- Approximate Ferry Locations
- Bank to Bank Mussel Survey Transect
- Indiana Bat Habitat
- 100 meter Mussel Survey Transect
- Ferry Route
- Approximate Staging Area Locations
- Superstructure Replacement with Minimal Approaches

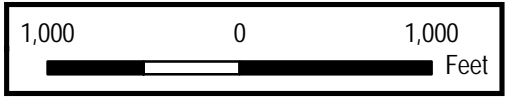


Exhibit 2
 Project Area (Topographic)
 Milton Madison Bridge
 Trimble County, Kentucky and
 Jefferson County, Indiana

Map Document: (P:\Project_Files\Kentucky\5-135_Trimble\GIS\BA_Exhibits\Exhibit1_Aerial.mxd) 10/1/2009 -- 10:21:51 AM WCO

- orangefoot pimpleback (*Plethobasus cooperianus*)
- pink mucket (*Lampsilis abrupta*)
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- clubshell (*Pleurobema clava*)
- fanshell (*Cyprogenia stegaria*)
- rough pigtoe (*Pleurobema plenum*)
- Indiana bat (*Myotis sodalis*)
- running buffalo clover (*Trifolium stoloniferum*)

The closest known mussel bed is approximately 2.5 miles upstream from the existing US 421 bridge, near Brooksborg, Indiana. A brailling survey of the mussel bed was conducted in 1993-1994. The results indicated a sparsely populated mussel bed approximately 5 miles in length and composed of six species. No listed species were observed during the survey.

Although not federally listed as endangered or threatened, the peregrine falcon (*Falco peregrinus*) is known to nest at the existing Milton Madison Bridge. Peregrine falcons are a United States Species of Management Concern.

IV. SPECIES STATUS

The primary causes of decline for each mussel species listed in the project area are similar. Impoundments and the subsequent loss of free-flowing conditions result in an array of drastically different habitat conditions including loss of riffles and runs, changes to water chemistry (nutrients, temperature, physicochemistry, etc.), and potential isolation from host species. Also, erosion caused by strip mining, logging, and farming practices leads to increased siltation in many rivers. This siltation can clog a mussel's incurrent and excurrent siphons resulting in malnutrition, poor reproduction, and even suffocation. Other threats include pollution from agricultural and industrial runoff.

Another, more recent threat associated with big river systems is the introduction of the exotic zebra mussel (*Dreissena polymorpha*). Zebra mussels are a highly prolific species capable of out-competing native mussel species for food and space, and directly interfering with native mussel reproduction via sperm filtration. In the Great Lakes they have been found attached (via byssal threads) in large numbers to the shells of live and freshly dead native mussels, indicative of direct mortality due to suffocation/starvation (inability to open the shell) or over exposure to the environment (inability to close the shell). These prolific competitors have been implicated in the loss of entire native mussel beds. The zebra mussel has recently been reported from the Ohio River System (Slone and Wethington 2001; USFWS, TESS 2004).

A. Orangefoot Pimpleback

Also referred to as the orange-footed pearlymussel, the orangefoot pimpleback mussel (*Plethobasus cooperianus*) attained endangered species status on June 14, 1976. A recovery plan was approved September 30, 1984. This species was historically known from the Ohio River (from western Pennsylvania to southern Indiana), the Wabash River (below Mt. Carmel, Illinois), the Cumberland River (from Cumberland County, Kentucky to near Nashville, Tennessee), the lower Clinch River (Anderson County, Tennessee) and the Tennessee River (near Knoxville to Benton County, Tennessee) and has also been reported from the Caney Fork, Holston, and French Broad Rivers in Tennessee and the Green and Rough Rivers in Kentucky. In Kentucky the species is thought to persist in the lower Ohio River in the Purchase region and the lower Tennessee (Cicerello *et al.* 1991).

The species inhabits large rivers and is usually found in 15 to 20 feet of water, where it burrows in the sand or gravel substrates. Reproduction of the species requires a stable, undisturbed habitat

and a sufficient population of fish hosts to complete the mussel's larval development. The host fish for the larvae (glochidia) of the orangefoot pimpleback are unknown (Parmalee and Bogan 1998).

B. Pink Mucket

The pink mucket (*Lampsilis abrupta*) formally attained endangered species status on June 14, 1976 and a recovery plan was approved on January 24, 1985. It was historically distributed in 25 rivers and tributaries in the Ohio, Cumberland, Mississippi, and Tennessee River systems. The species is likely extirpated in Illinois, New York, Ohio, Pennsylvania, and Virginia. Distributional records of the pink mucket in Kentucky are from the following drainages: Ohio River mainstem and minor tributaries, lower Tennessee River, lower Cumberland River, upper Green and Barren Rivers, Salt River, and upper Cumberland River below Cumberland Falls (Cicerello *et al.* 1991). Currently, it is rare in the Ohio River, Tennessee River (below Kentucky dam), and the upper Green River (Cicerello *et al.* 1991).

Pink mucket typically occurs in large rivers in habitats ranging in substrate compositions of silt, sand, gravel, cobble and boulder. With large rivers the species is most often associated with moderate to fast-flowing water with depths ranging from 1.5 to 26 feet. Sauger (*Stizostedion canadense*) and freshwater drum (*Aplodinotus grunniens*) have been listed among 19 possible host fishes for this species.

C. Ring Pink

The ring pink (*Obovaria retusa*) formally attained endangered species status on September 29, 1989. A recovery plan was approved November 14, 1989. Historically, the ring pink was widely distributed in the Ohio, Cumberland, and Tennessee River systems in Pennsylvania, West Virginia, Ohio, Illinois, Indiana, Kentucky,

Tennessee, and Alabama. Until recently the species was thought to be restricted to five non-reproducing populations in large rivers of Alabama, Indiana, Kentucky, Pennsylvania, and Tennessee. However, in the summer of 2005, two live specimens were found in the Green River between Mammoth Cave National Park and Green River Lake Dam. Prior to this recent discovery the species was most recently observed in Kentucky in the Tennessee River (McCracken, Livingston, and Marshall Counties) and in the upper Green River in Hart and Edmonson Counties.

The species is typically encountered in large rivers on gravel bars, or in shallow water (2 feet deep) on a substrate of gravel and sand. The host fish is unknown (Biggins 1991).

D. Clubshell

The clubshell (*Pleurobema clava*) formally attained endangered species status on January 22, 1993. A recovery plan was approved September 21, 1994. Historically, the species had a wide range and abundance. It was found in the states of Alabama, Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, Tennessee, and West Virginia; and in the Ohio, Allegheny, Scioto, Kanawha, Little Kanawha, Licking, Kentucky, Wabash, White, Vermillion, Mississinewa, Tippecanoe, Tennessee, Green, and Salt Rivers. Currently, it is known from 12 streams in Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and West Virginia. Within Kentucky, extant populations are restricted to the Green River in Edmonson, Green, and Hart Counties.

The species prefers large perennial streams and small to large rivers in clean, coarse, sand and gravel in runs, often just downstream of a riffle; it cannot tolerate mud or slack-water conditions and is very susceptible to siltation (Watters 1994). Individuals have been collected from depths of 18 feet in Tennessee (Cumberland and

Tennessee Rivers). Although the food habits and reproductive biology of the clubshell are unknown, they are probably similar to those of other freshwater mussels. The host fish for the larvae (glochidia) of the clubshell mussel are the blackside darter (*Percina maculata*), striped shiner (*Luxilus chrysocephalus*), central stoneroller (*Campostoma anomalum*), and the logperch (*Percina caprodes*) (Scott and Waters 1998).

E. Fanshell

The fanshell (*Cyprogenia stegaria*) formally obtained endangered status on June 21, 1990. A recovery plan was approved July 9, 1991. The species was historically distributed in the Ohio, Wabash, Cumberland, and Tennessee Rivers and their larger tributaries in Pennsylvania, Ohio, West Virginia, Illinois, Indiana, Kentucky, Tennessee, Alabama, and Virginia. Since the turn of the 20th century, the fanshell has undergone a substantial range reduction. Currently, reproducing fanshell populations exist in only four rivers – Clinch River (Tennessee and Virginia), Green River (Kentucky), Licking River (Kentucky), and Rolling Fork (Kentucky). Small remnant, apparently non-reproducing Kentucky populations still persist in other rivers and tributaries, including Tygarts Creek in Carter and Greenup Counties and Barren River in Allen and Barren Counties.

The fanshell inhabits medium to large rivers with coarse sand and gravel substrates and moderate to swift currents. Host fish for the larvae (glochidia) of this species include mottled sculpin (*Cottus bairdi*), banded sculpin (*Cottus carolinae*), greenside darter (*Etheostoma blennioides*), snubnose darter (*Etheostoma simoterum*), banded darter (*Etheostoma zonale*), tangerine darter (*Percina aurantiaca*), blotchside logperch (*Percina burtoni*), logperch (*Percina caprodes*), and Roanoke darter (*Percina roanoka*) (Jones and Neves 2002).

F. Rough Pigtoe

The rough pigtoe (*Pleurobema plenum*) formally attained endangered species status on June 14, 1976. A recovery plan was approved August 6, 1984. The species was historically known from the Ohio, Cumberland and Tennessee River drainages in Alabama, Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. Currently, the Kentucky distribution of this species is restricted to the Green River in Butler, Edmonson, Hart, and Warren Counties.

The species typically occurs in large rivers but may also become established in small rivers or headwater stretches of medium-sized rivers. It prefers substrates composed of firmly packed gravel and sand and has been found in Tennessee (Cumberland River) at water depths up to 15 feet. The host fishes are thought to be the rosefin shiner (*Lythrurus ardens*) and bluegill (*Lepomis macrochirus*) (Slone and Wethington 2001).

G. Indiana Bat

The Indiana bat (*Myotis sodalis*) formally attained endangered species status on March 11, 1967 (USFWS 1999). A recovery plan was approved March 1, 1999. The historic range for this species consisted of the central and southeastern United States. Within Kentucky, two caves, Bat Cave in Carter County and Coach Cave in Edmonson County, have been designated as critical habitat for the species (USFWS 1976).

Indiana bats hibernate during the winter months in large, cool caves, sinks, and/or mines (hibernacula) where they form tight clusters containing hundreds of individuals. Mines include coal, limestone, as well as other mineral recovery operations. Each spring, the females emerge from these hibernacula and migrate to summer (maternity) habitat consisting of hardwood forests. Maternity colonies are formed

in these areas under the exfoliating bark of dead trees or loose bark of living trees. The migration of males is variable. Some males do not migrate, others migrate only a short distance to smaller, warmer caves, and others migrate to the same habitat as females.

Major reasons for the decline in Indiana bat populations include channelization of streams, impoundment of waterways and associated flooding of bottomland forests, deforestation, application of insecticides, destruction or improper gating of winter habitat (*e.g.*, mines, cisterns, and caves), commercialization of caves, and vandalism of cave habitat (Barbour and Davis 1974; USFWS 1999, 2004; Slone and Wethington 2001).

H. Running Buffalo Clover

Running buffalo clover (*Trifolium stoloniferum*) obtained endangered species status on July 6, 1987. Historically, the species was known to occur in northern Arkansas, southern Missouri, eastern Kansas, southern Illinois, central and southern Indiana, central and southern Ohio, central Kentucky and central and northern West Virginia. Running buffalo clover has since been extirpated from Arkansas, Missouri, and Kansas. Currently, Kentucky has the largest number of known populations (66). The species occurs in 13 Kentucky counties (KSNPC 2007; USFWS 2007) and has been closely identified with both the inner and outer Bluegrass regions, with one known exception: a recent record from the western edge of Jackson County.

Prior to extensive settlement in North America, running buffalo clover was associated with buffalo, buffalo traces and relatively open savannah woodlands. The species is typically associated with limestone-based soils and is dependent on partial shade (often described as filtered sunlight) and periodic disturbance [*e.g.*, scouring from run-off or flooding, hoof

disturbance by grazing livestock, mowing, low traffic trails (*e.g.*, hiking, vehicle, logging)]. Populations in Kentucky have been found in both wooded uplands and on floodplains, the latter predominating (USFWS 2007). Additionally, the species has been found on sand and gravel bars of ephemeral streams, historic cemeteries, lawns of historic homes, and around large pre-settlement trees (Slone and Wethington 2001). Flowering occurs in April and May, with fruit maturing mostly in midsummer. Walking surveys should be conducted during this time in areas of favorable habitat.

Some specimens of white clover (*T. repens*) and Alsike clover (*T. hybridum*) may resemble running buffalo clover in earlier stages of development in the spring. These species are generally more tolerant and are able to survive in highly disturbed habitats or areas that have been closely mowed or grazed. White clover and Alsike clover can occur in the same habitat as running buffalo clover and should be carefully examined to separate these two species from running buffalo clover. It is difficult to identify with certainty except in a brief period of time just before flowering, during flowering, and a short time after flowering. Therefore, all searches for the occurrence of this species should be made only within these timeframes, which generally occur from late mid-April to mid-June.

The decline in running buffalo clover populations is likely a result of several factors: initial habitat destruction during settlement and subsequent land development, poor dispersal to new habitats from remnant populations, introduction of exotic weed species, excessive grazing and elimination of natural, periodic disturbances such as fire and grazing by native herbivores (bison and deer) (Campbell *et al.* 1988; Slone and Wethington 2001).

I. Peregrine Falcon

Peregrine falcons (*Falco peregrinus*) are most frequently observed nesting along cliff lines and, more recently, at artificial nesting sites constructed on buildings and bridges. Pier 8 of the existing US 421 bridge is one such site. A pair of nesting peregrine falcons has reliably nested there since 2002. Peregrines feed entirely on birds (especially small ducks and pigeons). Construction activities may affect this species if the nest box on pier 8 is disturbed.

V. SURVEY METHODS

A. Mussels

Prior to the selection of a proposed action, a mussel survey was conducted from June 23 to June 25, 2009. The purpose of this survey was to determine the potential for threatened and endangered species to occur in the area of the proposed alternatives. A total of seven transects were surveyed. Three transects (one per alternative) were surveyed from bank to bank by surface supplied air divers. Prior to the survey, the coordinates of each alternative were loaded into a handheld GPS to facilitate transect placement. Four additional 100 meter transects were surveyed in a narrow band of habitat from approximately 30 to 60 meters off the right descending bank (Exhibits 1 and 2).

Mussel sampling within the transect followed the *Draft Protocol for Mussel Surveys in the Ohio River* (2004). Each transect was divided into 10-meter segments. For each 10-meter segment of transect, encountered mussels were placed in a mesh bag and sent to the surface for identification by a Third Rock Consultants biologist. Substrate type (percentage of cobble, gravel, sand, and fines), depth, and mussel richness were recorded for each segment. After identification, the mussels were returned to the river in the immediate area from which they came.

B. Indiana Bat and Running Buffalo Clover

Habitat for Indiana bat and running buffalo clover was delineated during the June 22, 2009 field survey. No impacts are expected for these species. Approach work is extremely minimal, falling within the existing right-of-way, and no habitat was observed within or adjacent to these areas.

C. Peregrine Falcon

A pair of nesting peregrine falcons were observed during the field survey. Peregrine falcons are a United States Species of Management Concern. The pair has reliably nested at an artificial nest box on pier 8 since 2002. Construction activities may affect this species if the nest box on pier 8 is disturbed. If possible, activities that may result in nest destruction or disturbance should be conducted outside of the species' nesting season (*i.e.*, typically late February through July). If the nest box is removed during construction of the new US 421 bridge, KDFWR recommends re-installing a nest box at a safe nesting location as soon as possible. Questions concerning peregrine falcons should be directed to Kate Heyden (KDFWR avian biologist).

VI. SURVEY RESULTS

A total of 31 individuals representing 10 species were collected during the mussel survey (Table 1, page 9). Pink heelsplitter and threeridge were the dominant species collected. Twelve specimens were collected during the survey of the initial three bank to bank transects. Of the 12 specimens collected from these transects, 7 were found in a strip of gravel and sand approximately 30 to 60 meters off the right descending bank. The dominant substrate observed in this band was approximately 90 percent small gravel and 10 percent sand.

TABLE 1 – MUSSEL SURVEY RESULTS

	Length (meters)	Transect							TOTAL
		1	2	3	153	154	155	156	
		620	640	630	100	100	100	100	
	Orientation to Bank*	⊥	⊥	⊥					
Mussel									
Common Name	Scientific Name								
Pink heelsplitter	<i>Potamilus alatus</i>	1	2	2	1			2	8
Ebony shell	<i>Fusconaia ebena</i>		1		1		1		3
Pocketbook	<i>Lampsilis ovata</i>		1	1					2
Washboard	<i>Megaloniaias nervosa</i>		1					1	2
Pimpleback	<i>Quadrula pustulosa</i>			1		1			2
Black sandshell	<i>Ligumia recta</i>			1	1	1			3
Plain pocketbook	<i>Lampsilis cardium</i>			1					1
Threeridge	<i>Amblema plicata</i>				1	2	2	1	6
Ohio pigtoe	<i>Pleurobema cordatum</i>					1	1	1	3
Threehorn wartyback	<i>Obliquaria reflexa</i>							1	1
Total		1	5	6	4	5	4	6	31
Total Perpendicular									12
Total Parallel									19
Approximate density (mussels/square meter)**		0.0008	0.0039	0.0048	0.0200	0.0250	0.0200	0.0300	0.0068

*⊥ = perpendicular; || = parallel

**Based on a 2-meter-wide transect

An additional 18 individuals and 3 species were collected from the four 100 meter transects surveyed parallel to the bank in this band of habitat. Habitat outside of this band ranged from 100 percent sand, to 50 percent gravel/ 50 percent cobble, to a mix similar to that observed within the band. No juvenile mussels were observed during the field survey. Zebra mussels were present and frequently attached to the larger unionid mussels collected.

Approximated mussel densities were very low, ranging from 0.0008 to 0.03 mussels per square meter. Densities were estimated on the assumption that the width of each transect was approximately 2 meters wide. Densities on the bank-to-bank transects were lowest, ranging from

0.0008 to 0.0048 mussels per square meter. The 100-meter transects surveyed parallel to the right descending bank ranged from 0.02 to 0.03 mussels per square meter. The *Draft Protocol For Mussel Surveys in the Ohio River Where Dredging / Disposal / Development Activity Is Proposed*, developed by the Ohio River Valley Ecosystem Mollusk Subgroup (April 2004), designates that five or greater observed mussels (by surface search) within a ten-meter section of transect represent a mussel concentration (bed). Based on this criterion, only one segment of the 100-meter transect number 156 would be considered to have a density representative of a mussel bed.

No Indiana bats or running buffalo clover were observed. Additionally, no running buffalo clover habitat was observed. Scattered summer roosting habitat for Indiana bats was observed and delineated (Exhibits 1 and 2, pages 2 and 3).

VII. EFFECTS OF PROJECT ACTIONS

No listed species were observed during the survey, and habitat for all listed species in the project area was marginal to absent. Mussel densities were very low and seemed to decrease in transects closer to the existing US 421 bridge. All mussels encountered during the survey are common to the area. No changes in traffic densities are expected as a result of construction activities. Correspondingly, changes in subsequent development activities are unlikely. Therefore, no cumulative impacts are expected. Traffic is not expected to increase.

The following are impacts to Ohio River mussel habitat that may result from construction activities:

Direct:

- Dredging at three piers, removal of Pier 5, two proposed staging areas, and two proposed ferry landings may disturb mussel habitat.
- Demolition activities that result in bridge materials being dropped into the Ohio River could result in death of mussels (via direct crushing or smothering). Pieces of dropped materials that are not retrieved could result in loss of habitat.
- Temporary bents driven into the substrate could result in mussel death (via crushing).
- Installation of scour mitigation structures at the base of each pier could result in mussel death (via dredging and/or crushing during their installation).
- Demolition of Pier 5 may result in pieces of the pier being dropped into the Ohio River. This could result in death of mussels (via

direct crushing or smothering). Pieces of dropped materials that are not retrieved could result in loss of habitat.

- Disturbance of the nest box on pier 8 may affect peregrine falcon nesting activities.

Indirect:

- All aforementioned activities may result in temporary re-suspension of sediment. This could result in mussel death and/or loss of habitat (via smothering or the filling of interstitial spaces, respectively) upon resettling downstream. Also, rock installed as part of scour mitigation may have similar effects.
- Activities within the staging area (*e.g.*, barge mooring, truss assembly, equipment storage, etc.) may result in increased erosion.
- Improvements at the ferry landing locations (*e.g.*, grading and paving) may result in increased erosion during construction and increased runoff upon completion.

VIII. MINIMIZATION MEASURES

As previously noted, no listed species were observed during the survey, and habitat for all listed species in the project area was marginal to absent. Mussel densities were very low, and seemed to decline moving downstream towards the existing bridge. All mussels encountered during the survey are common to the area. The following measures will ensure impacts to threatened and endangered species and their habitat will be minimized.

- By constructing the new bridge at the site of the existing US 421 bridge potential impacts to threatened and endangered species have been greatly minimized. Reusing three river piers and eliminating one river pier greatly reduces the in-river footprint of construction activities and reduces potential impacts to mussel habitat. Also, because the new bridge will utilize existing approaches (which

fall in the existing right-of-way) impacts to running buffalo clover and Indiana bat have been eliminated.

- Use of a barge mounted suction dredge for all dredging activities will minimize re-suspension of sediment as a result of dredging. Also, only the minimal area required to complete construction activities – pier scour mitigation, staging areas, ferry landing sites – should be dredged.
- Dredged materials shall be stored such that they will not re-enter the Ohio River during de-watering.
- The minimum necessary number of bents shall be used during bridge construction.
- Piece-by-piece removal of the bridge will be used to the maximum extent possible during the demolition of the existing bridge. When explosives are necessary, bridge pieces dropped into the Ohio River will be retrieved as soon as safely allowed.
- Demolition of Pier 5 will be executed such that scatter of debris is minimized. Following demolition bridge pieces dropped into the Ohio River will be retrieved as soon as safety allows. The elimination of Pier 5 will create the potential for new habitat to be established in the pier's old footprint.
- Erosion control measures (*e.g.*, straw bales, silt fences, erosion mats, etc.) shall be in place prior to activities in the staging areas and at ferry landing locations.
- If possible, activities that may result in nest destruction or disturbance shall be conducted outside of the species' nesting season (*i.e.*, typically late February through July).
- If the peregrine falcon nest box is removed during construction of the new US 421 bridge, KDFWR recommends re-installing a nest box at a safe nesting location as soon as possible.

IX. CONCLUSION

Mussel surveys conducted in and around the action area from June 23 to 25, 2009 found very low mussel densities and marginal to poor mussel habitat. All mussels observed are common to the Ohio River. No endangered species were encountered during the field survey. Based on the results of the field survey, construction activities are “not likely to adversely affect” the listed mussel species.

Following the aforementioned minimization measures will ensure impacts to threatened and endangered species and their habitat are minimal.

Approach work for the bridge is minimal and expected to stay within the existing right-of-way. No Indiana bat or running buffalo clover habitat was observed in the immediate area surrounding the bridge. The project will have “no effect” on these species.

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APPENDIX A – EXISTING BRIDGE PROFILE

UPDATE DATE
LETTING DATE

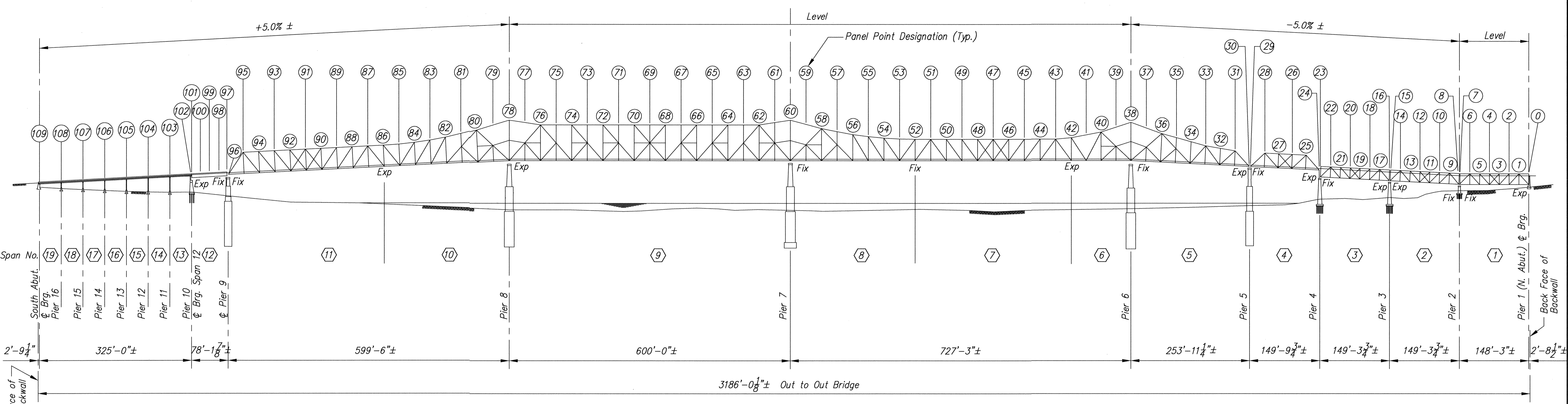
PLANS PREPARED AND SUBMITTED BY
HAZLET & ERDAL
DAMES & MOORE

DATE
REVISION
DATE
REVISION
DATE
REVISION

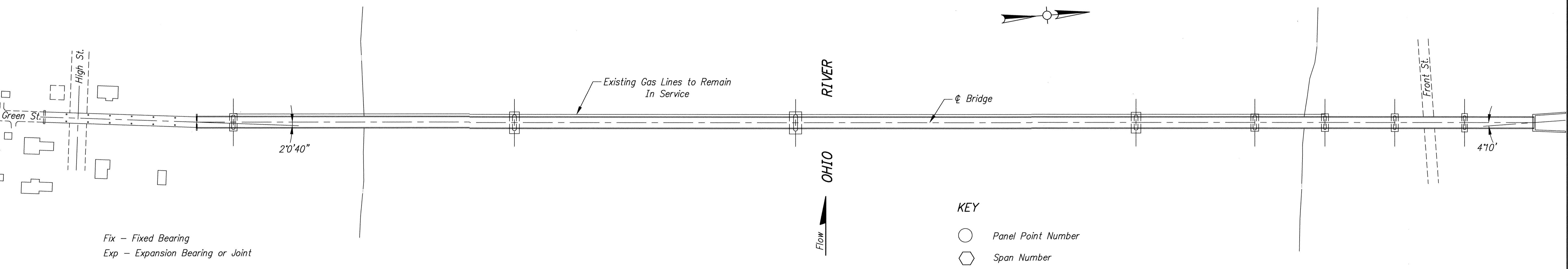
DESIGNED BY
CHECKED BY
DATE
02/96
DATE
TTC
DATE
AR

MILTON, KENTUCKY

MADISON, INDIANA



ELEVATION



PLAN

- KEY**
- Panel Point Number
 - ⬡ Span Number

Fix - Fixed Bearing
Exp - Expansion Bearing or Joint

LAYOUT

BRIDGE REPAIR & DECK REPLACEMENT SHEET 5

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
FRANKFORT
COUNTY OF
TRIMBLE
MILTON-MADISON, IN BRIDGE (US 421)

STATION
CONSTRUCTION PROJECT NO. MAINTENANCE PROJECT NO. DRAWING NO. 23948

ROAD
P.E. PROJECT NO.