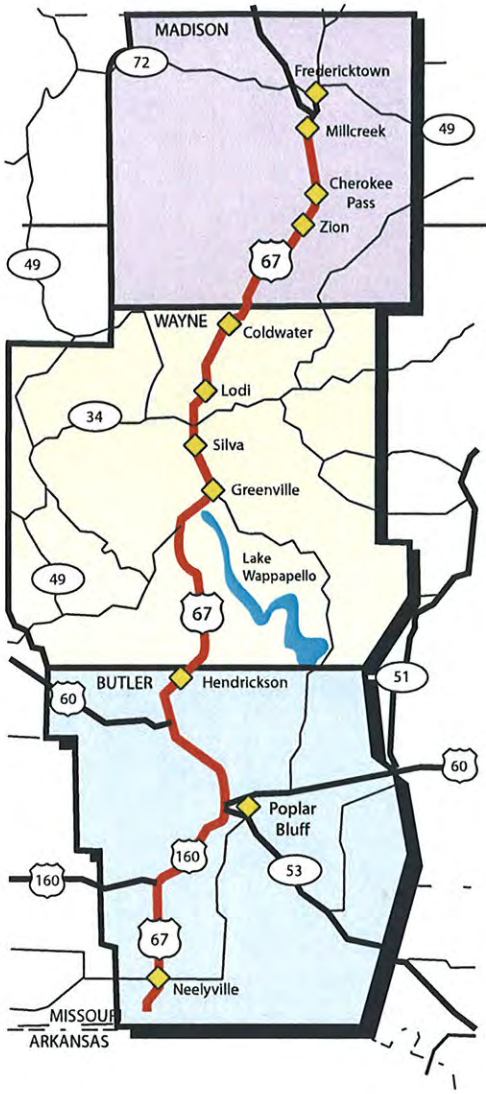

67

Final Environmental Impact Statement

U.S. Route 67

Madison, Wayne and Butler Counties, Missouri

Prepared for:

Federal Highway Administration

Missouri Department of Transportation

June 22, 2005

MoDOT Project No. J0P0746

FHWA-MO-EIS-01-01-F

ROUTE 67 CORRIDOR
Madison, Wayne, and Butler Counties, Missouri
Fredericktown to Neelyville
MoDOT Job No. J0P0746

FINAL ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to 42 U.S.C. 4332 (2) (c)
and where applicable, 49 U.S.C. 303 by the

U.S. Department of Transportation
Federal Highway Administration
and
Missouri Department of Transportation

Cooperating Agencies
U.S. Army Corps of Engineers, St. Louis District
U.S. Forest Service

6/20/05
Date of Approval

For MoDOT, Chief Engineer

6/22/05
Date of Approval

For FHWA

The following persons may be contacted for additional information concerning this document:

Ms. Peggy Casey, Environmental
Projects Engineer
FHWA Administration
209 Adams Street
Jefferson City, MO 65101-3203
(573) 636-7104

Mr. Kevin Keith, Chief Engineer
Missouri Department of Transportation
P.O. Box 270
Jefferson City, MO 65102-0270
(573) 751-2803

The Route 67 project is a proposed four-lane improvement to existing Route 67 from south of Fredericktown to a point just south of Neelyville. The project is approximately 137 kilometers (85 miles) in length and involves improvements to Route 67 in Madison, Wayne, and Butler Counties. This project will accommodate projected traffic demands, correct existing roadway deficiencies, and improve safety for the project area. This document includes a description of the environmental conditions and evaluates the potential impact of the alternate developed for this project.

Comments on this Final EIS are due by August 8, 2005 and should be sent to the persons listed above.

ES.0 Executive Summary

ES.1 Project Description

The Proposed Action is to construct a divided, multi-lane highway facility for U.S. Route 67 (U.S. 67) from south of Fredericktown to a point just south of Neelyville. This project is approximately 114 kilometers (km) [71 miles (mi)] (excluding the Poplar Bluff bypass) in length and involves improvements to U.S. 67 in Madison, Wayne, and Butler counties.

The primary purposes for the proposed action are to accommodate projected traffic demands, to improve safety, and to correct existing roadway deficiencies. A potential result of this project would be to enhance system continuity between the U.S. 67 corridor in Jefferson and St. Francois counties in Missouri, and the U.S. 67 corridor in Arkansas.

The matrix of build alternates that are discussed in this Final Environmental Impact Statement (Final EIS) consists of the following: three at Cherokee Pass, three at the Route N intersection in Madison County, three at the Route 34 intersection at Silva, two at Widows Creek in the vicinity of the Solid Rock Baptist Church in Wayne County, two at the Route 160 intersection in Butler County, and three at Neelyville. As proposed, each build alternate incorporates a typical cross section characterized by a minimum right of way of 76 meters (m) [250 feet (ft)]. However, because of the severity of grades and the need for service roads, the right of way width will in most cases be larger [as large as 200 m (650 ft)]. The proposed facility has a functional classification of principal arterial with an average daily traffic (ADT) volume greater than 1,700. The facility will be designed to meet all freeway standards in accordance with Figure 4-04.1 of the Missouri Department of Transportation (MoDOT) Policy, Procedure and Design Manual for the stated functional classification and traffic in rolling terrain. Based on this, the design speed used will be 110 kilometers per hour (km/hr) [70 miles per hour (mph)].

ES.2 Other Significant Actions in the Project Vicinity

Other major actions, or projects, have been completed, planned or proposed within the vicinity of the U.S. 67 project area. Ultimately, these projects may have an effect on the use of the proposed project.

- The relocation of U.S. 67 at Mill Creek is a four-lane freeway that was opened in 2002. The new facility is 4.83 km (3.0 mi) in length and includes an interchange at Route E.
- A relocation of U.S. 67 west of Poplar Bluff was completed in May 2001. This four-lane freeway is 11.30 km (7.02 mi) in length, and includes interchanges at Routes PP and M.
- A location study and EIS [Federal Highway Administration (FHWA), 1998] has been completed to address improvements to Route 60 from Van Buren to U.S. 67 north of Poplar Bluff, Missouri. The proposed facility is a four-lane expressway 50 km (31 mi) in length. Construction for this facility was initiated in 2000 and some sections have been completed.
- Currently a location study is addressing improvements to Route 34 from the intersection of Routes 21 and 34 in Carter County and extending eastward 85 miles to the intersections of Routes 34 and 72 in Cape Girardeau County. The proposal for this project is to evaluate upgrades to the existing two-lane facility to a wider two-lane or potentially a four-lane roadway. Potential relocations of Route 34 in Piedmont and Marble Hill are being considered.
- The Mark Twain National Forest (MTNF) Poplar Bluff Ranger District is in the conceptual planning stages for a new work complex in the vicinity of the existing Routes 60/67 interchange. The new complex will include both office and warehouse facilities. This complex may also serve as a multi-agency facility with the Missouri Department of Conservation (MDC), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), and Missouri Department of Natural Resources (MDNR). The planned location for the new facility is the north side of existing Route 60 on a 139-hectare (ha) [320-acre (ac)] parcel of MTNF managed property.

- State Highways D and BB as well as County Roads (CR) 221, 523, 526, 531, and 538 that are within the Wappapello Lake flood pool either have been or will be relocated/raised to meet the 100-year flood level requirements as discussed in the "Final Wappapello Lake Master Plan" (USACE, 2000). For state highways within the Wappapello Lake flood pool, the elevation is 405 ft National Geodetic Vertical Datum (NGVD), including 3.2 m (2 ft) of freeboard. For county roads within the Wappapello Lake flood pool, the elevation is 397 ft NGVD including 3.2 m (2 ft) of freeboard. Improvements to Route D were completed in the fall of 2004 to bring Route D to the 405-foot elevation requirement.
- A transmission line and substation were constructed from the existing Patterson substation to the new Silva substation for M&A Electric Power Cooperative, Inc. involving USACE-managed public land and private land.

ES.3 Alternates Considered

In order to meet the transportation objectives for the U.S. 67 project area, a number of alternatives were developed and evaluated. Alternatives considered as part of this evaluation process included the following:

- No Action,
- Transportation System Management (TSM),
- Mass Transit,
- Upgrade of the Existing U.S. 67 Alignment, and
- Build Alternates on Partial or New Location.

A preliminary study corridor was developed to define a boundary within which build and partial build alternates could be developed and studied. The preliminary study corridor was then narrowed to a more manageable size within which reasonable and practicable build alternates could be developed. Data from field reconnaissance were used to refine the preliminary study corridor. The refinement of the preliminary study corridor resulted in the development of the build alternates.

A primary criterion for the study corridor development was to maximize the utilization of the existing U.S. 67 right of way. Given the predominantly rural and undeveloped nature of the project area, and with consideration of the safety and efficiency of phasing construction, it was determined that multiple study alternates to the east and/or west of the existing facility were not reasonable or logical, and did not enhance achievement of the stated goals of the project Purpose and Need. Consequently, a majority of the length of the Preferred Alternative occurs just to the east or west of the existing facility. Evaluations for which side of the existing U.S. 67 to locate the project corridor involved the close examination of transportation efficiencies and facility performance, engineering and geometric considerations, and the avoidance and minimization of environmental impacts.

A number of build alternates within the project corridor were developed by minimizing environmental impacts and residential and business displacements, and by carefully considering traffic and engineering impacts to the existing infrastructure. A detailed analysis was also given to the provision of appropriate access to surrounding land uses via interchanges and service roads. These land uses included intersecting state and county roads, individual parcels, and federal and state lands.

The matrix of build alternatives consists of the following: three at Cherokee Pass, three at the Route N intersection in Madison County, three at the Route 34 intersection at Silva, two at Widows Creek in the vicinity of the Solid Rock Baptist Church in Wayne County, two at the Route 160 intersection in Butler County, and three at Neelyville.

Ultimately, a Preferred Alternative was identified which most closely responded to the project Purpose and Need and achieved the project transportation objectives and goals, while integrating a full consideration of the potential impacts to the human and natural environments.

Specifically, the Preferred Alternative consists of the following:

- At Cherokee Pass (Northern Terminus) – A relocation of U.S. 67 approximately 305 m (1,000 ft) west of existing with a diamond interchange proposed at Route C;
- Cherokee Pass to Route JJ – Four-lane widening immediately east of existing U.S. 67 with existing U.S. 67 serving as a frontage road;
- Route JJ – An eastern relocation of U.S. 67 approximately 290 m (950 ft) east of existing U.S. 67 with a proposed diamond interchange at Route JJ;
- Route JJ to Route N – Beginning just south of Route JJ, proposed U.S. 67 shifts from east to west of existing and consists of a four-lane widening immediately west of existing to CR 412. At CR412, the Preferred Alternative shifts to the east of existing for approximately 610 m (2,000 ft) and then shifts back to the west to Route N. All widening is immediately adjacent to existing.
- Route N to Route EE – At Route N, a diamond interchange is proposed. South of Route N, four-lane widening is proposed immediately west of existing with existing U.S. 67 being used as a frontage road to Route EE.
- Route EE to Route K – A diamond interchange is proposed at Route EE approximately 395 m (1,300 ft) west of existing U.S. 67. From there the Preferred Alternative lies immediately west of existing to CR212 then it shifts to immediately east of existing to CR213 then it shifts back to immediately west of existing to Route K.
- Route K to Route 34 – A diamond interchange is proposed at Route K basically centered on the existing intersection. The alignment continues immediately west of existing to just north of the Route 34 west junction. There, it shifts to immediately east of existing.
- Route 34 Area – A small realignment of Route 34 is proposed east of existing U.S. 67 to align with the Route 34 west junction. An interchange is proposed with directional off-ramps and looped on-ramps in the northwest and southeast quadrants of the interchange.
- Route 34 to North of Greenville – The Preferred Alternative runs immediately east of existing with existing being used as southbound lanes.
- Greenville Vicinity – The Preferred Alternative relocates U.S. 67 west of Greenville and is approximately 3.8 km (2 mi) long. A diamond interchange is proposed at Corps Road 21 approximately 240 m (800 ft) west of existing U.S. 67. The relocation runs from just north of Greenville to just south of Route D. A half diamond (to the south) is proposed at Route D.
- South of Greenville to CR404 – The Preferred Alternative is immediately west of existing from the Wappapello Lake bridge to Route A. It passes just west of Pleasant Valley Cemetery. At Route A, a diamond interchange is proposed and the Preferred Alternative shifts to immediately east of existing to CR404.
- CR404 to Route 49 – At CR404, a diamond interchange is proposed immediately east of existing U.S. 67. Just south of CR404, the Preferred Alternative crosses to immediately west of existing and continues that way basically to Route 49 except for a small section near Otter Creek where it crosses to immediately east of existing.
- Route 49 to Beginning of Divided Pavement – A diamond interchange is proposed at Route 49, and the Preferred Alternative crosses from west to east of existing just south of Route 49. A diamond interchange is proposed at Hendrickson Recreation Area, and an interchange with loop ramps and directional ramps to the south is proposed at Route JJ.
- Beginning Divided Pavement to Route 60-East – The Preferred Alternative in this section consists of a series of frontage road improvements and interchanges. Interchanges are proposed at Route 60-West, CR421, and CR441 (Township Line Road).
- End Divided Pavement to Route 160 – The Preferred Alternative is immediately east of existing through this section. As it approaches Route 160, it shifts slightly more to the east.
- Route 160 to Southern Terminus – A diamond interchange is proposed at Route 158 just east of Rout 160. Just south of Route 160 it shifts to immediately west of existing. A diamond interchange is proposed at Route 142.

The Draft EIS was issued on June 7, 2001. The following has been updated for the Final EIS:

- Traffic data;
- Crash data;
- U.S. Census data; and
- Natural Heritage Database search for listed species.

Additionally, a windshield survey for recent socioeconomic growth (i.e., residents and businesses) was completed. No substantial changes within the study area were noted.

Since the issuance of the Draft EIS, the Preferred Alternative has been modified at four locations and are listed below:

- The east frontage road within Alternate D was shifted east of buildings 317a and 317b (log buildings), which were determined eligible for listing in the National Registry of Historic Places (NRHP). Buildings 317a and 317b are located approximately 914 m (3,000 ft) north of CR411 in Madison County.
- The east frontage road within Alternate D was shifted east of building 78a (old barn), which was determined eligible for listing in the NRHP. Building 78a lies approximately 488 m (1,600 ft) north of CR411 in Madison County.
- Alternate L (Subalternative 1) at North Greenville Recreation Area was shifted slightly to the north and east to avoid an archaeological site eligible for listing in the NRHP and that warrants preservation in place.
- The east frontage road within Alternate L was shifted east of Greenville Civilian Conservation Corps Camp (site 23WE871) that may be eligible for listing in the NRHP approximately 182 m (600 ft) south of Route F in Wayne County.

For additional information, see Section 2.0, Project Alternatives.

ES.4 Summary of Environmental Impacts

A summary of impacts related to the Preferred Alternative and the No Action Alternative is provided on Table ES-1.

ES.4.1 Socioeconomic/Land Use

The Preferred Alternative will result in the displacement of 115 single family residences, 33 mobile homes, one multi-family residence, and 45 commercial buildings or businesses. Adequate replacement housing is available in the study area and relocation assistance will be provided for those displaced.

Tax impacts from the Preferred Alternative would be minimal, particularly in the larger taxing districts such as the Fredericktown R-1 School District in Madison County, the East Wayne Ambulance District School District in Wayne County, and the Poplar Bluff R-2 School District in Butler County. Impacts to these taxing districts would be less than one percent of total assessed valuation for each alternate. The taxing district which would experience the greatest impacts is the Marquand-Zion R-6 School District in Madison County. This district would lose approximately 5 percent of assessed valuation.

Right of way required for the project would entail the acquisition of 983 ha (2,429 ac).

Section 4(f) of the Department of Transportation Act [49 United States Code (USC) 303] protects publicly owned parks, recreation areas, wildlife and waterfowl refuges, and significant historic and archaeological resources. Section 4(f) resources that will be affected by the Preferred Alternative include Old Greenville National Historic Site, Greenville Recreation Area, the St. Francis River bridge, North Greenville Recreation Area/Greenville ballpark, and the Ozark Trail. Land and Water Conservation Funds were used to develop the Greenville ballpark; therefore, the Greenville ballpark is both a Section 4(f) and

6(f) resource affected by the Preferred Alternative. For detailed information, see Section 5.0, Final Section 4(f) Evaluation.

Table ES-1. Summary of Impacts with the Preferred Alternative

Resource Category	Preferred Alternative	No Action Alternative
Traffic and Transportation		
Total Length, km (mi)	114.06 (70.85)	
Number of Interchanges	17	
Changes in Access for Existing Roads	78	
Socioeconomic/Land Use		0
Number of Residential Displacements	115	
Number of Mobile Homes Displaced	33	0
Number of Commercial Displacements	45	0
Total Right of Way, ha (ac)	983 (2,429)	0
Area of Agricultural Land, ha (ac)	160.1 (395.6)	
106 Form Prime and Unique Farmland Affected, ha (ac)	229.8 (567.8)	0
Commercial Area Affected, ha (ac)	28 (69.2)	0
Mark Twain National Forest Affected, ha (ac)	155 (382)	0
Wappapello Wildlife Area Affected, ha (ac)	115 (285)	0
Coldwater Conservation Area Affected, ha (ac)	6 (15)	0
Induced Development Potential	Low	Low
Natural Environment		
Area of Wetland Impact, ha (ac)	32.4 (80.13)	
Area of Forest Land Impact, ha (ac)	607 (1,499.9)	0
Area of Floodplains Impacted, ha (ac)	158.2 (390.9)	0
Number of Perennial Streams Crossed	32	0
Number of Intermittent Streams Crossed	19	0
Number of Stream Relocations	7	0
Hazardous Materials		0
Number of Potential Sites Affected	15	
Noise		
Number of Receptors Exceeding Noise Abatement Criteria (NAC)	73	
Number of New Receptors Exceeding NAC	0	131
Cost		0
Construction, Right of Way, and Administrative (millions)	$521.603	0
Source: MACTEC, 2005.		

ES.4.2 Traffic and Transportation

The proposed project was developed in response to existing and projected traffic volume demands for the study area. Consequently, the major beneficial impact of the proposed action would be to relieve traffic congestion on existing roadways through a redistribution of traffic patterns and to improve the safety, efficiency, and convenience of the area's future transportation system.

The improvements to U.S. 67 will provide for improved service to local and through traffic, and improved continuity among area communities.

In general, the construction of the U.S. 67 improvements would significantly improve the traffic operations in the study area and it would help meet the transportation needs of the future. The Preferred Alternative provides improved service to both local and through traffic. In contrast, the No Action Alternative would result in increased congestion, higher accident rates, a reduced travel efficiency, and a reduced safety level. Accident rates and their associated costs are also expected to be lower with the Preferred Alternative as compared to the No Action Alternative.

ES.4.3 Air Quality

Although there will be an overall increase in traffic volumes, the Preferred Alternative will be in conformance with National Ambient Air Quality Standards (NAAQS) and is in conformance with the State Implementation Plan (SIP). In addition, this project is not expected to require further analysis of air quality due to the anticipated relatively low levels of traffic-related air emissions. It is anticipated that construction activities would cause minor negative short-term air quality impacts such as dust due to earthwork and roadway construction, and smoke from the open burning of debris.

ES.4.4 Noise

Localized noise impacts to residential receptors would occur with the Preferred Alternative. Noise level analyses show that 131 existing receptors are impacted by noise along existing U.S. 67. By comparison, 73 receptors would be affected by the Preferred Alternative in the design year, 2025 if the current land use were to remain the same as present conditions. This means that these receptors would exceed FHWA's Noise Abatement Criteria in the design year. Abatement studies found that available options for reducing noise levels at these locations are not feasible and/or not economically reasonable.

ES.4.5 Natural Resources

The planning process involved careful consideration and examination of the natural resources occurring within the U.S. 67 project corridor. Avoidance and minimization of impacts to natural resources was a prominent set of factors in the study alternative development and evaluation process.

The proposed action would result in both short- and long-term water quality impacts. Construction impacts include increases in sedimentation and turbidity levels of surface water resources. Long-term impacts include direct loss of aquatic habitat and changes to hydrology. The proposed right of way for the Preferred Alternative will cross 32 perennial and 19 intermittent, jurisdictional streams for a total of 51 jurisdictional stream crossings (bridged, culverted, or filled). There are seven jurisdictional stream channels that will require relocation due to the Preferred Alternative. The total length of relocated stream channel is approximately 3,541 m (11,619 ft). The total jurisdictional stream impacts (including transverse crossing and relocations) are approximately 6,130 m (20,109 ft).

Since the issuance of the Draft EIS, the total number of wetlands impacted by the Preferred Alternative have been reduced due to the wetland delineation efforts and U.S. Supreme Court ruling, Solid Waste Agency of Northern Cook County (SWANCC). The total jurisdictional wetlands impacted by the construction of the Preferred Alternative is approximately 32.4 ha (80.1 ac). Efforts will be made during the design phase to minimize hydrologic impacts to remaining wetlands. Regional impacts to groundwater recharge or groundwater quality are not expected, but localized impacts are possible.

The Preferred Alternative will be located in close proximity to several ecologically sensitive and/or potentially unique areas: Cherokee Pass Springs, Twelvemile Springs, Self Fen, Geronimo Spring, Alexander Fen, Bounds Fen, Box Spring, Cane Creek Slough, and forested dune/swale wetlands. Most of these resources are not directly impacted by the Preferred Alternative. The design phase will evaluate avoidance and minimization measures at these areas as well as engineering controls (e.g., vegetated swales, detention basins, etc.) to reduce indirect impacts to these sensitive resources.

Avoidance and minimization of impacts to floodplain resources were critical considerations of the planning process. The Preferred Alternative will involve 50 floodplain crossings (28 transverse and 22 longitudinal encroachments). The total potential area impact to floodplains is approximately 158.2 ha (390.9 ac). There are two Federal Emergency Management Agency (FEMA) regulatory floodways that are associated with the Black River and Cane Creek in Butler County. A two-lane companion bridge is proposed at both crossings. Hydraulic studies will be completed during the design phase for the proper sizing of all bridges and culverts. Within the 100-year floodplain, bridges and culverts will be designed such that the cross sectional area available for flood flow through structure openings is sufficiently large

to result in upstream flood level increase of not more than 0.30 m (1 ft). Within the floodways of the Black River and Cane Creek, these bridges will be designed so that there will be no increase in flood levels within the floodway during the occurrence of the base (100-year) flood discharge.

Direct impacts to forested land as a result of the construction of the Preferred Alternative would result in the conversion of 607 ha (1,499.9 ac). The right of way for the Preferred Alternative has the potential to convert a total of 160.1 ha (395.6 ac) of agricultural land (defined as a combination of cropland and pasture).

Habitat losses and alterations of natural habitat areas for the Preferred Alternative would impact the terrestrial wildlife in the study area. Habitat communities will be bisected (fragmented) causing an alteration of migration patterns and species movement among some faunal groups. The design phase will consider strategies for mitigating highway impacts on wildlife. These strategies may include expanded bridges, oversized culverts, guide fences, and dry drainage culverts.

Three federally listed species may have some potential to be affected by the Preferred Alternative. The Indiana bat and gray bat, both federally endangered mammals, were identified within 1.6+ km (1+ mi) of the Preferred Alternative on USACE property. An Indiana bat maternity colony was also identified approximately 2.4 km (1.5 mi) from existing U.S. 67. Although the federally endangered Hine's emerald dragonfly was not identified within the study corridor, several fens with suitable habitat are located adjacent to the Preferred Alternative.

Two state listed plant species (corkwood and water oak) will be directly impacted by the Preferred Alternative in Butler County. Two state listed mussels (western fanshell and Ouachita kidneyshell) were found immediately downstream of the Black River crossing and, therefore, have the potential to be indirectly impacted by the Preferred Alternative. A number of state listed fish and the state listed Big Creek crayfish have also been reported for streams and rivers within the project area and have the potential to be indirectly impacted by the Preferred Alternative.

Since project construction may not begin for several years, designs for the Preferred Alternative have not been completed, and circumstances could change during this time period (i.e., these species could move in or out of the area), it cannot be determined now how the project may impact any of the listed species. Therefore, after completing the design phase of the project and prior to construction, MoDOT will reinitiate informal consultation with the USFWS to discuss potential construction impacts to any federally threatened or endangered species. Additionally, MoDOT will coordinate with the USFWS and MDC to re-survey and re-locate listed mussel species as needed and appropriate prior to construction.

The U.S. Forest Service (USFS) publishes a list of Eastern Region [Region 9 (R9)] Regional Forester Sensitive Species consisting of numerous floral and faunal species that are considered sensitive to development activities and that have been documented or are likely to occur, within the National Forest boundaries (see Appendix C, USFS letter). Twenty-one R9 animal species and 49 R9 plant species potentially occur within the study corridor. No R9 species were located within the Preferred Alternative on MTNF property. One R9 plant species, orange coneflower was observed at one location within the study corridor on private land. This location will not be impacted by the Preferred Alternative.

ES.4.6 Cultural Resources

No architectural resources within the Area of Potential Effect (APE) [30 m (100 ft) beyond the right of way for the Preferred Alternative] are currently listed on the NRHP. Four architectural resources within the APE for the Preferred Alternative are recommended to be eligible for listing on the NRHP. The State Historic Preservation Office (SHPO) has concurred that there will be no adverse effect to three of these structures (buildings 78a, 317a and 317b). The fourth architectural resource, the St. Francis River bridge, will be removed by the Preferred Alternative. The St. Francis River bridge was included in the Final Section 4(f) Evaluation (see Section 5.0). Physical destruction of this bridge is considered an adverse

effect when applying the requirements of Section 106 of the National Historic Preservation Act [36 Code of Federal Regulations (CFR) Part 800.5]. The treatment of the St. Francis River bridge will be handled in accordance with the Missouri Historic Bridge Preservation Plan. There are no other eligible or listed architectural resources located within the APE for the Preferred Alternative. A Memorandum of Agreement (MOA) establishes the procedure to determine the mitigation for the adverse effect to the St. Francis River bridge [Final Section 4(f) Evaluation, Section 5.0].

The right of way for the Preferred Alternative will affect 44 archaeological resources (the entire site or a portion of the site). One of these sites, site 23WE637 Old Greenville National Historic Site (Old Greenville), is listed on the NRHP. Approximately 0.81 ac (2.0 ac) of new right of way will be required from Old Greenville and was included in the Final Section 4(f) Evaluation (see Section 5.0). Six historic features will be affected by the Preferred Alternative including a concrete foundation, two concrete features, two concrete and stone walls, and a relic domestic well. Physical features that contribute to the historic significance of Old Greenville will be impacted by the Preferred Alternative; therefore, when applying the requirements of Section 106 of the National Historic Preservation Act (36 CFR Part 800.5), there will be an adverse affect to Old Greenville. A MOA establishes the procedure to determine the mitigation to Old Greenville [Final Section 4(f) Evaluation (see Section 5.0)]

Twelve other archaeological sites may be significant within the context of prehistory or history and may meet the eligibility requirements for listing on the NRHP. A Phase II investigation is recommended for these sites to assess their eligibility status. The remaining 31 sites have been evaluated as ineligible for the NRHP and no further work is recommended for these sites. Some areas have not been surveyed (right of entry denied). The SHPO has reserved their final comment on archaeological resources until those areas have been surveyed and additional investigations have been completed.

A project-specific MOA between the FHWA and the Missouri SHPO has been developed to comply with Section 106 of the National Historic Preservation Act [see Section 5.0, Final Section 4(f) Evaluation]. The MOA provides for development of a mitigation plan for the adverse effect to the St. Francis River Bridge, the development of a mitigation plan for impacts to Old Greenville National Historic Site, additional Phase II testing, a Phase I survey for those properties where right of entry was denied, evaluation of any sites that may be present, and provides a framework for mitigation of impacts to any NRHP eligible resources that cannot be avoided.

ES.4.7 Cost

Estimated construction and right of way cost for the Preferred Alternative is $521.603 million.

ES.5 Areas of Controversy

There are no known areas of controversy.

ES.6 Regulatory Compliance

The proposed construction of U.S. 67, if approved, would result in several actions requiring permits. These include a Department of the Army Permit pursuant to Section 404 of the Clean Water Act (CWA) for the discharge of dredge and fill material in waters of the United States. The project area contains numerous streams and wetlands which would be impacted by the proposed highway construction. Impacts to these waters have been minimized through avoidance and by choosing alternative alignments with the least environmental impacts. During field reconnaissance with the project team, the USACE has become aware of the wetland and stream resources within the project corridor, as well as the issues and complexities of location study planning. Coordination is ongoing with the USACE regarding an Individual Permit for impacts to jurisdictional waters of the United States. Furthermore, the MDNR will process a request for Section 401 Water Quality Certification jointly with the 404 permit process.

A Section 402 (CWA), National Pollutant Discharge Elimination System permit for storm water discharges from construction sites will be required from the MDNR as construction activities will result in the disturbance of more than 2 ha (5 ac) of surface vegetation.

A floodplain development permit will be required from the Missouri State Emergency Management Agency prior to construction and development activities, to ensure that construction of the Preferred Alternative meets the requirements of the state of Missouri Executive Order 98-03. For the regulatory floodway associated with the Black River and Cane Creek in Butler County, a no-rise certificate will be required prior to the request for a floodplain development permit. Additional regulatory compliance includes formal responses to Executive Orders. Complete responses to Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Wetlands) are provided in Sections 4.13.2 and 4.11.7, respectively.

An MOA is required between the FHWA and SHPO to meet the responsibilities under Section 106 of the National Historic Preservation Act with respect to adverse effects to Old Greenville and the St. Francis River bridge, as well as any other unidentified archaeological site(s). An MOA is included in Section 5.0, Final Section 4(f) Evaluation, Exhibit 5-4.

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List of Abbreviations and Acronyms

ac	acre
ADT	average daily traffic
AHTD	Arkansas Highway and Transportation Department
AIRS	Aerometric Information Retrieval System
APE	area of potential effect
ASM	Archaeological Survey of Missouri
AST	aboveground storage tank
ASTM	American Society of Testing Materials
BA	Biological Assessment
BE	Biological Evaluation
BMPs	Best Management Practices
BO	Biological Opinion
°C	degrees Celsius
CCC	Civilian Conservation Corps
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CR	County Road
CSR	Code of State Regulations
CWA	Clean Water Act
dB	decibels
DBH	diameter at breast height
DGLS	Division of Geology and Land Survey
DGPS	Differential Global Positioning System
DHV	design hour volume
EA	environmental assessment
EIS	environmental impact statement
ERNS	Emergency Response Notification System
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FINDS	Facility Index System
FIRMs	Flood Insurance Rate Maps
FHBM	Flood Hazard Boundary Maps
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
ft	feet
FT	Federal Threatened
FW	farmed wetland
GIS	geographical information system
gpm	gallons per minute
GSRAD	Geological Survey and Resource Assessment Division
ha	hectare
HCM	Highway Capacity Manual
HGM	Hydrogeomorphic Assessment
HMIRS	Hazardous Materials Incident Report System
HMVKT	hundred million vehicle kilometers traveled
HMVMT	hundred million vehicle miles traveled
I-55	Interstate 55
ID	identification
IMOP	Inventory of Mines, Occurrences, and Prospects
ISTEA	Intermodal Surface Transportation Efficiency Act
km	kilometer
km/hr	kilometers per hour
L	liter
Log Mile	log mile
LOS	level of service
LQG	Large Quantity Generators
LTA	land type association
LUST	leaking underground storage tank
LWCA	Land and Water Conservation Act
LWCF	Land and Water Conservation Fund
m	meter
MASS	Missouri Agriculture Statistics Service
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
µg	microgram
µmhos/cm	micro ohms per centimeter
µS/cm	microsiemens per centimeter
mg/L	milligrams per liter
mi	mile
MILS	Mineral Industry Locator System
MoDOT	Missouri Department of Transportation
MOFWIS	Missouri Fish and Wildlife Information System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MoWET	Missouri Wetland Evaluation Technique
mph	miles per hour
MSDIS	Missouri Spatial Data Information Service
msl	mean sea level
MTNF	Mark Twain National Forest
MUTCD	Manual of Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act

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(Continued)

NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NHS	National Highway System
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
OHWM	ordinary high water mark
OSHA	Occupational Safety and Health Administration
PAD	PCB Activity Database
PC	prior converted cropland
PCB	polychlorinated biphenyl
PEM	palustrine emergent wetlands
PFO	palustrine forested wetlands
ppm	parts per million
PSS	palustrine scrub-shrub
PSTIF	Petroleum Storage Tank Insurance Fund
PUB	palustrine unconsolidated bottom
R9	Eastern Regional 9
RAATS	RCRA Administrative Action Tracking System
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RIMS	Regional Input-Output Modeling System
SARA	Superfund Amendments and Reauthorization Act
SE	State Endangered
SEMA	Missouri State Emergency Management Agency
SHPO	State Historic Preservation Office
SHWS	State Hazardous Waste Sites
SIP	State Implementation Plan
SMTS	Southeast Missouri Transportation Service
SQG	small quantity generator
SWANCC	Solid Waste Agency of Northern Cook County
SWF/LS	MDNR-Solid Waste Facilities/Landfill Sites
TCLP	total characteristic leaching procedure
TEA-21	Transportation Equity Act for the 21st Century
TPH	total petroleum hydrocarbons
TRIS	Toxic Release Inventory System
TSD	Treatment, Storage, and Disposal
TSM	Transportation System Management
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
vpd	vehicles per day
WHPA	Wellhead Protection Area
WP	wetland pasture
WWMA	Wappapello Wildlife Management Area
>	is greater than
<	is less than

1.0 Purpose and Need for Proposed Action

1.1 Purpose of Proposed Action

The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) are proposing to construct highway improvements to U.S. Route 67 (U.S. 67) from south of Fredericktown to a point just south of Neelyville. This project is approximately 114 kilometers (km) [71 miles (mi)] (excluding the Poplar Bluff bypass) in length and involves improvements to U.S. 67 in Madison, Wayne, and Butler counties. The primary purposes for the Proposed Action are to accommodate projected traffic demands, to improve safety, and to correct existing roadway deficiencies. MoDOT is planning to improve U.S. 67 to freeway status to the north of the project area from Interstate 55 (I-55) in Jefferson County to Fredericktown. In addition, the Arkansas Highway and Transportation Department (AHTD) has conducted an engineering feasibility study (dated February 1996) of U.S. 67 from Walnut Ridge, Arkansas north to the Missouri state line. Although environmental documentation and a location study have yet to be conducted by AHTD, the Proposed Action in the feasibility study is to construct a freeway.

In 1991, MoDOT conducted a traffic study in southeast Missouri to better understand traffic flows in that region of the state. The study area was bounded by Washington and Jefferson counties on the north, the Mississippi River on the east, the Arkansas state line on the south, and the Route 19 corridor on the west. The study concluded that of all the total trips in the study area, the primary north-south route was I-55, with 34 percent of the total trips. Traffic volumes on U.S. 67 were comparable to those on I-55. In 1992, MoDOT, as part of their 1992 plan, programmed U.S. 67 to be upgraded to a four-lane highway to help address the traffic demands in the area.

1.2 Project Description and Background

The U.S. 67 project involves the proposal for potential highway improvements from the relocation of U.S. 67 at Mill Creek south of Fredericktown to approximately 1.6 km (1 mi) south of Neelyville, Missouri (Figure 1-1). The study corridor for the U.S. 67 project is approximately 114 km (71 mi) in length. The U.S. 67 relocation at Mill Creek, which opened in 2002, is a freeway. A location study report prepared by MoDOT (MoDOT Job No. J0P0562) in April 1994 established a preferred location of U.S. 67 in the vicinity of Mill Creek and Route E in Madison County. An analysis and evaluation of potential impacts determined that this proposed project would not individually or cumulatively have a significant effect on the human environment and was approved as a Categorical Exclusion. The new bypass of Poplar Bluff also occurs within the study corridor. An Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI) for the location of the bypass was approved March 8, 1994. This bypass opened in 2000.

1.2.1 Corridor Location

The study corridor for the U.S. 67 project is characterized by a predominantly rural landscape. The corridor encompasses an area of variable width east and west of the existing alignment, ranging from a typical width of 760 meters (m) [2,500 feet (ft)] to 2,590 m (8,500 ft) wide east and west of the existing alignment at Cherokee Pass. The study corridor contains property managed by the Mark Twain National Forest (MTNF) [owned by the United States Department of Agriculture (USDA)] and owned and managed by the U.S. Army Corps of Engineers (USACE) at Wappapello Lake. Primary surface water resources dissecting the area include Twelvemile Creek, St Francis and Black rivers, Cane Creek, and other tributaries.

U.S. 67 is a two-lane rural highway in rolling terrain in Madison, Wayne, and northern Butler counties. Shoulder widths vary from 0.6 m (2 ft) wide to 3 m (10 ft) wide. In most cases, shoulders consist of

gravel. However, in northern Butler County, the shoulders are surfaced with asphalt. An exception to this existing two-lane cross-section is a 12.1-km (7.5-mi) section from 4.6 km (2.9 mi) north of the Route 60-west interchange to the Route 60-east interchange in Butler County. This section is a four-lane expressway with a depressed grass median. Several businesses abut the highway through this section, and an outer road system is in place in many locations. In southern Butler County, U.S. 67 is a two-lane highway in flat terrain. The area is characterized by numerous drainageways and ditches both alongside, and perpendicular to, the highway.

The construction of present-day U.S. 67 in Madison County dates to the mid-1940s. In Wayne County, most of U.S. 67 was constructed in the mid-1950s with the exception of a small segment from just north of Greenville to just south of the Wappapello Lake bridge. This section was constructed in the 1940s. The bridge over Widows Creek in southern Wayne County was reconstructed in 2002. Additionally, a third turn lane was added between the east and west intersections at Route 34 in 2003. In northern Butler County, U.S. 67 was reconstructed in the mid-1970s. This included a new crossing over the Black River. In southern Butler County, U.S. 67 primarily dates to the mid-1940s except for the bridge and approaches at the Cane Creek overflow which was constructed in 1980.

North of the project study area, U.S. 67 is a four-lane divided expressway. As mentioned earlier, MoDOT is planning to upgrade this portion of U.S. 67 from an expressway to a freeway. Two at-grade intersections have been upgraded on interchanges: Route V in Jefferson County and Parkway Drive in St. Francis County. South of the study area, in Arkansas, U.S. 67 is a two-lane rural highway from the state line to Newport. From Newport south to Little Rock, U.S. 67 is a four-lane divided highway.

1.2.2 Proposed Roadway Type

Solutions to the existing and design year (2025) transportation needs within the study corridor are being examined. The range of solutions examined include No Action, upgrade of existing facilities, partial build (some use of existing roadway and rights of way combined with use of new rights of way), and build solutions (new rights of way). Based upon projections of traffic volume, the anticipated roadway type for any proposed partial build/build alternates would consist of a four-lane divided roadway (two lanes in each direction). The project has been proposed to improve U.S. 67 to a fully-controlled access (i.e., freeway) facility. A schematic typical roadway section is shown on Figure 1-2. Due to the overall length of the project and consequential need for the phasing of construction, an expressway may be built in the interim prior to full construction of an ultimate freeway facility. Given this scenario, ultimate access for a freeway would be provided by grade-separated interchanges and outer roads; however, in the interim, access may be provided by at-grade intersections and median crossings as well.

Any proposed build solutions will include a roadway type that meets the design criteria of an interstate in rolling terrain (Reference Figure M4-04.1 of MoDOT's Policy, Procedure and Design Manual). This criteria results in a design speed of 110 km per hour (km/hr) [70 mi per hour (mph)], a minimum radius of horizontal curvature of 500 m (1,641 ft), and a maximum grade of 4 percent. The design will include fully paved shoulders, and each direction of traffic will be separated by a depressed grass median. Where a build alternate crosses a designated 100-year floodplain, the roadway grade will be designed to be above the 100-year floodplain as defined by the Federal Emergency Management Agency (FEMA). In addition to meeting the design criteria, the proposed roadway type should maximize the use of the existing highway right of way, and it should minimize impacts to environmental resources in the study area.

1.2.3 Logical Termini and Independent Utility

The proposed project is intended to improve safety, reduce congestion, mitigate geometric deficiencies, and establish system continuity. The northern terminus of the project connects to the southern end of the

planned U.S. 67 relocation at Mill Creek just south of Fredericktown. This relocation has been constructed to freeway standards (Figure 1-3). The southern terminus is at a point approximately 1.6 km (1 mi) south of Neelyville on U.S. 67, and about 3.2 km (2.0 mi) north of the Missouri-Arkansas state line. Logic for the location of the southern terminus is based on the uncertainty of the location of U.S. 67 in Arkansas. A location for U.S. 67 was presented in the above-mentioned AHTD engineering feasibility study; however, environmental documentation has not been prepared for the connection to U.S. 67 in Missouri. AHTD currently has no funding targeted for an environmental study but has indicated a desire to secure funding for such a study for U.S. 67. In order to provide a basis for a coordinated planning process between the states of Arkansas and Missouri, MoDOT drafted a Memorandum of Understanding (MOU) between the two state agencies (Appendix A). This MOU, dated in August 1998, allows for compatibility with a future AHTD location of U.S. 67. MoDOT does not want to dictate a location of U.S. 67 all the way to the state line as it could be incompatible with AHTD's future plans. Hence, the southern terminus is located north of the state line, as indicated above, to allow for flexibility with AHTD's plans.

The proposed project demonstrates independent utility, indicating that the proposed solution best addresses the aspects of the identified project Purpose and Need without construction of any additional improvements either to the north or south of the project termini, or within the project corridor. Specifically, the proposed project will:

- improve the safety of U.S. 67 in the project area by providing additional lanes, which will allow for easier passing, by correcting geometric deficiencies which exist in the project area, and by providing controlled access to the facility; and
- improve capacity of U.S. 67 by providing additional lanes.

The proposed project to construct a freeway from Fredericktown to Neelyville will improve travel efficiency for U.S. 67 traffic by improving safety and increasing capacity. An additional two lanes will eliminate the need for passing in the opposing lane, which will improve safety. Controlled access will reduce the potential for accidents on the facility by removing all streets and drives at-grade where turning-type accidents could likely occur. The additional lanes will also improve efficiency along the route by providing for more capacity. Given the establishment of logical termini, this project will meet its Purpose and Need even if no other improvements are made.

1.3 Need for Proposed Action

The proposal for this project is to upgrade the existing two-lane highway to a four-lane divided highway. As discussed in Section 1.2.2, a full range of solutions will be examined to determine the best practicable alternative to most effectively and efficiently meet the stated purposes and needs of the project. Generally, expanding system capacity could assist in meeting the purposes of improving safety and enhancing transportation efficiency. Additionally, interchanges could also improve system efficiency and reduce the potential for accidents resulting from conflicting turning movements at at-grade intersections. The provision of an outer road system at strategic locations throughout the corridor will be examined, as outer roads could also enhance traffic flow in and around communities and provide for safer traffic circulation.

The underlying needs for the Proposed Action in the study corridor involve:

- congestion [leading to a reduced level of service (LOS)] associated with projected traffic growth which is expected to double along the entire corridor over the next 21 years (up to 2025);
- areas of high accident rates (above the statewide average) and, particularly, areas of high fatal accident rates (also above the statewide average);

- roadway deficiencies on existing U.S. 67 including substandard geometrics and inadequate cross sections; and
- system continuity along U.S. 67 between I-55 in Jefferson County and Arkansas (where feasibility studies have been conducted recommending a four-lane divided highway).

1.3.1 Congestion

Traffic on U.S. 67 from Fredericktown to Neelyville is projected to grow at an annual rate of 2.0 to 2.7 percent per year. These growth rates vary depending on location within the study area. Given the length of the study area, it is expected that the growth rate will vary over the length of the corridor. These growth rates were determined from historical trends dating back 15 years. The existing average daily traffic (ADT) volumes for locations along the U.S. 67 corridor are presented on Figures 1-3 through 1-5 for Madison, Wayne, and Butler counties, respectively. Volumes on U.S. 67 in 2002 vary from a low of 3,510 vehicles per day (vpd) near the state line in Butler County to 12,900 vpd south of the Route 60-west interchange in Butler County. Design year (2025) volumes for these same locations increase to 6,140 vpd and 22,900 vpd, respectively. The traffic projections between Fredericktown and Neelyville are based upon historical trends in traffic data. Projected volumes, coupled with limited roadway capacity, driveway access, and high truck volumes, will pose an additional constraint during summer travel periods. Each of these variables affects traffic flow conditions and facility LOS.

LOS is a qualitative measure describing operational conditions within a traffic stream. References to LOS can be found in the Highway Capacity Manual, 2000. LOS ratings for a mainline facility are described as follows:

- LOS A--Describes free-flow conditions. Operation of vehicles is virtually unaffected by the presence of other traffic (0 to 2,000 ADT for a two-lane road).
- LOS B--Free-flow conditions, although presence of other vehicles begins to be noticeable. Average travel speed is somewhat diminished. Average space between vehicles is 13 car lengths [80.5 m (264 ft)] (2,000 to 4,000 ADT for a two-lane road).
- LOS C--Influences of traffic density become markable. Average travel speed for 112 km/hr (70 mph) design equals 80 km/hr (50 mph). Average space between vehicles is nine car lengths [53.3 m (175 ft)] (4,000 to 6,600 ADT for a two-lane road).
- LOS D--Borders on unstable traffic flow. Ability to maneuver is severely restricted. Average speed for 112 km/hr (70 mph) design equals 64 km/hr (40 mph). Average space between vehicles is six car lengths [38.1 m (125 ft)] (6,600 to 11,200 ADT for a two-lane road).
- LOS E--Operation at capacity. Average speed for 112 km/hr (70 mph) design equals 48 km/hr (30 mph). Average space between vehicles is four car lengths [24.4 m (80 ft)] (11,200 to 19,000 ADT for a two-lane road).
- LOS F--Traffic flow breakdown. Demands exceed capacity. Average travel speed is less than 48 km/hr (30 mph).

The existing traffic facility would provide a LOS D/E throughout U.S. 67 in the design year (2025) which would result in reduced speeds and maneuverability, higher accident probabilities, and increased congestion. Goals for improving U.S. 67 are actions where congestion would be reduced, the probability for the occurrence of accidents would be reduced, and cost savings could be realized in lower fuel consumption, travel costs, and vehicle operating expenses as compared to the condition of making no improvements within the corridor by the design year (i.e., the No Action Alternative).

1.3.2 Accidents and Safety

Accident totals on existing U.S. 67 have included 26 fatalities over a 5-year period from January 1, 1998 to December 31, 2002. High traffic volumes, in combination with a narrow roadway with substandard geometrics and shoulders, creates conditions for a higher accident rate potential on U.S. 67. The high accident locations in Madison, Wayne, and Butler counties during the 5-year period are shown on Figures 1-3 through 1-5. There were eight fatalities in Madison and Wayne counties and 10 fatalities in Butler County over the 5-year period. The statewide average fatality accident rate is 2.97 fatality accidents per hundred million vehicle miles traveled (HMVMT) for a two-lane highway. The Madison County rate is 5.6 fatal accidents per HMVMT which is 88 percent above the statewide average. Butler County's rate is 5.5 fatal accidents per HMVMT which is 85 percent above the statewide average. The fatal accident rate in Wayne County mirrors the statewide average.

Overall accident rate analyses were conducted on existing U.S. 67. The accident rate for Madison County was 113.8 accidents per HMVMT which is below the statewide average of 256 accidents per HMVMT for a two-lane highway. The accident rate for Wayne County is 118.9 accidents per HMVMT and Butler County is 212.1 accidents per HMVMT. These rates are also below the statewide accident rate for a two-lane highway. Though the county rate may be considered low in comparison to the statewide rate, there are specific locations where accidents occur which appear to be related to vehicles entering and exiting adjacent lands and with intersections at existing county and state routes.

1.3.2.1 Madison County

The locations and rates of accidents on U.S. 67 in Madison County from 1998 to 2002 are shown on Figure 1-3. This figure shows two locations on U.S. 67 within Madison County that have accident rates above the statewide average. The first location is a 1.4-km (0.85-mi) section through Cherokee Pass where the accident rate is 370.1 accidents per HMVMT (64 percent above the statewide average). The second location is an 8.3-km (5.1-mi) section from just south of Cherokee Pass to Route JJ which has a fatal accident rate of 8.9 accidents per HMVMT (three times the statewide average). Five fatal accidents occurred in this section over the 5-year period.

1.3.2.2 Wayne County

The locations and rates of accidents on U.S. 67 in Wayne County from 1998 to 2002 are shown on Figure 1-4. The figure shows three locations where the accident rate is above the statewide average. The first is a 0.8-km (0.5-mi) section at Route K where the accident rate is 230.7 per HMVMT, which is slightly over the statewide average. The second occurs over a 1.3-km (0.81-mi) section of U.S. 67 through the Route 34 west and east junctions. This section has a rate of 328.1 accidents per HMVMT which exceeds the statewide average by 66 percent. This location is characterized by significant turning movements associated with the Route 34 and U.S. 67 intersection. This section was upgraded with the addition of a third turn lane in 2003. This lowers the probability of accidents occurring in this section. However, capacity needs dictate four through-lanes in this section, so the third turn lane should be considered interim to the overall project. The third is a 0.8-km (0.5-mi) section at the Routes 49/172 intersection where the accident rate is 426.0 per HMVMT, which is 88 percent above the statewide average.

1.3.2.3 Butler County

The locations and rates of accidents on U.S. 67 in Butler County are shown on Figure 1-5. There are two types of roadway facilities in Butler County. The section of roadway from 4.6 km (2.86 mi) north of the Route 60-west interchange to the Route 60-east interchange is an existing four-lane divided expressway with outer roads located on each side of the existing highway. The accident rate on this section of roadway is actually below the statewide average of 182.30 accidents per HMVMT for an expressway.

The other type of roadway facility is a two-lane. This exists from the Wayne County line to 4.6 km (2.86 mi) north of the Route 60-west interchange, and from the south end of the Poplar Bluff bypass to the southern terminus of the project. The locations of accident problems on the two-lane highway portion are concentrated at the intersections with Route 160 and Route 142. The accident rate at the Route 160 intersection is 953.8 accidents per HMVMT or 4.2 times the statewide average. This rate is based on a raw accident total of 52 over the 5-year period. Additionally, three fatal accidents occurred over the 5-year period, which results in a fatal accident rate of 55.0 per HMVMT, or 18.5 times the statewide average. These accident problems can be attributed to poor roadway geometry coupled with a high number of turning movements, the lack of a center turn lane, and development adjacent to the intersection. The rate at the Route 142 intersection is 717.9 accidents per HMVMT or 3.2 times the statewide average. At Route 142, there were a total of 23 accidents over the 5-year period with 10 of them resulting in personal injury. These accident problems can be attributed to a high number of turning movements, the lack of a center turn lane, and driver inattentiveness. Each of these locations is characterized by excessive turning movement conflicts with existing through traffic.

1.3.3 Roadway Deficiencies

The current alignment of U.S. 67 contains numerous geometric deficiencies throughout the study corridor. Deficient geometry is defined as not meeting the design criteria as described in Section 1.2.2. The design speed for the proposed project is 110 km/hr (approximately 70 mph). Using a maximum superelevation of 8 percent, the design speed would limit horizontal curvature to a radius of 500 m (1,641 ft). The locations of the deficiencies as compared to the proposed project design criteria within Madison, Wayne, and Butler counties are shown on Figures 1-6 through 1-8. Over 75 percent of the existing vertical curves within Madison County have deficient stopping sight distances and 16 percent of all grades exceed the 4 percent maximum. In Wayne County, 24 percent of the existing vertical curves have deficient stopping sight distances and 15 percent of all grades exceed the 4 percent maximum. North of Poplar Bluff in Butler County, 58 percent of the vertical curves have stopping sight distances which fail to meet the design criteria. Existing grades north of Poplar Bluff fall within the 4 percent maximum guideline. There are no vertical curve problems south of Poplar Bluff. There are two deficient horizontal curves. One curve is on the four-lane divided section north of the junction with Route 60-west. The existing radius of curvature is 343 m (1,098 ft) which is substandard. The other is just north of the intersection with Route 160.

The locations and lengths of deficient vertical grades pose problems for heavy vehicles on ascending grades. The combination of deficient horizontal and vertical alignment creates a corridor in numerous areas along U.S. 67 that provide little opportunity for motorists to pass one another. This condition could increase accident probabilities as traffic volumes grow.

1.3.4 System Continuity

Section 1006 of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 directed development of a proposed National Highway System (NHS) in cooperation with the states and local officials. Section 1006 establishes that over 150,000 miles of roadway be designated for the NHS. Because of the national significance of the NHS, it is critical that the FHWA play a strong role in developing the NHS. Section 1006 of the ISTEA states that the purpose of the NHS is to "provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, ports, airports, public transportation facilities, and other major travel destinations, meet national defense requirements and serve interstate and regional travel." MoDOT has identified routes in Missouri which are of national significance. These routes were designated NHS routes. MoDOT is

committed to meeting the needs of the system. U.S. 67 is designated an NHS route. The project will provide for improved system continuity for U.S. 67 and augment the goals of the NHS, as follows:

- Section 1006 of ISTEA specifies areas of federal emphasis for improvements of the NHS, including state connectivity and multi-state corridors. A primary objective of the NHS is to provide an interconnected system of arterial routes and linkage of multi-state corridors. The Proposed Action would provide an enhanced connection between the U.S. 67 corridor in Jefferson and St. Francois counties in Missouri and the U.S. 67 corridor in Arkansas. The U.S. 67 corridor in Jefferson and St. Francois counties in Missouri is currently a four-lane expressway with plans to upgrade the facility to a four-lane freeway. In Arkansas, much of U.S. 67 is already a freeway with the AHTD having a goal to upgrade those unimproved sections of U.S. 67 to a freeway as part of their long rang statewide highway planning strategy (reference MOU in Appendix A). No schedule for these improvements has been identified at this time.
- Specifically, the improvements will complete the Missouri portion of a more direct four-lane divided highway linkage between St. Louis and Little Rock. Ultimately, when completed, the U.S. 67 corridor has the potential to draw traffic from the I-55 corridor from south of St. Louis to Memphis, Tennessee.

ISTEA authorized funding for fiscal years 1992 through 1997. In 1998, ISTEA was reauthorized as the Transportation Equity Act for the 21st Century (TEA-21). TEA-21 authorized funding for fiscal years 1998 through 2003. TEA-21 expired in 2003 and plans for a new federal highway re-authorization is currently being debated in Congress.

1.4 Summary of Project Purposes for Proposed Action

Justification for this project must be established pursuant to federal regulatory requirements. The National Environmental Policy Act (NEPA) requires a statement of the underlying "purpose and need" that forms the basis of the project alternatives, whereas the Clean Water Act (CWA) requires that the "basic project purpose" be established in order to facilitate the permitting process. The study process for this project will examine a full range of practicable alternatives in order to determine the solution that best meets the stated needs, goals, and objectives for the project. For this project, the merged NEPA/404 process will be used; thus, both the purpose and need for the NEPA process and the basic project purpose for the CWA process must be met.

The overall purpose of the Proposed Action is to provide a plan for transportation facility improvements to U.S. 67 between the planned Mill Creek relocation south of Fredericktown, and approximately 3.2 km (2 mi) south of Neelyville. The specific purposes of the project are to improve traffic flow and safety, address roadway deficiencies, and improve transportation efficiency within the project area. A potential result of this project would be to enhance system continuity between the U.S. 67 corridor in Jefferson and St. Francois counties in Missouri, and the U.S. 67 corridor in Arkansas. The objectives are a direct result of the MoDOT planning process which provides for improved safety and transportation efficiency throughout the state.

2.0 Project Alternatives

2.1 Identification of Preliminary Project Constraints

Considerable effort was expended in the early phases of the location study process to identify and characterize the various constraints of the project area. Constraints considered during this process entailed those that represented environmental concerns as well as those that had implications regarding engineering feasibility. Examples of environmental constraints considered during this stage of the project include the following:

- wetlands;
- floodplains;
- surface water resources (streams, water bodies);
- springs, caves, karst topography;
- threatened and endangered species;
- rare or unique ecological communities;
- potential or known hazardous waste sites;
- land managed by MTNF, USACE, and Missouri Department of Conservation (MDC);
- Section 4(f) and 6(f) lands;
- archaeological or historic sites;
- churches, schools, and cemeteries;
- residential and commercial areas; and
- prime farmland.

Similarly, constraints were also identified that had implications regarding engineering feasibility or the efficiency of the transportation system. Examples of such considerations included:

- topography;
- accident patterns;
- existing roadway deficiencies (inadequate clear zones and shoulder widths, sharp curves, steep grades, inadequate sight distance);
- existing infrastructure (roads, pipelines, transmission lines);
- proposed roadway; and
- design criteria.

Constraint information was developed by acquiring and consolidating information from a variety of sources including MoDOT, other state [e.g., Missouri Department of Natural Resources (MDNR), MDC] and federal agencies [e.g., USACE, U.S. Forest Service (USFS), Natural Resources Conservation Services (NRCS), U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), FEMA, U.S. Coast Guard (USCG), U.S. Geological Survey (USGS)], literature search, and field reconnaissance. As discussed in Section 9.0, the public also proved to be a valuable resource for information that was not part of the information of record. For example, information obtained from members of the public included identifying the locations of caves, springs, cemeteries, and residences that were not available from other sources.

The Draft Environmental Impact Statement (Draft EIS) was issued June 7, 2001. The following has been updated for the Final EIS:

- Traffic data;
- Crash data;
- U.S. Census data; and
- Natural Heritage Database search for listed species.

Additionally, a windshield survey for recent socioeconomic growth (i.e., residents and businesses) was completed. No substantial changes within the study area were noted.

2.2 Facility Type

Because of the length of the proposed facility, construction will require an extended period of time. In order to expedite improvements to the existing facility and to account for the availability of project funding, the phasing of construction is critical to maintaining the system efficiency of U.S. 67 to local and through traffic. Therefore, the development of the corridor must allow for practicable phasing of construction. One of the most efficient methods of improving the safety and efficiency of the existing route while constructing the freeway, given budgetary constraints, is to add one pair of lanes for the length of the project, while utilizing the existing two lanes.

In order to improve safety and system efficiency in an acceptable time frame, it is anticipated that an interim condition will exist. The interim condition is expected to be two new lanes built within proximity to the existing two lanes along most of the project corridor. This achieves the condition of a four-lane facility by adding only two new lanes for some length within the corridor. The interim condition can then be modified to attain a full freeway facility as money becomes available or as priorities change. This interim condition may actually be in place for many years before it is upgraded to a full freeway facility. When the upgrade to freeway is made, the existing highway may then be utilized as a frontage road and the direct access to the new four-lane can be controlled via interchanges and frontage roads.

Specifically, an interim condition five-lane section through Cherokee Pass may be considered as an alternate to what is presented in this study. This is in response to the recently-formed Transportation Corporation, which is helping fund the construction of the project along with MoDOT and the USACE. A five-lane section through Cherokee Pass would require a re-evaluation of part of this study as this condition was not evaluated herein.

Additionally, an interim condition four-lane section south of Route 160 to south of Neelyville may be considered as an alternate to what is presented in this study. This four-lane section may involve lane widening immediately adjacent to existing Route 67 with only a narrow painted median. This condition would require a re-evaluation of this portion of the study as this condition was not evaluated herein. Should the lane widening extend south past the southern terminus to the Arkansas line, a separate environmental evaluation will be required for the portion south of the southern terminus.

The proposed facility has a functional classification of principal arterial. In accordance with Figure 4-04.1 of the MoDOT Project Development Manual dated January 2, 2002, the criteria shown on Table 2-1 will be used when designing this facility based on the stated functional classification and traffic in rolling terrain.

Table 2-1. Design Criteria

Location	Current Traffic (2002) ADT (vpd)	Design Year (2025) ADT (vpd)	Design Speed [km/hr (mph)]	Lanes		Median Width [m (ft)]	Roadbed Width [m (ft)]	Right of Way	
				Number	Width [m (ft)]			Minimum Width [m (ft)]	Access Control
Northern Terminus to Cherokee Pass	5,990	10,480	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Cherokee Pass to Route EE	4,260	7,450	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route EE to Route 34	4,200	7,350	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route 34 to Route A	5,400	9,450	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route A to Route 49	4,410	7,720	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route 49 to Route 60-West	7,400	12,950	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route 60-West to Route 60-East	12,900	22,900	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route M to Route 160	8,500	14,870	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route 160 to Route 142	4,450	7,790	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled
Route 142 to Southern Terminus	3,510	6,140	110 (70)	4	3.6 (12)	15.8 (52)	38.4 (126)	76 (250)	Fully controlled

Source: MACTEC, 2003.

2.3 Development of Study Corridor

2.3.1 Purpose for Developing Study Corridor Criteria

Criteria were developed in order to guide and direct the development of a study corridor. These criteria were used as a framework by which to develop a study corridor that is logical and reasonable based upon information identified in the project Purpose and Need. The criteria were largely based upon transportation and engineering information (i.e., access issues, and engineering considerations relative to topographic and geologic conditions). Additionally, the criteria accounted for identified environmental resources (i.e., documented locations of listed species, wetlands, water resources, etc.) such that preliminary corridor development initiated the process of avoiding and minimizing impacts. Complete impact avoidance at the broad scale [450 to 2,500 m (1,475 to 8,200 ft)] of corridor development was not possible. However, the ultimate goal of the study team was to understand the sensitivity and relative importance of various environmental resources in the study area to allow for the development of a logical and reasonable corridor that minimized and/or avoided these resources.

The environmental resources were developed on an environmental constraints map created in geographical information system (GIS) using information from USGS, National Wetland Inventory (NWI) maps, and the Missouri Spatial Data Information Service (MSDIS). The study corridor was subsequently refined to a more manageable size within which reasonable and practicable build alternates could be developed. Data from field reconnaissance was used to refine the study corridor. These refinements were made from both engineering and environmental perspectives.

Engineering considerations include traffic and transportation issues, roadway deficiencies, and ease of construction. Access to adjacent properties, location and spacing of interchanges, and high accident locations were the primary traffic elements considered. Terrain, surrounding land use, and placement of service roads and interchanges played an integral role in determining the ease of construction.

Environmental considerations included impacts to the natural and human environment, and cultural resources. Water resources and wetland complexes were considered significant natural resources and impacts to these resources were minimized to the fullest extent. Historic cemeteries were considered sensitive cultural resources. Structures eligible and potentially eligible for listing on the National Register of Historic Places (NRHP) were considered sensitive cultural resources. Known archaeological sites were identified and avoided to the extent possible.

2.3.2 Determination of Logical Termini

The U.S. 67 project is a proposed freeway from approximately 4.8 km (3 mi) south of Route 72 in Fredericktown to approximately 1.6 km (1 mi) south of Neelyville, Missouri (Figure 2-1). The U.S. 67 project is approximately 114 km (71 mi) in length excluding the 10.9-km (6.8-mi) bypass west of Poplar Bluff. For the purpose of the location study, it was determined that the corridor should allow for the development of all reasonable study alternatives, and should eliminate the possibility for development of alternatives in areas that are not logically based on the proposed facility type, traffic and operations, and environmental constraints. Specifically, the width of the overall study corridor – the determination of how far to deviate from the existing alignment – should be accomplished early in the location study process.

The definition of the study corridor was accomplished by establishing criteria and objectives to assist in its development. These criteria are listed in Section 2.3.3. Reasonably, before the development of a corridor can begin, the logical termini must first be determined. The logical termini for this project have been identified as:

- Northern Terminus – the U.S. 67 four-lane improvement will connect to the southern end of MoDOT Job Number J0P0562, approximately 4.8 km (3 mi) south of Route 72 in Fredericktown; and
- Southern Terminus – the U.S. 67 four-lane improvement will end at a point approximately 1.6 km (1 mi) south of Neelyville, approximately 3.2 km (2 mi) north of the Missouri-Arkansas state line (Section 1.2.3).

2.3.3 Criteria for Development of Study Corridor

The following criteria were determined to be reasonable for the development of the study corridor:

1. **Maximize Use of Existing Right of Way –** Due to the length of the project, construction of the facility will necessarily occur over many years. In recognition of this fact, the existing two lanes will be used in place, where practicable, for a significant period of time. Therefore, the corridor should be developed to maximize the use of the existing U.S. 67 right of way.
2. **Facilitate Project Implementation While Maintaining Efficiency and Safety –** The corridor should be developed to improve traffic flow by facilitating through traffic and accommodating local traffic within the study area. The emphasis is to maximize accessibility to local traffic movements without degrading mainline efficiency and safety. A review of the traffic on U.S. 67 indicates that the major traffic generators for U.S. 67 are immediately adjacent to the route (Cherokee Pass, Silva, Greenville, Lodi, and Neelyville). This further emphasizes the need to maximize the use of the existing right of way to serve the major traffic generators.
3. **Initial Efforts of Impact Avoidance and Minimization While Developing Reasonable Range of Project Alternatives –** The corridor should be developed to allow for the identification of a reasonable range of project alternatives, which in turn, will allow for the avoidance and minimization of impacts to the following resources:
    a. those that are protected under existing laws or regulations (i.e., threatened and endangered species);
    b. those resources that, if impacted, would result in additional documentation, permitting, mitigation, and/or agency coordination [i.e., impacts to Section 4(f)/6(f) properties, wetlands]; and
    c. those that would incur, via impact, relatively high costs to MoDOT and FHWA (i.e., disruption of business districts, displacement of existing infrastructure or utilities, and clean-up activities of properties listed as containing hazardous materials).

Overall, these environmental resources are specifically identified as, but not limited to:

- churches;
- schools;
- cemeteries;
- parks and recreational areas;
- large wetland complexes;
- areas documented as supporting listed federal, state or USFS sensitive species;
- properties, structures or areas listed on the NRHP;
- business districts; and
- utilities (power plants, substations, water treatment plants, pipeline corridors, etc.).

It is imperative to distinguish the relative importance of the above-listed resources within the study area between the corridor development phase and study alternative development phase. As indicated above, the acknowledgment and understanding of the types, locations, and densities of the known resources within the study corridor are integral to the planning process. At the point of corridor development, the information obtained regarding environmental resources was utilized as a tool to influence the width of the corridor in those areas documented as supporting resources (i.e., listed species, wetlands, recreational lands, cultural resources, etc.). By definition, these resources did not dictate overall corridor location. Rather, in those areas that are mapped as containing resources, the corridor was made wide enough to allow the development of a reasonable range of study alternatives, while recognizing that the avoidance and minimization of these resources must be documented during the development and evaluation of the study alternatives. It should be noted that wetlands and floodplains could not be totally avoided during the corridor development stage of the project. However, the documented occurrences of these resources influenced corridor width at various locations. Wetland classifications, quality, functions, and relative

importance were studied during the development of the preliminary and final study alternatives. This information was then used to compare and evaluate the preliminary and final study alternatives.

2.3.4 Description of Study Corridor

The study corridor consists of the contiguous area extending from the north project terminus to the northern end of the Poplar Bluff bypass (MoDOT Job Number J0P0339) and from the southern end of the Poplar Bluff bypass to the project southern terminus. It is the area within which reasonable and practicable build alternates are to be developed. The following discussion pertains to the establishment of the study corridor.

2.3.4.1 Madison County

2.3.4.1.1 North Terminus to South of Cherokee Pass, Log Mile 116.90 to 120.50 [5.8 km (3.6 mi)]

The northern project terminus lies at the southern end of the U.S. 67 relocation at Millcreek (reference MoDOT Job Number J0P0562) at Log Mile 116.90 (Figure 2-2). This relocation was completed in 2001. There the corridor widens to allow for the development of three subcorridors in and around Cherokee Pass.

One is located slightly west of Cherokee Pass. Another is centered on the existing alignment, and a third is located east of Cherokee Pass. Detailed field efforts determined the corridor incorporating the existing facility would have significant and severe impacts to the Cherokee Pass businesses and was eliminated. However, because of requests received from several local business owners, this corridor was reintroduced.

The western subcorridor is centered approximately 275 m (900 ft) west of the existing highway at Route C to avoid impacting Pinecrest Camp to the west. It is not practicable to extend the western limit of the corridor because of terrain, greater potential for impacts to natural resources, additional cost, added roadway length, and decreased facility efficiency.

The eastern subcorridor is centered approximately 760 m (2,495 ft) east of the existing highway at Route A. It is located in this area to avoid commercial and residential impacts in the community, Revelle Cemetery, and some wetland areas. It is not practicable to extend the eastern limit of the corridor because of greater potential for impacts to natural resources, additional cost, added roadway length, and decreased efficiency.

The central subcorridor is situated adjacent to and west of the existing highway. There are numerous commercial displacements associated with this corridor. There was citizen pressure to retain this corridor even with the numerous business displacements. A group of property owners felt that the new four-lane should use the existing roadway and force the state to purchase the existing businesses so they could re-locate in a more advantageous location. This group did not want to have the highway re-located outside of the Cherokee Pass area.

Just north of Berry Wood Products, Inc., the three subcorridors come together into one study corridor. The study corridor lies west of Berry Wood Products, Inc., which is east of the existing highway because of possible hazardous material contamination at the site. A corridor east of Berry Wood Products, Inc. was impractical and not investigated due to added lane mileage and severe terrain.

South of Cherokee Pass, the corridor narrows. An expansion of the corridor to the east or west was not considered because the proximity to the existing development along U.S. 67 is reduced, which reduces the ability of the corridor to serve the existing traffic. In addition, expansion to the east or west of the stated limits results in greater fragmentation of undeveloped land.

2.3.4.1.2 South of Cherokee Pass to Route JJ, Log Mile 120.50 to 124.50 [6.4 km (4.0 mi)]

At County Road (CR) 401, the corridor is primarily situated to allow for the development of alternates east of, and adjacent to, the existing highway (Figure 2-2). However, the steep terrain east of the existing highway limits the eastern extent of the study corridor. Locating the corridor through this area minimizes impacts to resources west of U.S. 67 such as the Twelvemile Creek floodplain. The corridor crosses east of the existing highway to avoid several springs including Lampher Spring and a memorial forest plantation commemorating the Civilian Conservation Corps (CCC). From the intersection of CR401 to the intersection of Route JJ, the corridor is located east of the existing highway, while not extending past the existing west right of way line. This avoids impacts to wetlands, floodplains, and a channel relocation associated with Twelvemile Creek. Because FEMA maps are not available for Madison County, floodplain references are based on proximity to low-lying areas near surface waters of the streams.

The corridor widens to allow for the development of an interchange at Route JJ. This interchange is proposed east of the existing highway to avoid impacts to the Twelvemile Creek floodplain. The interchange is proposed far enough east to avoid impacting the Twelvemile Baptist Church and Graham Cemetery. The western extent of the proposed corridor is fixed due to greater fragmentation of undeveloped land, greater potential impact to the Twelvemile Creek floodplain, and reduced proximity to the existing development along U.S. 67. The eastern limit is set due to severe terrain, increased fragmentation of undeveloped land and reduced proximity to the existing development along U.S. 67. Alternatives slightly east or west of the existing highway would be redundant with the existing highway, which lacks roadway deficiencies.

2.3.4.1.3 Route JJ to Route N, Log Mile 124.50 to 130.0 [8.8 km (5.5 mi)]

Through this section, the corridor generally follows level terrain west of, and adjacent to, the existing highway (Figure 2-2). No other corridors were developed east or west of this corridor because they would be redundant with the existing highway corridor. Additionally, the existing stretch of roadway is not geometrically deficient. The development of other corridors would result in a much greater extent of habitat fragmentation. Immediately south of Twelvemile Baptist Church, the corridor shifts to the west of the existing highway to avoid impacts to Sanders Cemetery, Settle Cemetery, Old Mt. Pisgah Cemetery, and severe terrain east of the existing highway.

Immediately south of Settle Cemetery, the corridor narrows and shifts to the east of the existing highway to avoid the potential relocation of Twelvemile Creek. In addition, there are relatively large wetland complexes west of the main stream channel.

The corridor proceeds east of the existing highway from Settle Cemetery at Log Mile 126.8 to approximately 670 m (2,200 ft) south. From there, the corridor widens and shifts to the west of the existing highway to avoid severe terrain east of the existing highway.

The corridor widens to provide options for alternate development around Old Mount Pisgah Cemetery at Log Mile 128.8. South of Old Mount Pisgah Cemetery, the corridor widens further to allow for the development of interchange alternatives at Route N. The corridor is wide enough to allow for the development of interchanges east and west of the existing highway, as well as one centered on the existing alignment. The terrain on either side of the corridor limits is severe and renders any alternative outside of these limits impractical due to increased fragmentation of natural habitat and higher cost resulting from earthwork.

2.3.4.1.4 Route N to Wayne County Line, Log Mile 130.0 to 132.7 [4.3 km (2.7 mi)]

Immediately south of Route N, the corridor narrows and shifts to the west to avoid impacts to the Greenwood Branch of Cedar Creek, which lies to the east (Figure 2-2). This stream lies within 55 m (180 ft) of the existing roadbed. The terrain in this area is heavily rolling except for the floodplain of the Greenwood Branch. It is not practicable to place a corridor east of the Greenwood Branch because of

severe terrain in that area and because it would not align easily with the existing highway which begins to turn west near the county line. A corridor on the west aligns better with the existing highway alignment and avoids impacting Oakdale Church which lies east of the existing highway. Greenwood Cemetery actually lies within the corridor; however, the development of a build alternate should avoid impacting the cemetery. The existing highway lacks roadway deficiencies; therefore, it was determined unreasonable to extend the corridor boundary east or west of the proposed boundary because it would result in impacts to severe terrain and would increase habitat fragmentation. Constructing the roadway through areas of extreme terrain would result in higher roadway costs.

2.3.4.2 Wayne County

2.3.4.2.1 Madison County Line to Lodi, Log Mile 132.7 to 138.2 [8.8 km (5.5 mi)]

From the county line (Log Mile 132.7) to Log Mile 134.9, the corridor generally lies west of the existing highway to avoid the community of Coldwater and Linville-Barrett Cemetery (Figure 2-3). Additionally, wetlands and floodplains attributed to Cedar Creek and the Greenwood Branch are present east of the existing highway. As in Madison County, there are no mapped floodplains in Wayne County. These floodplains are identified by the proximity of low-lying areas associated with the creeks. Outside of these floodplains, the terrain is moderately to severely rolling. An interchange is proposed at Route EE at Coldwater. The corridor is located in an area of moderately sloping terrain in open field. The corridor then crosses the floodplains of Coon and Cedar creeks. An extension of the western limit of the corridor was not proposed because of increased habitat fragmentation through moderate to severe terrain. Additionally, it would result in loss of proximity to the existing homes, churches, and businesses of Coldwater, which would potentially result in additional lane mileage of MoDOT-managed facilities. Extensions to the east were not developed because of increased potential impact to Cedar Creek and Coldwater, and greater fragmentation of undeveloped land and natural habitat. Immediately south of CR301 near Log Mile 134.2, the corridor widens to allow for flexibility in locating a build alternate south of Coldwater. From Cedar Creek to CR303 at Log Mile 136.7 the corridor lies to the west of the existing highway to avoid Coldwater Conservation Area which lies east of the existing highway. No corridor was developed east of the Coldwater Conservation Area because it would result in increased fragmentation of undeveloped land and increased highway length, and it would be redundant with the existing highway. South of CR303 the corridor shifts east of the existing highway. The corridor is located east of the existing highway to avoid impacts in Lodi including Lewis Cemetery, a roadside park, a church, two archaeological sites, and extensive floodplains of Hunter and Bennett creeks. Numerous wetlands occur in proximity to the floodplains. A corridor to the far west of Lodi was not developed because of potentially significant impacts to the St. Francis River. It is not reasonable and practical to extend the eastern limit of the proposed corridor because of severe terrain which would result in higher costs.

2.3.4.2.2 Lodi to Route 34, Log Mile 138.2 to 143.2 [8.0 km (5.0 mi)]

Just to the south of Lodi, near Log Mile 138.7, the corridor splits to either side of Antioch Cemetery (Figure 2-3). The western fork follows the existing highway alignment. The eastern fork lies east of Antioch Cemetery. South of Antioch Cemetery, the corridor lies west of the highway to avoid some residential structures to the east and to align better with Route K. An interchange is proposed at Route K; therefore, the corridor widens to account for the development of this interchange. The corridor is situated more to the west side of the existing highway to avoid impacts to Twidwell Cemetery near Log Mile 140.7.

The corridor continues west of the existing highway to avoid impacts to the Mount Pisgah Cemetery near Log Mile 140.9 which abuts the east side of U.S. 67. As the corridor approaches the Gooseneck SEMO property, it splits to either side of the property. The east fork of the corridor follows the alignment of the existing highway and abuts the west right of way of the existing highway. The west fork lies west of the Gooseneck property. The corridor comes together for a short distance before again splitting, this time to

avoid impacting the Montgomery Church and Cemetery. The east fork of the corridor follows the existing alignment and abuts the west right of way line. The west fork passes west of Montgomery Church.

Near Montgomery Church (Log Mile 142.2), the corridor widens to allow for the development of interchange alternates at Route 34. The western edge lies about 460 m (1,500 ft) west of the existing alignment. The eastern edge is 305 m (1,000 ft) east of the existing highway. The corridor encounters severe terrain immediately north of Route 34-east and west of Hubble Creek. The corridor splits around the BP/Amoco convenience station, which lies between the two Route 34 junctions. In any case, an interchange at Route 34 must be designed in unfavorable terrain. Regardless of the location of the corridor, there is likely to be some impact to Hubble Creek and its floodplain.

The limits of the proposed corridor are fixed to the east and west to reduce fragmentation of undeveloped land. Additionally, the eastern limit is fixed to avoid impacts to Hubble Creek. The extension of the corridor would not be practical because of increased fragmentation of undeveloped land, redundancy with the existing highway, and increased highway length. The existing stretch of roadway does not contain geometric deficiencies.

2.3.4.2.3 Route 34 to Wappapello Lake, Log Mile 143.2 to 150.2 [11.2 km (7.0 mi)]

South of the Route 34-east intersection from Log Mile 143.2 to Log Mile 144.0, the corridor narrows to minimize impacts to the Hubble Creek floodplain and the community of Silva including the New Hope Baptist Church (Figure 2-3). The corridor lies to the east of the existing highway abutting the west right of way line to avoid Hubble Creek. It is not practicable to locate a corridor west of Hubble Creek or east of Silva because of potentially severe environmental and engineering impacts. A majority of the land west of Hubble Creek is owned and managed by the USACE [Wappapello Wildlife Management Area (WWMA)]. In addition, the St. Francis River flows to within 100 m (330 ft) west of existing U.S. 67. To the east of Silva is the Silva State Wildlife Management Area managed by the MDC. Terrain also becomes severe east of Silva.

North of Greenville, from Log Mile 144.0 to 146.7, the corridor is aligned to the east of existing U.S. 67 because of the close proximity to the St. Francis River and associated floodplain to the west. A western extension of the corridor would result in a new crossing of the St. Francis River and impacts to wetlands and other resources associated with the river. At Log Mile 146.7, the corridor widens and shifts to the west to allow for the development of an alternate west of existing U.S. 67 and Greenville. From Log Mile 149.5 to 149.7, the corridor narrows considerably to minimize impacts to land managed by the USACE, the Wappapello Lake flood pool, wetlands, potential locations of threatened and endangered species, and historic Old Greenville. The corridor incorporates the existing Wappapello Lake bridge crossing.

Initially, considerations were made to locate a corridor east of Greenville to allow for the development of build alternates east of Greenville. However, severe terrain east of Greenville combined with the added length of an alternate in this area made the development of a corridor east of Greenville impractical. A preliminary review revealed that an eastern corridor would have higher costs, increased disturbance of forested land, and would not serve the traffic of Greenville efficiently. Additionally, the public opposed an eastern corridor. Therefore, an eastern corridor around Greenville was dropped from further consideration.

A corridor along existing U.S. 67 through Greenville was determined to be impractical. There are numerous businesses and a few residences that would be displaced by a build alternate through Greenville. A corridor along U.S. 67 would bisect the community and businesses on both sides of the highway, which would create problems in maintaining local access. Greenville Cemetery fronts existing U.S. 67 and a corridor on existing alignment would likely impact the cemetery. Business displacements

would adversely affect the socioeconomic structure of the community while adding to the overall cost of the project. For these reasons, a corridor through Greenville was removed from further consideration.

Additionally, a corridor was considered west of the St. Francis River. However, a corridor placement in this area was determined to be impractical. A corridor to the west results in more damaging impacts to the St. Francis River floodplain and possibly the river itself. It also would not have the proximity to Greenville, which is something the citizens of Greenville are very interested in keeping. There are also potential archaeological sites closer to the river. These resources make a western corridor placement impractical.

Since the issuance of the Draft EIS, an alternative was developed to avoid Old Greenville, Greenville Recreation Area, North Greenville Recreation Area, Greenville ballpark and the St. Francis River bridge. This avoidance alternative resulted in bypassing the community of Greenville, loss of proximity to Wappapello Lake, higher costs and greater impacts to the environment and was eliminated. For additional information on this avoidance alternative (see Section 5.5.1 of the Final Section 4(f) Evaluation).

The proposed corridor is centered on the existing highway at the Wappapello Lake bridge to minimize impacts to land managed by the USACE, water resources associated with the St. Francis River and Holliday Creek, and the boundaries of historic Old Greenville and USACE Greenville Recreation Area. A corridor in any other location would result in additional fragmentation to land managed by the USACE, a bridge crossing on new location which would impact the water resources of the St. Francis River and/or Wappapello Lake, increased length of highway, and increased costs.

2.3.4.2.4 Wappapello Lake to Route A, Log Mile 150.2 to 151.9 [2.7 km (1.7 mi)]

South of Wappapello Lake, the corridor widens and remains west of the existing highway to avoid impacting Wight Cemetery, a Civil War soldier burial site, a trailhead of the Ozark Trail, and steep terrain on the east (Figure 2-3). This results in some degree of impact to the Pleasant Valley Creek floodplain.

The corridor then proceeds off of the existing alignment to the west of Pleasant Valley Cemetery and widens at Route A, where an interchange is proposed. The eastern and western limits of the proposed corridor were not extended beyond the current limits because alternates in these areas would create more highway lane miles on new alignment and greater fragmentation of undeveloped land. Additionally, the existing highway does not have any geometric deficiencies.

2.3.4.2.5 Route A to the Butler County Line, Log Mile 151.9 to 163.2 [18.1 km (11.3 mi)]

South of Route A, the corridor lies east of the existing highway) to avoid impacts to the Pleasant Valley Creek channel (a known losing stream) and the Bethel Baptist Church west of the existing highway (Figure 2-3). The USFS and USACE manage a majority of the property east of the proposed highway. A western extension of the corridor would result in greater fragmentation of undeveloped land, and would add highway length which would increase costs.

From Log Mile 153.9 to 160.7, the corridor is generally centered on existing U.S. 67. This location is comparatively more suitable than one to the east or west due to less severe terrain. Floodplain areas associated with Otter Creek lie east of the existing highway. At CR541, the corridor widens to allow for the development of a build alternate adjacent to a tributary to Widows Creek. There are wetlands between CR541 and the existing highway which make it an undesirable location for a build alternate. Therefore, the corridor is wider in this area.

The corridor narrows south of CR541 for a short distance before widening again as it approaches Widows Creek. It widens to allow for the development of an interchange at CR404 and CR545. Here, the corridor lies to the east of the existing highway to minimize impacts to the floodplains associated with Widows Creek and the associated wetlands within this floodplain.

South of CR404, the corridor shifts from east of existing U.S. 67 to west to avoid impacts to the floodplain and wetlands associated with Widows Creek. This results in the development of a build alternate in the vicinity of the Solid Rock Baptist Church near Log Mile 157.1, which lies west of the existing highway. The terrain west of the church is steep. The floodplain of Widows Creek lies immediately east of the existing highway. Build alternates in this area should minimize impacts to these resources.

The corridor narrows and shifts slightly to east of existing U.S. 67 to avoid impacts to the Taskee Pentecostal Church and the Cool Springs Baptist Church at Log Mile 158.3. East of the existing highway lies an expanse of the floodplains of Otter Creek and one of its tributaries. At Wolf Run Creek, the corridor widens and shifts slightly to the west to avoid impacts to the Wolf Run Creek/Otter Creek floodplain on the east.

North of Route 49, the corridor again shifts slightly to the east of the existing highway to avoid impacts to the Old Rucker Road Cemetery at Log Mile 160.9. The corridor then widens at Route 49 to allow for the development of an interchange alternate at Route 49 and Route 172. There are no significant constraints in the area of the interchange and the corridor is generally centered on the existing highway.

The corridor narrows south of Route 49 and is entirely east of the existing highway. The corridor is located in this manner to align with the previously purchased MoDOT right of way in Butler County (Section 2.3.4.3.1 and Figure 2-4).

No extensions to the proposed corridor boundary are reasonable or practical because they would result in loss of proximity to the existing highway and would severely fragment undeveloped forest land. The existing highway lacks roadway deficiencies making the need for a corridor on new alignment redundant with an existing functioning system.

2.3.4.3 Butler County

2.3.4.3.1 Wayne County Line to Route 60-East, Log Mile 163.2 to 174.5 [18.1 km (11.3 mi)]

From the county line (Log Mile 163.2) to Log Mile 167.2, the corridor is east of existing U.S. 67 (Figure 2-4). Right of way has been acquired by MoDOT east of the existing highway as part of the F-67-2(4) project in anticipation of constructing a four-lane divided highway at some point in the future. At the time of that project, only two lanes were built. In this area, the corridor is east of the existing highway to allow for the construction of the additional two lanes already planned in the previous project. This aligns with MoDOT's previously purchased right of way east of the existing two lanes. It is not reasonable or practical to locate a corridor off of the existing alignment due to the proximity of the Black River floodplain, documented locations of threatened and endangered species associated with the floodplain and the river, redundancy with the existing highway corridor, which lacks roadway deficiencies, and fragmentation of undeveloped forest land.

The corridor remains centered on the existing highway from Log Mile 167.2 to 170.1. This section incorporates an existing four-lane divided section. Again, it was determined to be unreasonable to locate a corridor anywhere but on the existing alignment in this section because a corridor on new alignment would be redundant with the existing four-lane highway. A deficient horizontal curve on U.S. 67 near the Sears Youth Camp at Log Mile 168.7 would be improved in this section.

The corridor is centered on the existing highway between the Route 60-west and Route 60-east interchanges. The improvements in this area are planned to be limited to frontage roads and interchanges.

The width is generally constant except for four areas: (1) at Hendrickson, (2) at Route JJ just south of the Black River, (3) in the vicinity of CR421, and (4) at Township Line Road (CR441). All of these locations

are wider to allow for the development of interchanges. The corridor at Route JJ is located to avoid impacts to the Black River floodplain, an electrical substation, and a quarry operation.

2.3.4.3.2 U.S. 67 Relocation West of Poplar Bluff, Log Mile 174.5 to 183.9 [15.0 km (9.4 mi)]

The study corridor does not include the area between Log Mile 174.5 and 183.9; these limits represent the northern and southern termini of the U.S. 67 relocation west of Poplar Bluff (Figure 2-4). This relocation project (MoDOT Project J0P0339) was opened in May 2001.

2.3.4.3.3 Just South of Route M to Route 160, Log Mile 183.9 to 187.6 [6.0 km (3.7 mi)]

The corridor begins south of Route M at the southern limit of MoDOT Job J0P0339 (Figure 2-4). Here it is generally centered on existing U.S. 67. The corridor aligns with a relatively new bridge over Cane Creek. A companion bridge is proposed west of the existing bridge. At Log Mile 185.4, the corridor crosses to the east of the existing highway to avoid Dunning Cemetery to the west and to align better with the re-alignment of the proposed corridor near Route 160. Corridors to the east or west of and detached from the existing alignment would be redundant with the existing highway, which lacks geometric deficiencies. Additionally the limits of the corridor were not extended because it would result in a loss of proximity to the existing highway and it would result in increased habitat fragmentation.

From Log Mile 185.9 to 188.9, the corridor is wider further to the east to accommodate the development of alternates for the purpose of correcting a deficient horizontal curve north of the Route 160 intersection and for the development of an interchange at Route 160. It is not practical to improve the highway to the west because it would be significantly longer than the proposed corridor.

2.3.4.3.4 Route 160 to Route 142, Log Mile 187.6 to 194.7 [11.4 km (7.1 Route 142 to South Project Terminus, Log Mile 194.7 to 197.2 [4.0 km (2.5 mi)]mi)]

South of Route 160 from Log Mile 188.9 to 192.2, the corridor is generally centered on the existing U.S. 67 alignment (Figure 2-4). This allows for the development of build alternates on either side of the highway. The existing corridor lacks geometric deficiencies; therefore, corridors were not developed to the east or west. The corridor crosses from upland to bottomland in this section approximately at Log Mile 188.9. This area is flat with numerous wetlands and ditches with scattered residential development. Initially, a wider corridor to the east of Lakeview Golf Course was considered. However, this was determined to be impractical due to reduced proximity to the existing corridor and increased fragmentation of bottomland farming operations.

Just south of Lakeview Golf Course, the corridor widens to allow for the development of interchange alternates at Route 142. The eastern limit of the corridor is just to the west of Mount Moriah Methodist Episcopal Church in Neelyville. The western limit of the corridor is just west of existing U.S. 67.

2.3.4.3.5 Route 142 to South Project Terminus, Log Mile 194.7 to 197.2 [4.0 km (2.5 mi)]

From Log Mile 194.7 to the southern terminus of the project area (Log Mile 197.2), the corridor widens to allow for the development of alternatives at the Route 142 intersection and Neelyville (Figure 2-4). From Neelyville to CR270, most of the corridor generally lies west of the existing highway due to the presence of scattered residential and commercial development east of the highway. Then, from CR270 to the southern terminus, the corridor is centered on the existing highway. A corridor east of Neelyville was not developed because it would be redundant with the existing highway corridor and would add length to the highway system. The study corridor ends approximately 3.2 km (2.0 mi) north of the Arkansas state line for reasons discussed in Section 1.2.3.

2.4 Project Alternatives Considered

Several types of project alternatives were considered in order to meet the future transportation needs of U.S. 67. Specifically, the following alternatives were considered:

- No Action,
- Transportation System Management (TSM),
- Mass Transit,
- Upgrade of the Existing U.S. 67 Alignment, and
- Build Alternates on Partial or New Location.

No Action

The No Action Alternative fails to meet the objectives and fails to address the needs outlined in the project Purpose and Need. However, the No Action Alternative was retained as a basis for comparison against the build alternatives.

TSM

The TSM alternative was determined to be impractical due to the rural setting of the project corridor and the use of U.S. 67 as a through traffic facility. Additionally, TSM improvements would not solve the transportation problems identified in the project Purpose and Need. A freeway is the stated desired transportation facility (Section 1.3), which TSM improvements would fail to achieve by definition of TSM. As a result, this alternative was not considered in detail, and was subsequently eliminated.

Mass Transit

There is also an absence of mass transit in the study area with the exception of longer distance shuttle services [Southeast Missouri Transportation Service (SMTS)] which are served by the build alternates proposed. Because of this fact, no mass transit alternatives were considered in the study corridor. See Section 3.4.3 for further discussion.

Upgrade of Existing U.S. 67 Alignment

The "Upgrade of Existing U.S. 67" alternative was determined to fail to meet the objectives and identified needs (i.e., congestion, accidents and safety, roadway deficiencies, and system continuity) presented in the project Purpose and Need. Therefore, it was considered to not be a viable final study alternate. Upgrading U.S. 67 by adding paved shoulders or by adding capacity through additional lanes while allowing at-grade access to remain would not meet the stated objectives of the Purpose and Need. To remove the at-grade access requires extensive interchange and outer road construction and right of way acquisition. This type of construction is more in line with a build alternative and not an upgrade of the existing facility.

Build Alternates on Partial or New Location

Within the study corridor described in Section 2.3, build alternates were developed to minimize environmental impacts and displacements within the study corridor, which concurrently considered traffic and engineering impacts to the existing infrastructure. A detailed analysis was also given to the provision of appropriate access to surrounding land uses via interchanges and service roads. These land uses included intersecting state and county roads, individual parcels, and federal and state lands.

The process of identifying and understanding the relative importance and inherent complexities of corridor constraints, coupled with the desire of achieving the project objectives stated in the Purpose and Need, culminated in identifying six locations where multiple build alternates were considered reasonable and logical. These locations, and associated build alternates, are listed below.

- three alternates at Cherokee Pass (Alternates A, B and C);
- three alternates at the Route N intersection in Madison County (Alternates E, F and G);
- three alternates at the Route 34 intersection at Silva (Alternates I, J and K);

- two alternates at Widows Creek in the vicinity of the Solid Rock Baptist Church in Wayne County (Alternates M and N);
- two alternates at the Route 160 intersection in Butler County (Alternates R and S); and
- three alternates at Neelyville (Alternates U, U′, and V).

The remaining portion of the project which represents the northern and southern limits of the project, and areas between the above-referenced six locations, consists of one build alternate. When considering the combination of alternates at each of the six locations, there is a possibility of 324 combinations of final study alternates. Given the length of the project and the possible number of final study alternates between the logical termini, the study team recommended that each of the above six locations be evaluated independently.

For those portions of the final study alternates where only one final build alternate was developed (roughly 78 percent of the length of the project), the determination to develop one build alternate and subsequent impact evaluation was, essentially, conducted during the development and refinement of the study corridor. The development and refinement of the study corridor provided logical and reasonable limits within which to develop a final build alternate which could meet the transportation objectives of the project, while reducing the potential for environmental impacts. Given that the evaluation process of avoiding and minimizing environmental impacts occurred in areas where one build alternate is identified, these areas are common to any combination of alternates in the above-stated six locations (Figures 2-5 through 2-18).

As discussed in Section 2.3.3, the study corridor was developed with the intent to maximize the use of existing right of way, to maintain efficiency and safety, and to minimize or avoid environmental resources. To meet these objectives, the study corridor was refined to an area within which only one build alternate could be considered reasonable and practicable. This limitation is due to the presence of sensitive environmental resources within close proximity of the study corridor such as water resources (streams, springs, fens), cultural resources (cemeteries, archaeological sites, historic structures) or physical features (steep bluffs, businesses, local road system). To reiterate the discussion in Section 2.3, parallel corridors (and subsequent build alternates) would be redundant with the existing highway facility. Further discussion as to the placement of these alternatives is found in Sections 2.4.2, 2.4.4, 2.4.6, 2.4.8, 2.4.9, 2.4.10, 2.4.11, 2.4.13, and 2.4.15.

As proposed, each build alternate incorporates a typical cross section as presented in Figure 1-2. It is characterized by a minimum right of way of 76 m (250 ft). However, because of the severity of grades and need for service roads, the right of way width will usually be larger [as large as 200 m (650 ft)].

For the purposes of describing the affected environment, environmental attributes (e.g., wetlands, terrestrial cover types, geology, springs, etc.) in the U.S. 67 project area were inventoried and/or characterized within the boundaries of the study corridor shown in Figures 2-2 through 2-4. Associated regional, community, and socioeconomic impacts were assessed on a larger scale. The consideration of potential impacts associated with each build alternate was conducted by quantifying impacts within the proposed right of way for each of the alternates. Resources adjacent to these proposed rights of way were also noted and considered. A description of each of the build alternates is provided below and illustrated in Figures 2-5 through 2-18.

2.4.1 Cherokee Pass—Madison County

2.4.1.1 Alternate A

This alternate begins at the northern project terminus which is at the southern end of the relocation of U.S. 67 at Mill Creek (MoDOT Project J0P0562) that was completed in November 2001) (Figure 2-5). From there it proceeds southerly adjacent to the west right of way of existing U.S. 67 to a point

approximately 1.5 km (0.93 mi) north of Route C where it then proceeds southwesterly for 1.6 km (1.0 mi) and intersects with Route C approximately 305 m (1,000 ft) west of existing U.S. 67 where a diamond interchange is proposed. From Route C it proceeds southerly and west of the Madison County Public Water Supply and then proceeds southeasterly and crosses existing U.S. 67 just north of CR401. The remainder of the segment is adjacent to the east right of way of existing U.S. 67.

2.4.1.2 Alternate B

This alternate begins at the northern project terminus and proceeds southerly, and adjacent to, the west right of way of existing U.S. 67 for most of its length (Figure 2-5). An interchange is proposed at Route A, and Route C is relocated to the north to intersect with the proposed Route A interchange. The northbound off-ramp is looped to the north side of Route A. This alternate displaces all of the homes and businesses currently fronting the western side of existing U.S. 67. The alternate crosses to east of existing U.S. 67 just north of CR401. The remainder of the segment is adjacent to the east right of way of existing U.S. 67.

2.4.1.3 Alternate C

This alternate begins at the northern project terminus and proceeds southeasterly crossing existing U.S. 67 and then through undeveloped ground before intersecting with Route A approximately 780 m (2,560 ft) east of existing U.S. 67 (Figure 2-5). A diamond interchange is proposed at Route A.

From Route A, the alternate proceeds southwesterly to a point just north of Berry Wood Products, Inc. where it crosses existing U.S. 67 to avoid Berry Wood Products, Inc. The alternate curves back to the southeast and crosses existing U.S. 67 just south of the facility and is adjacent to the eastern right of way of existing U.S. 67 for the remainder of the segment.

2.4.2 Alternate D—Madison County

This alternate is common to all final study alternatives and begins at the southern end of Alternates A, B, and C (Figures 2-6a through 2-6c). It begins by running parallel to and adjacent to the existing east right of way of U.S. 67. It continues this way for approximately 5.5 km (3.4 mi) to avoid various resources on the west side including four springs which include Lampher Spring, a CCC memorial plantation, various businesses just south of Cherokee Pass including a car dealership and restaurant, and the floodplain of Twelvemile Creek. It crosses Twelvemile Creek twice (Figure 2-6a). At the northern crossing the existing triple box culvert is extended under the proposed lanes. A bridge is proposed at the second crossing. Existing U.S. 67 functions as a service road through this area. An overpass is proposed approximately 610 m (2,000 ft) north of Griffin Hollow. This overpass connects service roads on the east and west of proposed U.S. 67. The alternate continues adjacent to the east right of way of existing U.S. 67. A box culvert extension is proposed at Griffin Hollow.

The alternate proceeds southeasterly away from existing U.S. 67 approximately 1.1 km (0.68 mi) north of Route JJ (Figure 2-6b) and then intersects with Route JJ approximately 290 m (950 ft) east of existing U.S. 67. The alternate stays to the east to avoid impacts to the Twelvemile Creek floodplain and associated wetlands. A diamond interchange is proposed at Route JJ.

South of Route JJ the alternate turns southwest while remaining east of Graham Cemetery and Twelvemile Baptist Church. It crosses existing U.S. 67 approximately 1.45 km (0.9 mi) south of Route JJ at an unnamed tributary of Twelvemile Creek and remains east of the Cloninger-Hoffmann Cemetery. The tributary at this crossing is proposed to be culverted. From this point, the alternate is adjacent to the west right of way of existing U.S. 67.

It remains west of existing U.S. 67 for the next 1.75 km (1.1 mi) to avoid impacts to Sanders Cemetery, Settle Cemetery, and several businesses including the Split Rail Gift Shop and a filling station. A grade

separated crossing is proposed approximately 2.7 km (1.7 mi) south of Route JJ to connect service roads on each side of the proposed route.

The alternate continues southerly along the western limit of right of way to a point across from Settle Cemetery where it crosses existing U.S. 67 to avoid impacts to the main channel of Twelvemile Creek and a fen associated with a tributary to Twelvemile Creek (Figure 2-6c). For about 1.3 km (0.8 mi), the alternate incorporates the existing U.S. 67 roadbed as the southbound lanes for the proposed four-lane facility. Then the alternate crosses existing U.S. 67 again and incorporates the use of the existing U.S. 67 roadbed as the northbound lanes of the proposed four-lane facility with the lane widening being to the west. This is to avoid impacts to Mt. Pisgah Cemetery. The alternate continues this way for the remainder of its length to approximately 1.75 km (1.09 mi) north of the Route N intersection. A spring exists at the southern end of Segment D across from Mt. Pisgah Cemetery, which may cause the new pavement in the area to be on a bridge structure. The service road in the area needs to be aligned to avoid the spring outlet, and design measures need to be taken to insure that the hydrology downstream of the spring is maintained.

Since the issuance of the Draft EIS, the Preferred Alternative has been modified slightly to avoid impacts to architectural resources. Specifically, the east frontage road was shifted approximately 30 m (100 ft) east of historic building 317a (log cabin) which is eligible for listing in the NRHP. This building is approximately 914 m (3,000 ft) north of CR411 in Madison County. Additionally, the east frontage road was also shifted to avoid building 78a which is eligible for listing in the NRHP. The extent of the shift is approximately 52 m (170 ft) and the building is approximately 488 m (1,600 ft) north of CR411 in Madison County.

2.4.3 Route N Alternates—Madison County

2.4.3.1 Alternate E

This alternate begins at the southern end of Alternate D and proceeds southeasterly off of the existing U.S. 67 alignment through heavily wooded rolling terrain (Figure 2-7). Alternate E intersects Route N approximately 230 m (750 ft) west of existing U.S. 67. A diamond interchange is proposed at Route N. From there it continues off of existing alignment, running roughly parallel to existing U.S. 67. It continues through undeveloped forested ground to a point approximately 2.1 km (1.3 mi) south of Route N where the alternate ends adjacent to the west right of way of existing U.S. 67.

2.4.3.2 Alternate F

Alternate F begins at the southern end of Alternate D and crosses to the east of existing U.S. 67 so that the existing U.S. 67 roadbed functions as the southbound lanes of the proposed four-lane facility (Figure 2-7). Two new lanes are proposed east of the existing two lanes. A diamond interchange is proposed at Route N. A two-lane extension of Route N to CR325 is also proposed. The alternate continues southerly for approximately 750 m (2,460 ft) where it shifts slightly west to be adjacent to the west right of way of existing U.S. 67. From here the existing roadbed functions as a service road. The alternate continues like this for the remainder of its length [approximately 2.2 km (1.4 mi)].

2.4.3.3 Alternate G

Alternate G begins at the southern end of Alternate D and then crosses existing U.S. 67 in a southerly direction off of the existing alignment (Figure 2-7). A diamond interchange is proposed at Route N approximately 220 m (720 ft) east of the current Route N intersection. The interchange falls just west of a cellular phone tower managed by Cybertel RSA Cellulars Ltd. The alternate continues southerly to a point approximately 925 m (3,035 ft) south of the proposed Route N interchange where it crosses existing U.S. 67 and roughly becomes parallel to and adjacent to the west right of way of the existing highway for the remainder of the alternate.

2.4.4 Alternate H—Madison and Wayne Counties

Alternate H is common to all final study alternatives and runs from just south of Route N in Madison County to north of Route 34 in Wayne County, a distance of approximately 17 km (10.6 mi) (Figures 2-8a through 2-8c). It begins by running southerly adjacent to the west right of way of existing U.S. 67 near the Greenwood Branch of Cedar Creek in Madison County. It continues like this across the Wayne County line where it then turns slightly north and west of the existing alignment near the community of Coldwater. It lies to the west of the existing highway to avoid the Greenwood Branch, Linville-Barrett Cemetery, and the community of Coldwater. Care needs to be taken in the design phase when locating the new pavement near Greenwood Cemetery. The new alignment falls between the cemetery and the existing roadway.

Route EE is extended approximately 395 m (1,300 ft) to the northwest to intersect with the proposed U.S. 67 alignment. A diamond interchange is proposed at Route EE just northwest of the current Route EE intersection. The alternate crosses Coon Creek before becoming adjacent again to the west right of way of existing U.S. 67 near CR302 (Figure 2-8b). An eastern location of the proposed route would result in greater impact to the Cedar Creek floodplain and a new church along U.S. 67. A box culvert is proposed at Coon Creek. Two new bridges are proposed for the crossing at Cane Creek with the existing U.S. 67 bridge being left in place as existing U.S. 67 is to function as a service road. A box culvert is also proposed at the Wilmore Creek crossing.

The alternate continues southerly and to the west of existing U.S. 67 from Cane and Wilmore Creeks to approximately CR212. It lies to the west to avoid impacts to the Coldwater Conservation Area on the east. It then crosses existing U.S. 67 and becomes adjacent to the east right of way and continues like this from approximately CR303 to CR213 (Figure 2-8c). Between these limits a box culvert is proposed at Hunter Creek, two bridges are proposed at Bennett Creek, two grade separation bridges are proposed at CR213, and the existing route is to function as a service road. The bridges at Bennett Creek also serve as a grade separation for access to CR214 and the community of Lodi. The alternative lies to the east of existing U.S. 67 to avoid impacts to Lewis Cemetery, the residences of Lodi, the floodplains of Hunter and Bennett Creeks, a Church of the Nazarene, and a spring. Just south of Lodi near CR213, the alternate crosses existing U.S. 67 and incorporates the use of the existing U.S. 67 pavement as the northbound lanes for the proposed four-lane facility. The alternate continues southerly like this for the remainder of its length to just north of Route 34. At the intersection with Route K, a diamond interchange is proposed. The Route K interchange lies approximately 4 km (2.5 mi) north of Route 34. The new lanes lie to the west to avoid impacting Mt. Pisgah Cemetery and Twidwell Cemetery, and to maintain a better design by avoiding excessive crossings over the existing highway.

2.4.5 Route 34 (Silva) Alternates—Wayne County

2.4.5.1 Alternate I

Alternate I consists of a near western relocation of U.S. 67 at Route 34 and Silva (Figure 2-9). It begins at the southern end of Alternate H and proceeds southwesterly off of existing alignment to the west of Montgomery Church and the vacant Libla Industries buildings. Grade separation bridges are proposed at Route 34 with southbound on/off ramps positioned near the grade separation. The northbound off ramp is located across from Route 34-east, while the northbound on ramp is located north of Montgomery Church. Existing U.S. 67 acts as a service road and functions as part of the access system to the community of Silva. East of U.S. 67, Route 34 is relocated to the north to align with Route 34 west of U.S. 67. The realignment of Route 34 is approximately 820 m (2,700 ft) long. The proposed grade separations at Route 34 are approximately 350 m (1,150 ft) west of the existing intersection of U.S. 67 and Route 34-west.

South of Route 34 the alternate proceeds southeasterly through undeveloped forest area running roughly parallel to Hubble Creek for several hundred meters before crossing the confluence of Hubble Creek and Peters Branch at Silva. Two bridges are proposed at this creek crossing. Approximately 300 m (985 ft) south of the Peters Branch crossing, the alternate crosses existing U.S. 67 such that the existing U.S. 67 roadbed functions as the southbound lanes of the proposed four-lane facility. The alternate terminates near the existing intersection with CR306.

2.4.5.2 Alternate J

Alternate J runs adjacent to existing U.S. 67 for its entire length of 3.03 km (1.9 mi) (Figure 2-9). It begins at the southern end of Alternate H and immediately crosses to the east of existing U.S. 67 and proceeds southerly adjacent to the east right of way. Two bridges are proposed at Hubble Creek approximately 320 m (1,050 ft) north of Route 34-west. An interchange is proposed at Route 34 with Route 34-east being relocated to the north to align with Route 34-west. The southbound and northbound on-ramps to proposed U.S. 67 are "folded" to form loop ramps. The southbound on ramp is folded to avoid excessive impacts to the Hubble Creek floodplain. The northbound on ramp is folded to avoid excessive rock cutting in the hill in the northeast quadrant of the interchange. A grade separation bridge is proposed over U.S. 67 to carry Route 34 traffic. Approximately 655 m (2,150 ft) south of Route 34, the alternate crosses the Peters Branch where two bridges are proposed. The alternate then crosses existing U.S. 67 such that the existing U.S. 67 roadway is used as the southbound lanes of the proposed four-lane facility. The alternate ends near the intersection with CR306.

2.4.5.3 Alternate K

Alternate K involves a slight eastern relocation of U.S. 67 at Route 34 just north of Silva before becoming adjacent again to existing U.S. 67 (Figure 2-9). The alternate begins at the southern end of Alternate H and immediately crosses existing U.S. 67 and proceeds southeasterly through the floodplain of Hubble Creek and eventually over Hubble Creek via two bridges. The alternate then intersects with relocated Route 34 approximately 170 m (550 ft) east of the Route 34-west intersection. A diamond interchange is proposed at relocated Route 34 which is relocated east of existing U.S. 67 to line up with Route 34 west of U.S. 67. Through this stretch, existing U.S. 67 functions as a service road. The alternate proceeds southerly across existing Route 34-east and then over Peters Branch where two bridges are proposed. The alternate then lines up adjacent to existing U.S. 67 such that the existing U.S. 67 pavement functions as the southbound lanes of the proposed four-lane facility. The alternate ends near the intersection with CR306.

2.4.6 Alternate L—Wayne County

Alternate L begins near the intersection with CR306 (the southern end of Alternates I, J, and K) and ends just north of the intersection with CR404, a distance of 19.1 km (11.9 mi) (Figures 2-10a through 2-10d). This alternate is common to all final study alternatives and incorporates the relocation of U.S. 67 through the Greenville area.

The alternate begins near Silva where the existing U.S. 67 pavement would function as the southbound lanes of the proposed four-lane facility. The pavement widening takes place to the east to avoid increased impacts to the St. Francis River floodplain and wetlands associated with the floodplain. A grade separation overpass is proposed approximately 460 m (1,500 ft) south of the intersection with CR306. This overpass provides access from CR306 and the Bounds Creek Access west of U.S. 67 to Silva on the east. From Silva all traffic can access proposed U.S. 67 at the proposed Route 34 interchange. The alternate continues southerly over Bounds Creek where an extension to the existing box culvert is proposed.

The alternate proceeds southerly near the St. Francis River floodplain to approximately 930 m (3,050 ft) north of Corps Road 21 in Greenville where it proceeds west of existing U.S. 67. Shortly before this point

of divergence with the existing highway, the new pavement lies to the east of the existing highway to avoid the main channel of the St. Francis River. It then proceeds through the floodplain of the St. Francis River before rising into rolling and wooded terrain west of Greenville. A diamond interchange is proposed at Corps Road 21, which serves as access to Greenville. The existing highway functions as a service road or business route through the commercial area of Greenville. For reasons discussed in Section 2.3.4.2.3, the development of a final study alternate in the vicinity of Greenville is limited to an area just west of the city but not west of the St. Francis River. This places the alternate directly through the North Greenville Recreation area, a 60.7-ha (150-ac) site managed by the USACE. This recreation area is unavoidable as an alternate further west impacts the St. Francis River and an alternate further east impacts the commercial area of Greenville. The alternate proceeds southeasterly on tangent to north of Route D at the Joe Bruce Morris property and then curves southwesterly to rejoin the existing highway alignment just north of Historic Greenville (Figure 2-10b).

The alternate then proceeds through the St. Francis River floodplain and the area around historic Old Greenville and the Greenville Recreation Area at Wappapello Lake. Initially, the alternate was developed west of existing U.S. 67 in the direction of Old Greenville to avoid a large complex of forested wetlands and the parking area at the boat ramp at Greenville Recreation Area.

South of the lake, the alignment lies adjacent to the west right of way of existing U.S. 67 through the Pleasant Valley Creek floodplain, to avoid a grave of an unknown Civil War soldier and a parking lot and trail access for the Ozark Trail. A box culvert is proposed at Pleasant Valley Creek approximately 1.6 km (1.0 mi) south of Wappapello Lake. At this point the alternate continues southwesterly veering away from existing U.S. 67 west of Pleasant Valley Cemetery (Figure 2-10c). The alternate then crosses existing U.S. 67 approximately 430 m (1,400 ft) north of the intersection with Route A. An extension of Route A connects to a proposed diamond interchange just east of existing U.S. 67. This extension continues on new alignment past the diamond interchange before tying into existing U.S. 67 in front of Pleasant Valley Cemetery.

The proposed U.S. 67 alignment becomes adjacent to the east right of way just south of Route A opposite Pleasant Valley Creek. The alternate then proceeds southerly parallel to existing U.S. 67 for approximately 4.6 km (2.9 mi) with existing U.S. 67 functioning as a service road. This location is to avoid excessive channelization of Pleasant Valley Creek and its associated tributaries. A grade-separated overpass is proposed at Route F to provide access to existing U.S. 67. The overpass also provides a connection to property owned and managed by the MTNF. Near the intersection with CR541 (Figure 2-10d), the alternate proceeds southeasterly away from existing U.S. 67 through undeveloped forested land to avoid impacts to Widows Creek. The alternate terminates approximately 550 m (1,800 ft) north of the intersection with CR404.

Since the issuance of the Draft EIS, the Preferred Alternative has been modified in the vicinity of Greenville CCC camp (site 23WE871) which may be eligible for listing in the NRHP. Specifically, the east frontage road was shifted further east approximately 22 m (70 ft) to avoid impacting the site, which is centered approximately 183 m (600 ft) south of Route F in Wayne County.

Several issues in proximity to Greenville make it a complex area within which to develop a new four-lane freeway. The area is marked with numerous environmental, cultural, and socioeconomic resources. Because of the complexity and number of these resources, a more detailed examination of the proposed alternate became necessary and focused on two areas: (1) in the vicinity of North Greenville Recreation Area and the Greenville ballpark at Corps Road 21 and U.S. 67 on the northwest edge of Greenville, and (2) in the vicinity of Historic Greenville and Greenville Recreation Area. In each of these areas, further study revealed the need to develop options, or subalternates, to the originally proposed alternate. The subalternates in each area were developed based on extensive field research at each location during the summer of 2000. Sections 2.4.6.1 and 2.4.6.2 describe the subalternates in the vicinity of Greenville

ballpark and Historic Greenville, respectively. The process of developing and comparing the subalternates is presented in detail in the Section 4(f) evaluation (Section 5.0).

2.4.6.1 Subalternates in the Vicinity of North Greenville Recreation Area

Two key resources lie west of U.S. 67 at Corps Road 21 in Greenville. One is the North Greenville Recreation Area managed by the USACE. The other is the Greenville ballpark which sits on a 5.39-ha (13.32-ac) piece of property leased to the City of Greenville by the USACE. Additionally, the Greenville ballpark lies within the North Greenville Recreation Area. The Greenville ballpark property is mostly wooded except for the ballpark and adjacent parking area. The North Greenville Recreation Area is a Section 4(f) resource. Additionally, the City of Greenville was awarded funds from the Land and Water Conservation Act to improve the ballpark, which qualifies the ballpark as a Section 6(f) resource [and Section 4(f) resource]. For additional information, see Final Section 4(f) Evaluation (Section 5.0).

Subalternate 1 (Preferred Alternative)

This subalternate diverges west of existing U.S. 67 approximately 533 m (1,750 ft) north of Corps Road 21 in Greenville (Figure 2-10e). It proceeds southeasterly through the North Greenville Recreation Area and the Greenville ballpark. Access to Greenville is provided via a diamond interchange at Corps Road 21. The subalternate then continues southeasterly up from the St. Francis River floodplain to heavily wooded rolling terrain west of the Greenville wastewater lagoons. Because of the ballpark, subalternates were developed in the vicinity of Greenville ballpark with the intent to minimize or avoid impacts to the leased property and the ballpark.

Subsequent to the issuance of the Draft EIS, the Phase I archaeological survey identified an archaeological site that may be eligible for inclusion on the NRHP. A portion of this archaeological site warranted preservation in place. To avoid the part of the site that warranted preservation in place, the entire subalternate was shifted slightly north and east from a point approximately 533 m (1,750 ft) north of Corps Road 21 to Corps Road 21. As a result, the proposed west frontage road north of Corps Road 21 was aligned more to the north and east to tie directly with the gravel road providing access to the St. Francis River. The alignment for mainline U.S. 67 was shifted slightly to the north and east away from the floodplain of the St. Francis River, which resulted in a slight modification at the interchange at Corps Road 21.

Subalternate 1 is the preferred subalternate at the North Greenville Recreation Area because it is the most effective at minimizing impacts to North Greenville Recreation Area and archaeological resources. Although this subalternate impacts the Greenville ballpark and the property leased by the City of Greenville, the city of Greenville agreed to the principle of this subalternate and, at the time of this writing, has begun developing plans for a replacement location for the ballfield.

Subalternate 2

This option diverges west of existing U.S. 67 at the same point as Subalternate 1 (Figure 2-10f). It then proceeds through the St. Francis River floodplain and across part of the property leased to the City of Greenville by the USACE. While impacting the southwestern portion of the leased property, this subalternate does not impact the playing field of the ballpark. All impacts to the leased property occur to heavily wooded undeveloped land. A diamond interchange is proposed at Corps Road 21, which provides access to Greenville. This subalternate then rises into rolling wooded terrain west of the Greenville wastewater lagoons.

Subalternate 3

This subalternate diverges west of existing U.S. 67 approximately 500 m (1,640 ft) north of Corps Road 21 in Greenville (Figure 2-10g). It then proceeds more southerly than Subalternate 2 through the St. Francis River floodplain. It avoids the entire property leased to the City of Greenville by passing south and west of the property. A diamond interchange is proposed at Corps Road 21, which provides access to

Greenville. The subalternate then turn westerly and rises out of the St. Francis River floodplain into wooded terrain south and west of the Greenville wastewater lagoons.

Subalternate 4

This subalternate diverges west of existing U.S. 67 at Corps Road 21 in Greenville immediately south of the property leased to the City of Greenville (Figure 2-10h). It then proceeds southerly between the ballpark property and the wastewater lagoons avoiding the ballpark property entirely. A diamond interchange is proposed in this area which serves as access to Corps Road 21 and Greenville. Access to Greenville is via Poplar Street. South of the proposed interchange, the subalternate proceeds westerly and rises out of the floodplain and into heavily wooded terrain south and west of the Greenville wastewater lagoons.

2.4.6.2 Subalternates in the Vicinity of Old Greenville National Historic Site/North Greenville Recreation Area

Several resources exist in this area and include (1) Greenville National Historic Site (Old Greenville), a site listed on the NRHP; (2) the Greenville Recreation Area managed by the USACE [a Section 4(f) resource]; (3) several acres of forested wetlands east of the existing highway; and (4) the St. Francis River bridge, which is eligible for listing on the NRHP.

Old Greenville is managed by the USACE and comprises village streets, building foundations, steps to the courthouse, and sidewalks associated with the original town. Memory Lane is a 1.6 km (1-mi), self-guided, walking trail through Old Greenville. Interpretive plaques identify the locations and descriptions of approximately 20 historic sites. A gazebo presents the history of Old Greenville including the role Old Greenville played as the county seat of Wayne County. Old Greenville includes Hickman Cemetery, located north of Old Greenville, Union Cemetery located west of the campground on private property, and the Wight Cemetery located southeast of Old Greenville.

A Phase I cultural resource inventory was performed during the spring of 2000, which identified several historic features within the proposed right of way that had not been previously identified. These features include a concrete foundation, two concrete features, two concrete and stone walls, and a relic domestic well. These features are located east of the earliest settled portions of Old Greenville and are considered significant because these features are located within the historic boundaries of Old Greenville. The concrete features are embedded in the side slope of U.S. 67 and located within the MoDOT right of way; however, this right of way property is leased to MoDOT by the USACE.

Out of the 55.44 ha (137 ac) comprising this historic site, 19.02 ha (47 ac) of Old Greenville overlap with Greenville Recreation Area and are classified as recreation land in the Wappapello Lake Master Plan (2000). The remaining 36.42 ha (90 ac) are classified as an "environmentally sensitive-cultural area." Visitors to Old Greenville routinely use the facilities in Greenville Recreation Area. Greenville Recreation Area consists of 65.55 ha (162 ac) on both sides of U.S. 67. This area is used for picnicking, hiking, fishing, and canoeing.

For reasons discussed in Section 2.3.4.2.3, one corridor was developed in this area. This corridor lies immediately west of Greenville and east of and adjacent to Old Greenville. Once the corridor was identified, the project team focused on the environmental constraints within this area. These environmental constraints comprised the following:

- Historic Old Greenville boundary;
- Greenville Recreation Area boundary;
- Wight Cemetery (an NRHP listed cemetery) southeast of the St. Francis River bridge;
- the eligible St. Francis River bridge;
- high quality wetlands and floodplains east of U.S. 67 and north of the St. Francis River;

- a backwater slough and associated wetland south of the St. Francis River bridge and east of existing U.S. 67;
- steep bluffs east and west of existing U.S. 67 and south of the St. Francis River; and
- a grave of an unknown Civil War soldier located on a steep bluff south of the St. Francis River and east of existing U.S. 67.

Community leaders and citizens of Greenville as well as members of the USACE have indicated that the new alignment should assist those traveling to Greenville and Wappapello Lake. The public and USACE representatives were particularly concerned with adverse travel and loss of access to Greenville and Route D. Initially one interchange was proposed for both Greenville and Route D. As a result of public comments and agency coordination with the USACE, two interchanges (at Corps Road 21 and at Route D) are being recommended. A half-diamond interchange is proposed at Route D, which would allow for access to and from the south only.

A power line corridor, in existence since the 1950s, is located within Old Greenville and is between approximately 28.0 m and 62.2 m (92 ft and 204 ft) from the existing U.S. 67 pavement. Meetings with the public and USACE have indicated that any impacts to Historic Greenville west of the power line are unacceptable.

To comply with Section 4(f) of the Department of Transportation Act, the project team evaluated alternates that avoid and minimize impacts to Old Greenville, including context sensitive designs. The alternate process at Old Greenville focused on a particular roadway section from the proposed interchange at Route D to a point immediately south of the St. Francis River bridge. Originally, eight subalternates were developed, which considered the environmental constraints, the proposed change by USACE in the 100-year flood elevation of Wappapello Lake from 120.93 m to 123.44 m (395 ft to 405 ft), and the capability of the subalternate to be constructed in stages. An evaluation of the eight subalternates resulted in the retention of four subalternates for further analysis. For additional information, see the Final Section 4(f) Evaluation (Section 5.0).

Subalternate 1

The northbound lanes would utilize existing U.S. 67 at its current elevation (395 ft) (Figure 2-10i). The southbound lanes would be located west of existing U.S. 67 at elevation 405 ft. A service road would be located west of the southbound lanes at existing grade and would link Route D and Old Greenville. A 15.8-m (52-ft) wide grass median (from shoulder to shoulder) would lie between the northbound and southbound lanes. The existing St. Francis River bridge would be removed. When compared with other subalternates, subalternate 1 would have the highest impacts to Old Greenville and the lowest impacts to Greenville Recreation Area and the wetlands east of U.S. 67. The concrete foundation, concrete features, concrete and stone walls, and relic domestic well would be impacted by Subalternate 1. The power line would be relocated farther west, which would increase the encroachment into Old Greenville.

Subalternate 2

The northbound and southbound lanes would be constructed immediately east of existing U.S. 67 at elevation 405 ft (Figure 2-10j). Existing U.S. 67 would become a service road connecting Route D to Old Greenville. This subalternate would incorporate a depressed 15.8-m (52-ft) depressed grass median. The existing bridge over the St. Francis River would need to be removed. This subalternate would not affect Historic Greenville, but would have the highest impacts to Greenville Recreation Area, floodplains, and wetlands east of U.S. 67. All existing concrete foundations and retaining walls in Historic Greenville would remain intact. The power line would be unaffected.

Subalternate 3

The centerline of proposed U.S. 67 would be approximately 7.0 m (23 ft) east of the centerline of existing U.S. 67 (Figure 2-10k). The northbound and southbound lanes would be constructed at elevation 405 ft

and would be separated by a 4.3-m (14-ft) paved median with a concrete median barrier. A service road would be constructed west of the southbound lanes and east of the power lines at existing grade to connect the Route D interchange and Old Greenville.

Subalternate 3 was developed as an alternative to a standard typical section (which would include a 15.8-m (52-ft) depressed grass median and 9.1-m (30-ft) clear zones with 6:1 side slopes). The standard typical section creates a large footprint which is minimized by Subalternate 3 by reducing the width of the median to 4.3 m (14 ft) and by steepening the side slopes. The narrower median would require the implementation of a concrete median barrier and the steeper side slopes would necessitate the construction of guard rail at the edge of the shoulder.

The concrete feature embedded in the side slope of U.S. 67 and one of the two concrete and stone walls would be impacted by this subalternate. The concrete foundation and the northern concrete and stone wall would not be affected. This subalternate minimizes overall impacts to Old Greenville, Greenville Recreation Area, wetlands, and floodplains but has a higher accident cost because of the presence of the concrete median barrier and the guard rail. Based on analysis of a similar freeway section (I-70 at the Missouri River crossing in Cooper and Boone Counties), a forecast of the number of accidents through this section of U.S. 67 was made. The accident rate on this type of facility is estimated to be 47 percent higher than the statewide average for a typical rural freeway with a depressed grass median and having no guard rail. This equates to an increased cost of $187,200 per year compared to the statewide average accident costs.

The concrete barrier median would be approximately 2.4 km (1.5 mi) in length. The evaluation of this subalternate did not consider adverse travel to emergency vehicles, problems associated with snow removal, or the associated energy costs. With this type of facility in a rural environment, there is a greater potential for property damage and injury accidents; however, fatality accidents are less likely.

Subalternate 4

The centerline of proposed U.S. 67 would be approximately 5.8 m (19 ft) east of the centerline of existing U.S. 67 (Figure 2-10l). The northbound and southbound lanes would be constructed at elevation 405 ft and separated by a 15.8-m (52-ft) depressed grass median. A standard 9.1-m (30-ft) clear zone would be part of this subalternate, which eliminates any need for the use of guard rail.

Subalternate 4 has a similar horizontal alignment compared to Subalternate 3 but does not incorporate a reduced facility (narrower median and steeper side slopes). This subalternate would have slightly greater impacts to Old Greenville, Greenville Recreation Area, wetlands, and floodplains than Subalternate 3. The concrete foundation, concrete features, concrete and stone walls, and relic domestic well would be impacted by Subalternate 4. With subalternate 4, the St. Francis River bridge, which is potentially eligible for the NRHP, would be removed. The power line would be unaffected. However, the accident costs are comparable to the statewide average and are lower than Subalternate 3.

Subalternate 4 is the preferred subalternate at Old Greenville because it is the most effective subalternate at minimizing impacts to Old Greenville, impacts to the natural resources in Greenville Recreation Area, and balancing costs (including construction, mitigation, and accident costs.)

2.4.7 Widows Creek Alternates—Wayne County

2.4.7.1 Alternate M

Alternate M begins at the southern end of Alternate L just north of the intersection with CR404 (Figure 2-11). CR404 is extended to the east to intersect with the proposed alignment. At this point, a diamond interchange is proposed. A service road is proposed east of the interchange to provide access to CR545. The interchange and service road are located to the east to avoid channelization to the Widows Creek channel. Immediately south of the proposed interchange, the grass median widens considerably, to

as much as 155 m (510 ft). The alternate shifts such that the existing U.S. 67 alignment becomes the proposed southbound lanes and the proposed northbound lanes lie to the east to form the wide median. Widows Creek flows in its current channel through the proposed median. This wider median extends from near CR543 to CR546, a distance of approximately 2.5 km (1.6 mi). Near CR546, the median returns to its typical width where a 280-m (930-ft) box culvert is proposed to carry the flow of Widows Creek under the proposed alternate. The excessive length of the culvert is due to the skew between the alternate and the creek. The alternate ends approximately 120 m (400 ft) north of CR406 adjacent to the west right of way of existing U.S. 67.

2.4.7.2 Alternate N

Alternate N begins at the southern end of Alternate L just north of the intersection with CR404 (Figure 2-11). A proposed diamond interchange is proposed at an extension of CR404 similar to the layout described in Section 2.4.7.1. The reason for this location is also stated in Section 2.4.7.1. The alternate then turns southeasterly and crosses existing U.S. 67 approximately 210 m (700 ft) south of the intersection with CR545. From this point the existing U.S. 67 pavement functions as the northbound lanes of the proposed four-lane facility. A service road is proposed west of the proposed four-lane facility. The alternate continues this way for the remainder of its length to approximately 120 m (400 ft) north of the existing intersection with CR406.

2.4.8 Alternate O—Wayne and Butler Counties

The alternate is common to all final study alternatives and begins just north of the intersection with CR406 in Wayne County and ends at the existing four-lane divided pavement in north Butler County, a distance of 14.7 km (9.1 mi) (Figures 2-12a through 2-12c). It proceeds southerly through the Otter Creek floodplain adjacent to and east of the existing right of way to avoid the remains of the old town of Taskee, which is labeled as the Taskee Historic Area in the Wappapello Lake Master Plan (2000). This historic area is located just north of Otter Creek. Once south of the Taskee Historic Area, the alternate switches to become adjacent to and west of the existing right of way to avoid Otter Creek, Wolf Run Creek, and Goldbeck Hollow east of existing U.S. 67. Twin bridges are proposed over Otter Creek. The alternate continues this way through land managed by the USACE. Approximately 1.3 km (0.81 mi) north of CR548, the alternate proceeds southerly slightly off of existing alignment before becoming adjacent to the west right of way of existing U.S. 67 near CR548. At CR548, the alternate passes between the existing highway and Old Rucker Cemetery. South of CR548, the alternate is aligned such that the existing U.S. 67 pavement functions as a service road to the east. The pavement widening occurs to the west to maintain transportation consistency with the proposed pavement widening in north Butler County. CR403 functions as a service road to the west.

The alternate intersects Route 49 (and realigned Route 172) approximately 2.1 km (1.3 mi) north of the Wayne/Butler County line. Route 172 is realigned to the north to line up with Route 49 (Figure 2-12b). A diamond interchange is proposed at this location. At Route 49, the alternate is west of the existing highway with the existing highway functioning as a service road. Just south of Route 49, the alternate shifts to the east with the existing pavement functioning as the southbound lanes. This general alignment continues for the remainder of the alternate [approximately 8.6 km (5.3 mi)]. MoDOT previously acquired right of way and planned for two additional lanes east of existing U.S. 67 in northern Butler County to allow for the construction of two new northbound lanes (Section 2.3.4.3.1). A diamond interchange is proposed at CR401 and Route H at Hendrickson (Figure 2-12c). The alternate then crosses the Black River where a companion bridge is proposed east of the existing river bridge. Approximately 825 m (2,710 ft) south of the center of the Black River channel, the alternate interchanges with Route JJ. The ramps to and from the south are looped to the south side of Route JJ to avoid impacting an electrical substation and the Black River quarry. The alternate continues to run southerly, with existing U.S. 67 serving as the southbound lanes of the proposed four-lane facility.

2.4.9 Alternate P—Butler County

Alternate P is common to all final study alternatives and extends from the beginning of existing four-lane divided pavement in northern Butler County to the interchange at Route 60-east, a distance of approximately 12 km (7.4 mi) (Figures 2-13a through 2-13c). It basically incorporates the use of the existing four-lane divided pavement except in the location of a deficient horizontal curve near the Sears Youth Center and CR522. Here, the alternate shifts slightly east of the existing alignment to provide a horizontal curve that meets the project design criteria. The length of relocation totals approximately 725 m (2,380 ft).

Other significant features pertaining to the alternate include a grade-separated crossing approximately 1 km (0.6 mi) north of CR522 for access, a diamond interchange at CR421, a diamond interchange at CR441 (Township Line Road), and a grade-separated crossing at CR423. This alternate also incorporates the construction of service roads in locations where service roads are not provided.

Presently, two interchange options are proposed at CR441 (Township Line Road). Impacts from these two options were quantified and evaluated. Although Option 1 would require relatively more commercial land and Option 2 would require relatively more residential land, this evaluation resulted in no major differences between the two options, and either option could be carried forward as the recommended alternate. A final decision on this interchange location can be made during the design phase.

2.4.10 Alternate PB

Alternate PB is common to all final study alternatives and represents the Poplar Bluff bypass (MoDOT Job Number J0P0339) completed in May 2001. This can be seen in part on Figures 2-13c and 2-14a. No new study alternates or new points of access were developed in this area.

2.4.11 Alternate Q

This alternate is common to all final study alternatives and begins at the southern terminus of the Poplar Bluff bypass south of Poplar Bluff and ends approximately 1.3 km (0.81 mi) north of the existing Route 160 intersection, a distance of 4.7 km (2.9 mi) (Figures 2-14a and 2-14b). The alternate incorporates existing U.S. 67 for use as the northbound lanes of the proposed four-lane facility as this meets the configuration of the southern end of the Poplar Bluff bypass and it also minimizes impacts to the wetlands associated with Cane Creek and the old channel of Cane Creek. The alternate enters the Cane Creek floodplain and crosses both the old Cane Creek channel and the current channel via new bridges parallel to and west of the structures currently in place. The alternate continues southwesterly along existing alignment for approximately 650 m (2,130 ft) before it crosses existing U.S. 67 near CR323. The alternate is then adjacent to the east right of way of existing U.S. 67 with four new lanes of roadway proposed. Existing U.S. 67 functions as a service road south of this crossing. The alternate lies to the east to avoid impacting Dunning Cemetery, which abuts the west right of way. Grade-separated bridges are proposed at the crossing of CR482 and CR343. There is no direct access to the proposed route at this location. The alternate continues adjacent to the east right of way for the remainder of its length.

2.4.12 Alternates at Route 160

2.4.12.1 Alternate R

Alternate R begins just north of Route 160 adjacent to the east right of way of U.S. 67 and then proceeds southerly away from the existing alignment to a point along Route 158 approximately 410 m (1,350 ft) east of U.S. 67 (Figure 2-15). An interchange is proposed at Route 158, which also serves as access to Route 160. The southbound on ramp is looped to the north of Route 158. The alternate lies just east of the Butler County Water District #1 facility south of Route 158. Approximately 655 m (2,150 ft) south of Route 160, the alternate crosses U.S. 67 and then lies adjacent to the west right of way for the next

1,000 m (3,280 ft) to CR360 and passes through the Francis Salvage Yard, which appears to be no longer in use. At CR360, the alternate turns southwesterly away from the existing alignment for the next 850 m (2,790 ft) to avoid the Fellowship Southern Baptist Church of Neelyville, which lies just to the west of existing U.S. 67. It then crosses right of way of an old railroad grade approximately 250 m (825 ft) west of existing U.S. 67. CR360 also marks the rough boundary between upland rolling hills and bottomland floodplain. From the old railroad grade, the alternate proceeds southeasterly to CR338 where it is adjacent to the existing west right of way.

2.4.12.2 Alternate S

Alternate S begins just north of Route 160 adjacent to the east right of way of U.S. 67 and then proceeds southerly away from the existing alignment to a point along Route 158 approximately 250 m (825 ft) east of U.S. 67 (Figure 2-15). A diamond interchange is proposed at Route 158, which also serves as access to Route 160. The alternate continues southwesterly past Route 158 and becomes adjacent to the existing east right of way approximately 290 m (900 ft) south of the Route V intersection. From this point, the alternate continues southerly adjacent to the east right of way until just north of CR338 where it crosses existing U.S. 67 and lies adjacent to the west right of way to align with Alternate T to the south. The existing highway functions as a service road for the length of this alternate. This alternate extends across upland rolling hills to bottomland floodplain near CR360.

2.4.13 Alternate T

Alternate T is common to all final study alternatives and extends from near CR338 to just north of Neelyville in Butler County, a distance of 6.3 km (3.9 mi) (Figures 2-16a and 2-16b). The alternate begins just south of CR338 adjacent to the existing west right of way. It remains adjacent to the west right of way for its entire length. A quantitative review of land use and wetlands through this area indicated a greater impact to residential and commercial property and to wetlands resulting from an alternative placed on the east side of the existing highway. Over the length of this alternate, there are crossings of Epps Ditch, Harviell Ditch, and Hart Ditch. This alternate lies entirely in the bottomland floodplain typical to the "Bootheel" of Missouri. The existing highway functions as a service road and provides access to adjacent properties. A grade-separated crossing at Route MM is proposed to keep east-to-west access open over the proposed highway. The alternate terminates just south of the Lakeview Golf Course.

2.4.14 Neelyville Alternates

2.4.14.1 Alternate U

Alternate U begins at the southern end of Alternate T and north of Neelyville and proceeds southwesterly away from existing U.S. 67 through open farm ground to a point approximately 320 m (1,050 ft) west of existing U.S. 67 and 715 m (2,350 ft) north of Route 142 (Figure 2-17). From there, the alternate proceeds southerly and intersects Route 142 where an interchange is proposed. The ramps to and from the south are looped to the north side of Route 142. The alternate then continues southerly between the Corkwood Conservation Area, managed by the MDC, and existing U.S. 67. This is slightly outside of the boundary of the project corridor discussed in Sections 2.3.4.3.4 and 2.3.4.3.5. However, during the phase of build alternate development, the study team decided to extend the limits of consideration of a build alternate west of Neelyville to this area. A grade separation is proposed at CR270, without access to the proposed route. The existing highway functions as a service road through the Neelyville area. Approximately 150 m (490 ft) south of CR270, the alternate proceeds southwesterly and becomes adjacent to the existing east right of way. The length of this alternate is 3.9 km (2.4 mi)

2.4.14.2 Alternate U′

Alternate U′ was developed as a result of existing records review and field reconnaissance efforts which revealed the presence of a prehistoric archaeological site known as the Wilbourn Site, a part of the Powers

Phase Village (Figure 2-17). This site is located north of Route 142 and approximately 305 m (1,000 ft) west of U.S. 67. The alignment proposed under Alternate U resulted in a some impact to this site near the southbound on and off ramps. Upon evaluation, the study team along with MoDOT shifted the alignment of Alternate U and create a new alignment, Alternate U′, to avoid this resource. This site is characteristic of a Middle-Mississippi bottomland village of southeastern Missouri dating to between 1200 AD and 1350 AD, and was determined to be significant enough to be avoided.

This alternate begins in the same location as Alternate U and proceeds southwesterly away from existing U.S. 67 through open farm ground to a point approximately 233 m (765 ft) west of existing U.S. 67 and 625 m (2,050 ft) north of Route 142. From there, the alternate proceeds southerly and intersects Route 142 where a diamond interchange is proposed. The placement of this interchange avoids the Wilbourn Site. The alternate then continues southerly between the Corkwood Conservation Area and existing U.S. 67. A grade separation is proposed at CR270 where the alternate proceeds southwesterly and becomes adjacent to the existing east right of way. The existing highway functions as a service road through Neelyville.

2.4.14.3 Alternate V

Alternate V begins at the southern end of Alternate T and north of Neelyville, crosses U.S. 67 and proceeds southeasterly to a point 200 m (650 ft) east of U.S. 67 and 350 m (1,150 ft) north of Route 142 (Figure 2-17). From there, the alternate proceeds southerly and intersects Route 142 where a diamond interchange is proposed just west of Mt. Moriah Church. The alternate continues southerly to 830 m (2,720 ft) south of Route 142 and then proceeds southwesterly, crosses U.S. 67 230 m (750 ft) north of CR270 and becomes adjacent to the existing east right of way. A grade-separated crossing is proposed at CR270 to keep east-to-west access open.

2.4.15 Alternate W

This alternate is common to all final study alternatives and is the southernmost alternate on the project (Figure 2-18). It is 1.7 km (1.0 mi) long and is adjacent to the east right of way for its entire length to avoid a large drainage ditch west of the existing highway. It ends at the project's southern terminus approximately 410 m (1,350 ft) south of CR272.

2.5 Evaluation of the Final Build Alternates

An alternative evaluation technique was developed and employed in order to evaluate each of the build alternates to determine which most closely meets the stated Purpose and Need, and which exhibits measures to reduce impacts on the human and natural environment. Each final build alternate was subjected to a more rigorous evaluation in order to identify those that best meet the stated Purpose and Need (Section 1.0) while minimizing potential impacts to environmental resources of the study area.

Criteria for the evaluation of the final build alternates were developed to facilitate a qualitative evaluation of the alignments. The criteria were developed directly from FHWA Technical Advisory T6640.8A dated October 30, 1987. Specifically, the criteria used include:

- Social and Economic, including a consideration of consistency with existing and future land use plans, economic development, effects on community cohesion, neighborhoods, residential and commercial displacements, and recreation;
- Traffic/Transportation, including a consideration of access, service to local and through traffic, and safety;
- Natural Environment, including a consideration of effect on habitats, forest lands, wild and scenic rivers, prime and unique farmland, floodplains, surface water and groundwater quality, threatened and endangered species, and wetlands;

- Cultural, including a consideration of prehistoric and historic archaeology, architectural resources, and historical resources; and
- Others, including air quality noise, impacts during construction, and cost.

These groups were utilized to categorize various elements of the analysis and determine the potential impacts that each alternate may incur as measured against each criterion. Each group was then further divided into subgroups in order to refine the evaluation process.

The specific evaluation criteria used were selected based upon research that was conducted in the corridor, input from the public, and the requirements of NEPA (i.e., a multidisciplinary consideration of impacts to the human and natural environments). Quantitative data were also developed for each of the preliminary study alternates and were used to reflect the potential magnitude of impact of each final build alternate.

Alternates were eliminated from further consideration if they contained a relatively high impact to environmental or cultural resources or if engineering considerations nullified the relative benefits of the alternate. Overall, cost played a significant role in the evaluation as well. The following discussion provides a summary of the major considerations involved in the evaluation of the alternates.

2.5.1 Summary of Impacts of the Final Build Alternates

The following provides a summary of the advantages and disadvantages for each build alternate.

Build Alternates	Advantages	Disadvantages
Cherokee Pass—Madison County		
Alternate A	• Fewest acquisitions • Lowest cost alternative • Fewest social impacts (tie) • Fewest noise impacts • Relatively low impact during construction	• Relatively moderate natural resource impacts • Somewhat inconsistent with existing land use • Has slightly higher visual impact
Alternate B	• Most consistent with existing land use • Lowest impact to natural resources	• Highest number of acquisitions • Relatively high social impacts • Highest number of hazardous waste site impacts • Relatively high impact during construction
Alternate C	• Fewest social impacts (tie)	• Inconsistent with existing land use • Relatively high farmland impact • Highest natural resource impact • High visual impact • Most costly
Route N—Madison County		
Alternate E	• Relatively low noise impacts	• Relatively higher impact on water quality • Highest cost
Alternate F	• Least costly alternate • Relatively lower impact on water quality	• Slightly greater impacts to natural resources
Alternate G	• Fewest farmland impacts • Fewest natural resource impacts • Relatively low impact during construction	• More noise impacts • Relatively higher cost
Silva—Wayne County		
Alternate I	• Lowest acquisition impact • Relatively low impact during construction	• Somewhat inconsistent with existing land use • Relatively high natural resource impact • Highest impact to water quality • Relatively high impact to hazardous waste sites • Relatively high cost

Build Alternates	Advantages	Disadvantages
Alternate J	• Most consistent with existing land use • Least impacts to natural resources • Relatively low impact to water quality • Lowest cost alternate	• Relatively high acquisition impacts • Relatively high impact to hazardous waste sites • Relatively high impact during construction
Alternate K	• Fewest impacts to hazardous waste sites	• Least consistent with existing land use • Relatively high acquisition impacts • Highest impacts to natural resources • Relatively high impact during construction • Highest visual impact
At Widows Creek—Wayne County		
Alternate M	• Fewer noise impacts • Lower cost	• Greater impacts to natural resources • High impact to water quality • Relatively high impact during construction
Alternate N	• More consistent with existing land use • Much lower impact to natural resources • Relatively lower impact during construction	• Slightly higher cost
Route 160—Butler County		
Alternate R	• Lower acquisition impacts • Lower natural resource impacts • Lower cost	• Higher noise impacts • Relatively higher impact during construction
Alternate S	• Lower noise impacts • Relatively low impact during construction	• Relative higher farmland impacts • Higher acquisition impacts • Relatively high natural resource impacts
Neelyville		
Alternate U	• Lower farmland impacts • Lower noise impacts • Lower impact during construction • Lower cost	• Potential for impact to archaeological resource
Alternate U′	• Lower farmland impacts • Avoids archaeological resources • Simple diamond interchange design	• Relatively higher noise impacts
Alternate V	• Lower impact to natural resources	• Higher cost • Higher noise impacts • Higher hazardous waste impacts • Potential for higher impact during construction

2.5.2 Final Study Alternate Evaluation and Public Input

A number of public meetings and small group meetings provided the study team with feedback from the community. Particular interest areas include Cherokee Pass, Greenville, the area around Route 160, and Neelyville. At Greenville, only one build alternate was developed; therefore, that alternate was not part of this evaluation process.

Many residents of Cherokee Pass favor the near west bypass (Alternate A) because it has less of an impact on the residences and businesses of the community and because of its visibility from the community. The residents and business owners of Cherokee Pass have a strong desire to maintain visibility from the new facility, and have adequate access into the business district.

Public sentiment at Route 160 was not unanimous. Many people indicated they would like to see the existing highway used as part of the proposed alternate. This is not possible given the deficient horizontal curve on the existing alignment just north of Route 160. Some indicated a desire to place the alternate in line with an old auto salvage yard west of the existing highway in lieu of the east which affects eight residential properties. There was not an overwhelming favorite in this area.

The public comments for the Neelyville alternates did not produce a clear favorite among those presented. Many residents in the area voiced concern about paving the shoulders of the existing roadway. In summer 2001, MoDOT paved the shoulders along U.S. 67 from Route 160 to south of Neelyville.

2.5.3 Summary of Final Study Alternate Evaluation

The project Purpose and Need and the evaluation definitions and criteria were the bases for developing the study alternates and provided the mechanisms of comparison between each of the alternates. In general, alternates which incorporated the use of an existing transportation corridor were determined to be more consistent with existing land uses than those that did not. Because of the nature of the study area (rural, many sensitive natural resources, rolling terrain in northern three-quarters of area, flat farmland in southern quarter of area), impacts to residential and commercial property and impacts to natural resources were determined to be of increased importance in the evaluation of study alternates. In addition, there was sensitivity to the change in landscape form and predominant land use patterns across the study corridor. For instance, farmland impacts were closely scrutinized in southern Butler County where row cropland comprises most of the landscape. Travel patterns were salient considerations in Cherokee Pass.

2.5.3.1 Alternates at Cherokee Pass

At Cherokee Pass, Alternate A was determined to be most consistent with the stated objectives of the Purpose and Need, and minimized impacts to the human and natural environment. Alternate A also has the lowest cost compared to Alternates B and C. Therefore, Alternate A is the Preferred Alternative at Cherokee Pass.

Table 2-2. U.S. 67 Quantitative Summary for Cherokee Pass

Indicator	Alternate		
	A	B	C
Total Length (km)	5.672	5.556	5.904
Number of State or County Road Severances or Changes in Access	4	4	3
Total Length of Bridges (m)	104	91	278
Number of Culverted Stream Crossings	1	1	1
Total Number of Structures	3	2	4
Area through Cropland (ha)	0	0	0
Number of Agricultural Severances	2	4	7
Area through Agricultural Land (ha)	3.8	2.86	15.41
Area through Residential Land (ha)	6.88	7.54	9.62
Area through Commercial Land (ha)	2.42	9.41	2.58
Area through Industrial Land (ha)	0.07	0.07	0.13
Area through Public and Semi-Public Land (ha)	0	0	0
Area through Forested Land (ha)	45.26	28.87	45.79
Area through Federal, State Property (ha) (including National Forest)	0	0	0
Area through Old Field/Pastureland (ha)	7.80	6.26	17.18
Area through Highly Erodible Soils (ha)	28.81	24.02	36.16
Area through Urban Land (ha)	5.96	18.13	18.31
Area through Open Water (ha)	0.47	0.18	0.61
Area through Wetlands (PEM) (ha)	0.05	0.05	0.02
Area through Wetlands (PFO) (ha)	0	0	0
Area through Wetlands (PUB) (ha)	0.09	0.01	0.36
Area through Wetlands (PSS) (ha)	0	0	0
Area through Wetlands (Riverine) (ha)	0.07	0.07	0.07
Area through Wetlands (Total) (ha)	0.21	0.13	0.45
Area through Floodplains (ha)	0	0	0
Area through Unique Ecological Areas (ha)	0	0	0
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	0	0	0

Table 2-2. U.S. 67 Quantitative Summary for Cherokee Pass

Indicator	Alternate		
	A	B	C
Area through National Forest (Mark Twain) (ha)	13.46	10.47	7.62
Area through National Forest (Private) (ha)	28.48	28.01	40.49
Number of Significant Architectural Structures	0	1	0
Area through Potential Archaeological Sites (ha)	0	0	0
Number of Impacted Historic Sites	0	0	1
Number of Perennial Streams Crossed	0	0	0
Number of Intermittent Streams Crossed	2	2	5
Area through Karst Topography (ha)	11.55	9.74	10.90
Number of Public Water Supply Wells Impacted	1	0	0
Number of Schools within 76 m (250 ft)	0	0	0
Number of Churches within 76 m (250 ft)	0	1	0
Number of Cemeteries within 76 m (250 ft)	0	0	0
Number of Single Family Building Acquisitions	8	24	16
Number of Multi-Family Building Acquisitions	0	0	0
Number of Church Building Acquisitions	0	0	0
Number of Neighborhoods Disrupted	0	1	0
Number of Public Lands Affected	0	0	0
Number of Commercial Building Acquisitions	1	11	2
Number of Farm Building Acquisitions	1	0	4
Number of Commercial Parcels Affected	5	11	4
Number of Industrial Parcels Affected	1	1	1
Number of Public Utility Displacements	1	0	0
Number of Public Utilities Affected	1	1	2
Number of Sensitive Noise Receptors within Noise Abatement Criteria	4	7	7
Construction Cost ($ in millions)	22.713	21.773	28.928
Right of Way Cost ($ in millions)	1.599	4.652	2.379
Administrative and Engineering Cost ($ in millions)	3.634	3.483	4.628
Total Cost ($ in millions)	27.946	29.909	35.935
Number of Major Hazardous Waste Sites Crossed	1	1	1
Number of Underground Storage Tank (UST)/Aboveground Storage Tank (AST) Hazardous Waste Sites Crossed	2	5	3
Other Hazardous Waste Sites Crossed.	0	0	0

2.5.3.2 Alternates at Route N

At Route N in Madison County, there were not any significant indicators differentiating the alternates. However, Alternate F is the least expensive and meets all objectives of the Purpose and Need, and makes use of the existing highway corridor. Therefore, Alternate F is the Preferred Alternative at Route N.

Table 2-3. U.S. 67 Quantitative Summary for Route N in Madison County

Indicator	Alternate		
	E	F	G
Total Length (km)	3.750	3.909	3.867
Number of State or County Road Severances or Changes in Access	2	2	2
Total Length of Bridges (m)	138	84	138
Number of Culverted Stream Crossings	0	0	0
Total Number of Structures	2	1	2
Area through Cropland (ha)	0	0	0
Number of Agricultural Severances	6	6	3
Area through Agricultural Land (ha)	4.76	3.39	1.74
Area through Residential Land (ha)	0.78	0.93	0.99
Area through Commercial Land (ha)	0	0	0

Table 2-3. U.S. 67 Quantitative Summary for Route N in Madison County

Indicator	Alternate		
	E	F	G
Area through Industrial Land (ha)	0	0	0
Area through Public and Semi-Public Land (ha)	0	0	0
Area through Forested Land (ha)	46.40	61.28	42.38
Area through Federal, State Property (ha) (including National Forest)	0	0	0
Area through Old Field/Pastureland (ha)	5.62	3.42	1.74
Area through Highly Erodible Soils (ha)	40.93	42.02	37.72
Area through Urban Land (ha)	1.04	2.98	2.80
Area through Open Water (ha)	0.96	0.41	0.34
Area through Wetlands (PEM) (ha)	0	0	0
Area through Wetlands (PFO) (ha)	0	0.09	0.03
Area through Wetlands (PUB) (ha)	0.72	0.08	0.08
Area through Wetlands (PSS) (ha)	0	0	0
Area through Wetlands (Riverine) (ha)	0	0	0
Area through Wetlands (Total) (ha)	0.72	0.17	0.11
Area through Floodplains (ha)	0	0	0
Area through Unique Ecological Areas (ha)	0	0	0
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	0	0	0
Area through National Forest (Mark Twain) (ha)	0	0	0
Area through National Forest (Private) (ha)	0	0	0
Number of Significant Architectural Structures	0	0	0
Area through Potential Archaeological Sites (ha)	0	0	0
Number of Impacted Historic Sites	0	0	0
Number of Perennial Streams Crossed	0	0	0
Number of Intermittent Streams Crossed	3	6	5
Area through Karst Topography (ha)	23.98	17.61	18.13
Number of Public Water Supply Wells Impacted	0	0	0
Number of Schools within 76 m (250 ft)	0	0	0
Number of Churches within 76 m (250 ft)	0	0	0
Number of Cemeteries within 76 m (250 ft)	0	0	0
Number of Single Family Building Acquisitions	2	3	3
Number of Multi-Family Building Acquisitions	0	0	0
Number of Church Building Acquisitions	0	0	0
Number of Neighborhoods Disrupted	0	0	0
Number of Public Lands Affected	0	0	0
Number of Commercial Building Acquisitions	0	0	0
Number of Farm Building Acquisitions	0	0	0
Number of Commercial Parcels Affected	0	0	0
Number of Industrial Parcels Affected	0	0	0
Number of Public Utility Displacements	0	0	0
Number of Public Utilities Affected	0	0	0
Number of Sensitive Noise Receptors within Noise Abatement Criteria	0	1	0
Construction Cost ($ in millions)	25.066	16.248	20.705
Right of Way Cost ($ in millions)	0.380	0.496	0.432
Administrative and Engineering Cost ($ in millions)	4.011	2.600	3.313
Total Cost ($ in millions)	29.457	19.344	24.499
Number of Major Hazardous Waste Sites Crossed	0	0	0
Number of UST/AST Hazardous Waste Sites Crossed	0	0	0
Other Hazardous Waste Sites Crossed.	0	0	0

2.5.3.3 Alternates at Route 34 (Silva)

The alternates at Route 34 (Silva) had some prevalent water quality and natural resource differentiators. Alternate J was determined to be the most consistent when evaluated against the Purpose and Need and the evaluation criteria as it minimizes impacts to the natural environment and has the lowest cost. Therefore, Alternate J is the Preferred Alternative at Silva.

Table 2-4. U.S. 67 Quantitative Summary for Silva

Indicator	Alternate		
	I	J	K
Total Length (km)	3.236	3.027	3.012
Number of State or County Road Severances or Changes in Access	1	1	1
Total Length of Bridges (m)	676	536	628
Number of Culverted Stream Crossings	2	2	2
Total Number of Structures	4	5	5
Area through Cropland (ha)	0	0	0
Number of Agricultural Severances	7	9	6
Area through Agricultural Land (ha)	5.23	3.33	6.32
Area through Residential Land (ha)	2.21	3.70	3.14
Area through Commercial Land (ha)	0.92	3.29	0.46
Area through Industrial Land (ha)	6.48	3.45	0
Area through Public and Semi-Public Land (ha)	0.33	0.44	0.34
Area through Forested Land (ha)	23.51	8.65	15.08
Area through Federal, State Property (ha) (including National Forest)	0.14	0.14	0.14
Area through Old Field/Pastureland (ha)	5.79	4.43	7.67
Area through Highly Erodible Soils (ha)	24.07	12.79	20.32
Area through Urban Land (ha)	7.43	11.34	5.53
Area through Open Water (ha)	0.11	0.12	0.32
Area through Wetlands (PEM) (ha)	0.10	0.07	0.98
Area through Wetlands (PFO) (ha)	0	0	0
Area through Wetlands (PUB) (ha)	0	0.12	0.15
Area through Wetlands (PSS) (ha)	0	0	0
Area through Wetlands (Riverine) (ha)	0.28	0.10	0.12
Area through Wetlands (Total) (ha)	0.38	0.29	1.25
Area through Floodplains (ha)	4.83	1.17	3.17
Area through Unique Ecological Areas (ha)	0	0	0
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	0	0	0
Area through National Forest (Mark Twain) (ha)	0	0	0
Area through National Forest (Private) (ha)	0	0	0
Number of Significant Architectural Structures	0	0	0
Area through Potential Archaeological Sites (ha)	0	0	0
Number of Impacted Historic Sites	0	0	0
Number of Perennial Streams Crossed	3	3	3
Number of Intermittent Streams Crossed	2	3	3
Area through Karst Topography (ha)	35.28	23.96	27.42
Number of Public Water Supply Wells Impacted	0	0	0
Number of Schools within 76 m (250 ft)	0	0	0
Number of Churches within 76 m (250 ft)	1	1	1
Number of Cemeteries within 76 m (250 ft)	1	1	0
Number of Single Family Building Acquisitions	2	6	5
Number of Multi-Family Building Acquisitions	0	0	0
Number of Church Building Acquisitions	0	0	0
Number of Neighborhoods Disrupted	0	0	0
Number of Public Lands Affected	1	2	1
Number of Commercial Building Acquisitions	0	2	1

Table 2-4. U.S. 67 Quantitative Summary for Silva

Indicator	Alternate		
	I	J	K
Number of Farm Building Acquisitions	0	0	0
Number of Commercial Parcels Affected	2	5	3
Number of Industrial Parcels Affected	2	1	0
Number of Public Utility Displacements	0	0	0
Number of Public Utilities Affected	0	0	0
Number of Sensitive Noise Receptors within Noise Abatement Criteria	2	1	2
Construction Cost ($ in millions)	17.259	12.399	17.055
Right of Way Cost ($ in millions)	1.324	1.261	0.498
Administrative and Engineering Cost ($ in millions)	2.761	1.984	2.729
Total Cost ($ in millions)	21.344	15.643	20.280
Number of Major Hazardous Waste Sites Crossed	0	0	0
Number of UST/AST Hazardous Waste Sites Crossed	0	0	0
Other Hazardous Waste Sites Crossed.	2	2	0

2.5.3.4 Alternates at Widows Creek

At Widows Creek near the Solid Rock Baptist Church, the two alternates were considerably different. Alternate M incorporates a much wider median than Alternate N and requires more right of way taking. Alternate N was determined to be more consistent with respect to the Purpose and Need, while reducing environmental impacts. Therefore, Alternate N is the Preferred Alternative in the Widows Creek area.

Table 2-5. U.S. 67 Quantitative Summary for Widows Creek Area in Wayne County

Indicator	Alternate	
	M	N
Total Length (km)	3.457	3.452
Number of State or County Road Severances or Changes in Access	2	2
Total Length of Bridges (m)	244	348
Number of Culverted Stream Crossings	5	3
Total Number of Structures	4	5
Area through Cropland (ha)	0	0
Number of Agricultural Severances	2	2
Area through Agricultural Land (ha)	0.38	0.37
Area through Residential Land (ha)	3.00	2.87
Area through Commercial Land (ha)	1.50	1.50
Area through Industrial Land (ha)	0	0
Area through Public and Semi-Public Land (ha)	0.35	0.35
Area through Forested Land (ha)	35.51	22.78
Area through Federal, State Property (ha) (including National Forest)	3.66	2.11
Area through Old Field/Pastureland (ha)	13.76	2.84
Area through Highly Erodible Soils (ha)	16.64	15.54
Area through Urban Land (ha)	6.75	6.27
Area through Open Water (ha)	1.39	0.23
Area through Wetlands (PEM) (ha)	0	0
Area through Wetlands (PFO) (ha)	0.25	0.20
Area through Wetlands (PUB) (ha)	0	0
Area through Wetlands (PSS) (ha)	0	0
Area through Wetlands (Riverine) (ha)	0	0
Area through Wetlands (Total) (ha)	0.25	0.20
Area through Floodplains (ha)	25.08	6.9
Area through Unique Ecological Areas (ha)	0	0
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	0	0
Area through National Forest (Mark Twain) (ha)	9.71	9.67

Table 2-5. U.S. 67 Quantitative Summary for Widows Creek Area in Wayne County

Indicator	Alternate	
	M	N
Area through National Forest (Private) (ha)	47.71	22.43
Number of Significant Architectural Structures	0	0
Area through Potential Archaeological Sites (ha)	0	0
Number of Impacted Historic Sites	0	0
Number of Perennial Streams Crossed	0	0
Number of Intermittent Streams Crossed	7	7
Area through Karst Topography (ha)	0	0
Number of Public Water Supply Wells Impacted	0	0
Number of Schools within 76 m (250 ft)	0	0
Number of Churches within 76 m (250 ft)	1	1
Number of Cemeteries within 76 m (250 ft)	0	0
Number of Single Family Building Acquisitions	8	8
Number of Multi-Family Building Acquisitions	0	0
Number of Church Building Acquisitions	0	0
Number of Neighborhoods Disrupted	0	0
Number of Public Lands Affected	1	1
Number of Commercial Building Acquisitions	2	2
Number of Farm Building Acquisitions	1	1
Number of Commercial Parcels Affected	3	3
Number of Industrial Parcels Affected	0	0
Number of Public Utility Displacements	0	0
Number of Public Utilities Affected	0	0
Number of Sensitive Noise Receptors within Noise Abatement Criteria	1	3
Construction Cost ($ in millions)	12.791	2.592
Right of Way Cost ($ in millions)	0.783	0.692
Administrative and Engineering Cost ($ in millions)	2.046	2.015
Total Cost ($ in millions)	15.620	15.298
Number of Major Hazardous Waste Sites Crossed	0	0
Number of UST/AST Hazardous Waste Sites Crossed	0	0
Other Hazardous Waste Sites Crossed.	1	1

2.5.3.5 Alternates at Route 160

Alternate R at Route 160 minimizes impacts to the human and natural environments. It meets all objectives of the stated Purpose and Need and has the lower cost. Therefore, Alternate R is the Preferred Alternative at Route 160.

Table 2-6. U.S. 67 Quantitative Summary for Widows Creek Area in Wayne County

Indicator	Alternate	
	R	S
Total Length (km)	4.446	4.442
Number of State or County Road Severances or Changes in Access	7	6
Total Length of Bridges (m)	113	113
Number of Culverted Stream Crossings	0	0
Total Number of Structures	1	1
Area through Cropland (ha)	9.81	12.93
Number of Agricultural Severances	14	18
Area through Agricultural Land (ha)	24.74	24.23
Area through Residential Land (ha)	7.44	9.17
Area through Commercial Land (ha)	5.32	2.87
Area through Industrial Land (ha)	0	0
Area through Public and Semi-Public Land (ha)	0.03	0.34

Table 2-6. U.S. 67 Quantitative Summary for Widows Creek Area in Wayne County

Indicator	Alternate	
	R	S
Area through Forested Land (ha)	13.74	16.80
Area through Federal, State Property (ha) (including National Forest)	0	0
Area through Old Field/Pastureland (ha)	15.27	13.21
Area through Highly Erodible Soils (ha)	0	0
Area through Urban Land (ha)	10.29	8.14
Area through Open Water (ha)	1.04	1.58
Area through Wetlands (PEM) (ha)	0.44	0.50
Area through Wetlands (PFO) (ha)	2.12	1.78
Area through Wetlands (PUB) (ha)	1.02	2.77
Area through Wetlands (PSS) (ha)	0	0
Area through Wetlands (Riverine) (ha)	0	0
Area through Wetlands (Total) (ha)	3.58	5.05
Area through Floodplains (ha)	0	0
Area through Unique Ecological Areas (ha)	0	1.30
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	0	0
Area through National Forest (Mark Twain) (ha)	0	0
Area through National Forest (Private) (ha)	0	0
Number of Significant Architectural Structures	1	1
Area through Potential Archaeological Sites (ha)	0	0
Number of Impacted Historic Sites	0	0
Number of Perennial Streams Crossed	0	0
Number of Intermittent Streams Crossed	3	4
Area through Karst Topography (ha)	0	0
Number of Public Water Supply Wells Impacted	2	1
Number of Schools within 76 m (250 ft)	0	0
Number of Churches within 76 m (250 ft)	0	1
Number of Cemeteries within 76 m (250 ft)	0	0
Number of Single Family Building Acquisitions	13	20
Number of Multi-Family Building Acquisitions	0	0
Number of Church Building Acquisitions	0	0
Number of Neighborhoods Disrupted	0	0
Number of Public Lands Affected	1	0
Number of Commercial Building Acquisitions	4	8
Number of Farm Building Acquisitions	5	6
Number of Commercial Parcels Affected	7	10
Number of Industrial Parcels Affected	0	0
Number of Public Utility Displacements	0	1
Number of Public Utilities Affected	1	1
Number of Sensitive Noise Receptors within Noise Abatement Criteria	6	4
Construction Cost ($ in millions)	11.947	15.169
Right of Way Cost ($ in millions)	2.959	4.786
Administrative and Engineering Cost ($ in millions)	1.912	2.427
Total Cost ($ in millions)	16.818	22.382
Number of Major Hazardous Waste Sites Crossed	0	0
Number of UST/AST Hazardous Waste Sites Crossed	1	2
Other Hazardous Waste Sites Crossed.	0	0

2.5.3.6 Alternates at Neelyville (Route 142)

Each alternate at Neelyville basically meets the stated objectives of the Purpose and Need and each does a reasonable job of reducing impacts to the human and natural environment. In contrast, Alternate U was evaluated somewhat more favorably over Alternate V due to the lower cost ($2.3 million). As referenced

in Section 2.4.14.2, a third alternate was developed in this area. Therefore, Alternate UN is the Preferred Alternative at Neelyville.

Table 2-7. U.S. 67 Quantitative Summary for Neelyville

Indicator	Alternate		
	U	U′	V
Total Length (km)	3.901	4.070	4.019
Number of State or County Road Severances or Changes in Access	2	2	4
Total Length of Bridges (m)	185	185	201
Number of Culverted Stream Crossings	0	0	0
Total Number of Structures	2	16	2
Area through Cropland (ha)	13.99	15.27	23.42
Number of Agricultural Severances	11	6	12
Area through Agricultural Land (ha)	13.99	15.15	23.39
Area through Residential Land (ha)	1.45	1.19	3.09
Area through Commercial Land (ha)	0	0	3.03
Area through Industrial Land (ha)	0	0	0
Area through Public and Semi-Public Land (ha)	0	0	0
Area through Forested Land (ha)	6.57	7.83	6.79
Area through Federal, State Property (ha) (including National Forest)	0	0	0
Area through Old Field/Pastureland (ha)	1.61	0.09	0.07
Area through Highly Erodible Soils (ha)	0	0	0
Area through Urban Land (ha)	4.81	5.99	7.65
Area through Open Water (ha)	5.16	5.71	0.24
Area through Wetlands (PEM) (ha)	1.44	0.21	3.43
Area through Wetlands (PFO) (ha)	5.28	6.40	0.26
Area through Wetlands (PUB) (ha)	0.04	0.06	0
Area through Wetlands (PSS) (ha)	0	0	1.13
Area through Wetlands (Riverine) (ha)	0	0	0
Area through Wetlands (Total) (ha)	6.76	7.70	4.82
Area through Floodplains (ha)	18.47	21.23	22.49
Area through Unique Ecological Areas (ha)	0.04	0	0
Threatened and Endangered Species Sites within 90 m (300 ft) of Right of Way	3	3	3
Area through National Forest (Mark Twain) (ha)	0	0	0
Area through National Forest (Private) (ha)	0	0	0
Number of Significant Architectural Structures	0	0	0
Area through Potential Archaeological Sites (ha)	0.97	0	0.01
Number of Impacted Historic Sites	0	0	0
Number of Perennial Streams Crossed	1	0	1
Number of Intermittent Streams Crossed	1	4	2
Area through Karst Topography (ha)	0	0	0
Number of Public Water Supply Wells Impacted	0	0	0
Number of Schools within 76 m (250 ft)	0	0	0
Number of Churches within 76 m (250 ft)	0	0	1
Number of Cemeteries within 76 m (250 ft)	0	0	0
Number of Single Family Building Acquisitions	3	6	15
Number of Multi-Family Building Acquisitions	0	0	0
Number of Church Building Acquisitions	0	0	0
Number of Neighborhoods Disrupted	0	0	0
Number of Public Lands Affected	0	0	0
Number of Commercial Building Acquisitions	0	0	9
Number of Farm Building Acquisitions	7	7	1
Number of Commercial Parcels Affected	0	0	12
Number of Industrial Parcels Affected	0	0	0

Table 2-7. U.S. 67 Quantitative Summary for Neelyville

Indicator	Alternate		
	U	U′	V
Number of Public Utility Displacements	0	0	0
Number of Public Utilities Affected	0	0	0
Number of Sensitive Noise Receptors within Noise Abatement Criteria	2	2	3
Construction Cost ($ in millions)	9.798	10.282	10.887
Right of Way Cost ($ in millions)	0.888	1.489	3.151
Administrative and Engineering Cost ($ in millions)	1.568	1.645	1.742
Total Cost ($ in millions)	12.253	13.417	15.780
Number of Major Hazardous Waste Sites Crossed	0	0	0
Number of UST/ AST Hazardous Waste Sites Crossed	0	0	2
Other Hazardous Waste Sites Crossed.	0	0	0

2.5.4 Alternates on Common Alignment

As mentioned in Section 2.4, approximately 78 percent of the length of the project consists of a series of locations where one final build alternate was developed. These areas represent components of the Preferred Alternative which connect locations where two, or more, alternates were developed (Sections 2.4.1, 2.4.3, 2.4.5, 2.4.7. 2.4.12, and 2.4.14 and Figures 2-5 through 2-18). The determination of locating a single alternate at these locations was supported by attempting to most closely meet the transportation objectives and needs summarized in the project Purpose and Need, and by achieving the balance of maximizing the use of existing right of way while reducing environmental impacts. Section 2.3.4 provides an in-depth discussion of the transportation, engineering, and environmental variables that factored into the location planning process. Those areas where one final build alternate was developed are considered common to all final study alternates within the project logical termini. In these areas, no comparison was made against the No Action alternate, because the No Action alternate fails to meet the objectives of the stated Purpose and Need. Further discussion of the Preferred Alternative, which incorporates those alternates common to all final study alternates, is presented in Section 4.6.1.1.

2.5.5 Summary of Proposed Action

The Preferred Alternative is comprised of alternates A, D, F, H, J, L, N, O, P, Q, R, T, UN, and W. The Preferred Alternative provides improved service to traffic and reduces impacts to a variety of environmental resources. The selection of the Preferred Alternative was accomplished through an assessment of the social, economic, engineering, and environmental consequences of each alternate in combination with public input. Avoidance and minimization measures to offset impacts to wetlands as required by Section 404(b)1 of the CWA are discussed in Sections 4.12 and 4.26.2. The Proposed Action is comprised primarily of constructing additional pavement adjacent to the existing highway. At its greatest extent, the Preferred Alternative is 0.64 km (0.4 mi) from the existing highway (west of Greenville).

Relocations having a lateral distance of more than 305 m (1,000 ft) from the Preferred Alternative to the existing highway are at Cherokee Pass and Route JJ in Madison County; Route EE, Greenville, Route A, and CR404 in Wayne County; and Route 160 and Neelyville in Butler County. A range of build alternates were evaluated at Cherokee Pass, Route N in Madison County, Route 34, CR404 in Wayne County (near Widows Creek), Route 160, and Neelyville. Table 2-8 provides a summary of the estimated project costs.

A final decision on selection has been made based on comments received from state and federal agencies and the public. These comments have been addressed in this Final EIS.

Table 2-8. Estimated Project Costs

Alternate		Construction Cost (million $)	Right of Way Cost (million $)	Engineering and Adm. Cost (million $)	Total Cost (million $)
Cherokee Pass	A	22.713	1.599	3.634	27.946
	B	21.773	4.652	3.484	29.909
	C	28.928	2.379	4.628	35.935
	D	52.342	3.093	8.375	63.810
At Route N	E	25.066	0.380	4.011	29.457
	F	16.248	0.496	2.600	19.344
	G	20.705	0.432	3.313	24.449
	H	81.509	3.323	13.041	97.873
At Route 34 (Silva)	I	17.259	1.324	2.761	21.344
	J	12.399	1.261	1.984	15.643
	K	17.059	0.498	2.728	20.280
	L	100.383	1.141	16.061	117.585
At Widow's Creek	M	12.791	0.783	2.046	15.620
	N	12.592	0.692	2.015	15.298
	O	56.322	0.724	9.012	66.058
(Option 1)	P	19.233	4.144	3.077	26.455
	Q	14.193	2.620	2.271	19.084
At Route 160	R	11.947	2.959	1.912	16.818
	S	15.169	4.786	2.427	22.382
	T	15.406	1.378	2.465	19.249
At Neelyville	U	9.798	0.888	1.568	12.253
	UN	10.282	1.489	1.645	13.417
	V	10.887	3.151	1.742	15.780
	W	2.400	0.237	0.384	3.021
Total (for Preferred Alternative)		**427.971**	**25.157**	**68.475**	**521.603**

Shaded Alternates indicate Preferred Alternative.

Source: MACTEC, 2004

3.0 Affected Environment

3.1 Socioeconomics

In addition to potentially affecting the biological aspects of the environment, transportation projects may also affect the socioeconomic aspects of a community or region. Consequently, an EIS must examine the impacts on the social and economic features of a community. Analysis of potential impacts begins with the identification of a study area's population, neighborhoods and communities, housing, income distribution, and employment characteristics.

Two geographic areas have been examined to document the existing socioeconomic conditions of the affected environment. The term "region" refers to Madison, Wayne, and Butler counties. The term "socioeconomic study area" refers to the smaller area within these three counties encompassing existing U.S. 67, beginning south of Fredericktown (Figure 3-1). It follows U.S. 67 through the southern part of Madison County, continuing through Wayne and Butler counties to its terminus south of Neelyville, approximately 3.2 km (2.0 mi) north of the Missouri-Arkansas state line. MoDOT constructed a highway bypass for a large section of U.S. 67 that runs through Poplar Bluff. This section is not included in the socioeconomic study area.

Both the region and the socioeconomic study area were used for analyzing social and economic data. Data provided by the U.S. Department of Commerce through the Bureau of the Census were used in the analyses.

3.1.1 Demographic Characteristics

3.1.1.1 Population

The larger region contains a 2000 population of 65,926, which includes the combined population of Madison, Wayne, and Butler counties. Table 3-1 shows the 1980, 1990, and 2000 populations of the jurisdictions within, and around, the U.S. 67 region. The most populous jurisdiction in the region is Butler County with a 2000 population of 40,867. Madison and Wayne counties each contain less than half of the population of Butler County with 11,800 and 13,259, respectfully. The 2000 Census results indicate increases in all three counties since 1990, particularly in Wayne County where population increased by more than 1,700 persons, or 14.9 percent. Population in the 1980s within Neelyville declined, but has made small gains during the 1990s. Overall, the region, as presented in Figure 1-1, realized an increase in population between 1980 and 2000 (Table 3-1).

Table 3-1. Study Corridor Population

Area	1980	1990	% Change 1980-1990	2000	% Change 1990-2000
Madison County	10,725	11,127	3.7	11,800	6.0
Fredericktown	4,006	3,965	-1.0	3,928	-0.9
Wayne County	11,277	11,543	2.4	13,259	14.9
Greenville	391	442	13.0	451	2.0
Butler County	37,693	38,765	2.8	40,867	5.4
Poplar Bluff	17,139	16,996	-0.8	16,651	-2.0
Neelyville	472	364	-22.9	487	33.8
Study Corridor	59,695	61,435	2.9	65,926	7.3

Sources: U.S. Department of Commerce, Bureau of Census, 1980, 1990 and 2000.

The townships within each county that encompass the study corridor are shown in Figure 1-1. Examining the population characteristics of these smaller geographic areas shows a more realistic count of the study

corridor population. Although the townships affected include areas beyond the region, the population of each is relatively small, which further indicates the rural nature of the area.

As illustrated in Figure 1-1, the socioeconomic study area, which includes portions of the 12 townships identified in Table 3-2, is a much smaller area than the region. The total population within these townships, excluding the population within the Cities of Fredericktown and Poplar Bluff, was 25,005 in 2000. The incorporated areas of Greenville and Neelyville, had 2000 populations of 451 and 487, respectfully. The remainder of the socioeconomic study area is sparsely populated except for several concentrations of residents in Cherokee Pass, Silva, and several other smaller unincorporated areas along U.S. 67 (see Figure 1-1).

Table 3-2. 2000 Population and Racial Characteristics by County and Township

Area	Total Population	White	African American	Other Races
Madison County	11,800	11,599	15	186
St. Michael Township*	2,743	2,712	1	30
Central Township	480	479	0	1
Twelvemile Township	330	324	0	6
Marquand Township	839	815	0	24
Wayne County	13,259	12,951	22	286
Cedar Creek Township	461	447	1	13
St. Francois Township	1,960	1,911	5	44
Black River Township	606	586	0	20
Butler County	40,867	37,663	2,132	1,072
Black River Township	1,488	1,428	24	36
Epps Township	2,598	2,496	32	70
Poplar Bluff Township*	8,278	7,840	254	184
Beaver Dam Township	3,963	3,854	14	95
Neely Township	1,259	1,060	162	37

* *The population of Fredericktown and Poplar Bluff have been subtracted from their respective township populations to more accurately reflect the study corridor population.*

Source: U.S. Department of Commerce, Bureau of the Census, 2000.

3.1.1.2 Racial Characteristics

The 2000 racial composition of each township included in the study corridor is presented in Table 3-2. In terms of racial characteristics, residents of the townships are predominantly white and account for 95.8 percent of the three-county total population, while African Americans and other races comprise 4.2 percent of the population. The townships in Madison and Wayne counties are composed of nearly 100 percent white residents. The Butler County townships are more racially diverse, possessing a small percentage of nonwhite residents overall (7.8 percent) and Neely Township exhibiting 2000 African American population of 12.9 percent.

3.1.1.3 Age and Housing Characteristics

Additional population characteristics and housing data for the study corridor from the 2000 Census are shown on Table 3-3. The median age in all three counties exceeds the overall median age for the state of Missouri. This is particularly evident in Wayne County where the median age was 42.5 compared to 36.1 for the state. The median age in the townships which encompass the corridor varied, but were generally above the statewide median age.

Table 3-3. Population and Housing Characteristics, 2000

	Households				Housing					Income
Area	Median Age	Number	Average Size		Number	% Occupied Units	% Owner-Occupied Units	Median Home Value		% Persons Below Poverty Level
State of Missouri	36.1	2,194,594	2.48		2,442,017	89.9	63.1	$86,900		11.7
Madison County	39.1	4,711	2.46		5,656	83.3	63.5	$54,900		17.2
St. Michael Township	39.6	2,740	2.35		3,052	89.8	63.9	$53,600		18.7
Central Township	38.3	181	2.65		209	86.6	72.2	$38,400		26.6
Twelvemile Township	39.6	131	2.52		180	72.8	57.8	$70,400		29.8
Marquand Township	39.0	334	2.51		426	78.4	59.1	$46,000		23.6
Wayne County	42.5	5,551	2.36		7,496	74.1	57.9	$41,200		21.9
Cedar Creek Township	42.6	186	2.48		274	67.9	56.6	$54,200		35.8
St. Francois Township	41.2	811	2.37		1,033	78.5	59.0	$36,100		19.4
Black River Township	45.1	254	2.39		498	51.0	43.8	$54,100		15.9
Butler County	38.7	16,718	2.39		18,707	89.4	61.5	$58,100		18.6
Black River Township	37.0	540	2.61		589	91.7	82.2	$87,900		17.3
Epps Township	37.0	979	2.65		1,067	91.8	75.8	$89,400		7.0
Poplar Bluff Township	39.0	10,383	2.32		11,538	90.0	55.4	$54,800		21.7
Beaver Dam Township	37.9	1,561	2.54		1,720	90.8	75.1	$68,400		13.5
Neely Township	34.8	511	2.46		571	89.5	63.7	$29,400		19.2

Source: U.S. Bureau of the Census , 2000.

The average household size in the region was consistent with the 2000 statewide average household size of 2.48 persons. within the socioeconomic study area, this number varied by township. The percentage of occupied housing units was generally lower within the region and socioeconomic study area compared to the state, with the exception of Butler County which remained consistent with the state. Correspondingly, the percentage of owner occupied units was lower overall, particularly in Wayne County. Although Butler County had a high occupancy rate, its owner occupied rate was below the statewide average. Median home values within the study corridor were at least $15,000 below the median home value for the state in 2000 with the exceptions of Black River and Epps townships in Butler County. within the townships of the socioeconomic study area, median home values varied from their respective county averages. within the Wayne County townships along the corridor, median home values were well below the county. In Butler County, these values were higher than the county average except in Neely Township where the median home value was approximately one half the value for the county.

3.1.2 Community Characteristics and Services

3.1.2.1 Community Characteristics

Most community services in the study corridor are located within Greenville, Poplar Bluff, and Neelyville. These facilities include medical, governmental and emergency service, and educational facilities. Volunteer fire stations are located in Cherokee Pass, Silva, Greenville, and Neelyville. Other community facilities consist of 35 churches along the existing highway and within the incorporated areas, the Wayne County Courthouse and other municipal facilities in Greenville, the Greenville R-II District schools, and the Neelyville R-IV District schools.

Several groupings of between two and five homes, built in relative close proximity to each other, are located along U.S. 67. Cherokee Pass and Silva are unincorporated communities where residents share a common sense of community. Cherokee Pass has several small retail and service establishments including flea markets, restaurants, and gas stations. There are approximately 90 single-family residences in Cherokee Pass in addition to the businesses along the highway that serve the local community and through traffic. Silva is located on the east side of U.S. 67 in Wayne County and has about 60 residences.

With the exception of the incorporated areas and Cherokee Pass and Silva, there are no geographically and socially defined neighborhood or community areas within the region. As shown in the previous section, the region and study area are predominantly low-income, although no specific concentration of low-income residents exists along the corridor. The largest concentration of minority residents in the study area is located in the city of Neelyville. Development in the corridor has occurred along the highway as U.S. 67 is used as the principal connection between communities and as access to community services. Residential development in this area is not characteristic of platted neighborhood subdivision development common in more densely populated areas. Typically in these areas, access is provided from local streets within subdivisions, and interaction occurs between subdivision residents. The lack of any areas with significant concentrations of homes indicates that interaction among residents in the socioeconomic study area takes place at the community level where schools and other facilities are located and services are offered. Transportation to communities, particularly Fredericktown, Greenville, and Poplar Bluff is on U.S. 67.

3.1.2.2 Economic Characteristics

Businesses located along existing U.S. 67 are primarily retail and service-oriented businesses such as gas stations, convenience stores, restaurants, and flea markets. Although there are no large employment generators within the socioeconomic study area, concentrations of these service-oriented businesses are located in Cherokee Pass, Greenville, and north and south of the Poplar Bluff city limits. These businesses provide some employment, however, the largest employment centers within the study corridor are in Fredericktown and Poplar Bluff.

U.S. Department of Commerce data on the number of persons employed and the number of business establishments by sector in Madison, Wayne, and Butler counties are shown on Table 3-4. As shown, Wayne County has the least employees and establishments among the three counties, while Butler County far surpasses the remaining region. Most residents are employed in the services and retail sectors, but a large percentage is also employed within the manufacturing sector.

Table 3-4. Employment and Establishments by Sector, 2000

	Madison Co.			Wayne Co.			Butler Co.	
Sector	Number of Employees*	Total Establishments		Number of Employees*	Total Establishments		Number of Employees*	Total Establishments
Total	2,464	269		2,066	252		15,072	1,043
Agricultural Services, Forestry, and Fishing	0-19	2		0-19	2		0-19	2
Mining	0-19	1		20-99	2		0-19	2
Utilities	20-99	2		0-19	2		117	3
Construction	114	36		104	28		1,043	94
Manufacturing	501	17		566	33		3,555	51
Wholesale Trade	20-99	9		27	7		526	61
Retail Trade	443	52		434	47		2,471	245
Transportation and Warehousing	221	19		38	11		329	48
Information	38	7		49	4		284	13
Finance and Insurance	69	15		84	15		410	57
Real Estate and Rental and Leasing	27	5		3	3		168	31
Professional, scientific and technical services	20-99	9		79	13		302	50
Management of companies and enterprises	0-19	1		0	0		0-19	2
Admin, support, waste mgt, remediation services	18	10		14	6		764	40
Educational Services	0	0		0	0		0-19	2
Health care and social assistance	395	21		260	15		3,246	118
Arts, entertainment and recreation	20	5		9	8		20-99	10

Table 3-4. Employment and Establishments by Sector, 2000

Sector	Madison Co.		Wayne Co.		Butler Co.	
	Number of Employees*	Total Establishments	Number of Employees*	Total Establishments	Number of Employees*	Total Establishments
Accommodation and Food Services	198	16	107	24	1,168	72
Other Services (except public administration)	106	39	83	26	565	126
Auxiliaries (except corporate, subsidiary and regional management)	100-249	1	100-249	1	0-19	2
Unclassified Establishments	0-19	2	3	5	8	14

** Ranges are given for some sectors due to disclosure restrictions.*

Source: U.S. Department of Commerce, County Business Patterns, 2000.

Compared to the 2000 population shown in Table 3-1, the number of employed persons, as a percentage of the total population, in each of the three counties is 20.8 percent, 15.6 percent, and 36.9 percent for Madison, Wayne, and Butler counties, respectively. The 2000 Census also showed that 38.8 percent of Madison County workers and 38.8 percent of Wayne County workers commuted outside their county of residence to work, compared to 8.5 percent of Butler County workers. These numbers indicate the reliance of area residents on the employment centers in Southeastern Missouri.

Approximately 20 percent of the region's population had incomes below the poverty level in 2000 (see Table 3-3). This was particularly evident within the study corridor townships where the percentage of persons below the poverty level varied from 7.0 percent in Epps Township in Butler County to 35.8 percent in Cedar Creek Township in Wayne County.

Table 3-5 provides personal per capita income for the region counties and the State of Missouri. Although per capita income has risen within the study corridor since 1990, all three counties have remained consistently below the statewide per capita income. Per capita income in Madison County was 66 percent of the Missouri personal per capita income, with Wayne and Butler counties being between 67 percent and 79 percent, respectively, of the statewide average.

Table 3-5. Per Capita Personal Income

Area	1990	1994	1997	1999	% Change 1990-94	% Change 1994-97	% Change 1997-99	% Change 1990-99
Madison County	$11,725	$13,681	$15,874	$13,215	16.7	16.0	-16.8	12.7
Wayne County	$10,238	$11,451	$13,443	$13,434	11.8	17.4	0.0	31.3
Butler County	$12,728	$15,668	$18,506	$15,721	23.1	18.1	-15.0	23.5
State of Missouri	$17,639	$20,576	$23,629	$19,936	16.7	14.8	-15.6	13.0

Source: U.S. Department of Commerce, 1990, U.S. Bureau of the Census, 2000.

In terms of tax base, the study area counties are composed primarily of residential properties, with over one-half of all properties in each county assessed as residential (Table 3-6). Agriculturally assessed land makes up a small percentage of the three counties, however, it accounts for nearly 20 percent of the Wayne County tax base. The largest tax base is in Butler County, which is approximately four times the size of the tax base for Madison and Wayne counties. The large commercial tax base in Butler County, at 34 percent of the total assessed value, is primarily associated in and around Poplar Bluff which provides a regional center for commercial activity. In Madison and Butler counties, the incorporated areas make up between 40 and 50 percent of the total county assessed value. However, in Wayne County, where municipal populations are much lower, the percentage of the County's total assessed value attributed to incorporated areas was 23 percent.

Table 3-6. Assessed Value in Madison, Wayne, and Butler Counties

	Madison	Wayne	Butler
Total 1999 Assessed Value of Real Estate	$41,032,890	$52,880,950	$206,760,240
Residential Land Percentage of Assessed Value	73%	52%	58%
Commercial Land Percentage of Assessed Value	21%	29%	34%
Agricultural and Forest Cropland Percentage of Assessed Value	6%	19%	3%
Percentage of Total Assessed Value Attributed to Municipalities	43%	23%	49%
Source: County Clerk's Offices of Madison, Wayne, and Butler counties.			

Butler County is the most populous county in the socioeconomic study area with over three times as many people as Madison and Wayne counties. According to the 2000 Census, all three counties experienced population increases during the 1990s. In terms of racial characteristics, the region and the socioeconomic study area are predominantly white, with a greater amount of diversity in Butler County compared to Madison and Wayne counties. Income, home values, and home ownership characteristics indicate that the socioeconomic study area and the region are less affluent compared to the state overall. The cities of Fredericktown and Poplar Bluff serve as major employment centers for the region where most workers are employed in the services, retail trade, and manufacturing sectors.

3.2 Land Use

3.2.1 Project Corridor Overview

The socioeconomic study area is located within three counties in Southeastern Missouri B Madison, Wayne, and Butler counties. Land use in these counties is characterized by the predominantly rural nature of the area, with agricultural and recreational uses and significant holdings of land in public ownership being the predominant elements within the landscape (see Figure 3-1). Land development patterns in the area have been strongly influenced by the existing U.S. 67 corridor and the large expanses of state and federally owned land located adjacent to the route.

A field inventory of existing land uses was conducted as part of the location study and environmental documentation processes, using aerial photography and direct observation (windshield survey). The results of this inventory are presented in Table 3-7. The inventory of public and park lands was an integral component in the study alternate development and evaluation processes. The occurrence of Section 6(f) properties and the potential for Section 4(f) involvements were closely evaluated during the course of location study planning (see Section 3.2.2 and 5.0).

The predominant land use within the project corridor includes undeveloped land and land used for agricultural purposes. In the U.S. 67 study area, most land classified as agricultural is not actively farmed for row crops, but is mainly used for pasture land or is fallow. This land use category is separate from the large amount of state and federally owned forested land within the MTNF, the WWMA, and the Coldwater Conservation Area. Additionally, there are over 564 hectares (ha) [1,394 acres (ac)] in residential use which consist primarily of single-family homes and mobile homes located along U.S. 67. Concentrations of residential areas are located in, or near, Cherokee Pass, Silva, Greenville, and Neelyville. Most of the commercial uses within the socioeconomic study area are located within Cherokee Pass, Greenville, and north and south of the City of Poplar Bluff. There are, however, various commercial uses located throughout the corridor. The majority of industrial uses are located north of Poplar Bluff along the four-lane divided portion of U.S. 67. Additional industrial uses, including quarry and construction operations, are located in Wayne County.

Table 3-7. Existing Land Use in the Study Corridor

	Madison County		Wayne County		Butler County		Total	
	Ha	Ac	Ha	Ac	Ha	Ac	Ha	Ac
Agricultural	2,410	6,026	2,466	6,165	2,166	5,416	7,043	17,607
Single Family	152	379	202	506	210	524	564	1,394
Multi-Family	0	0	0	0	2	5	2	5
Commercial	36	91	34	85	86	215	157	391
Industrial	3	8	17	43	24	61	45	112
Public/Semi-Public	0	0.3	12	31	51	129	64	160
Forest/Conservation	482	1,206	876	2,189	234	584	1,592	3,979
Highway Right of Way	140	349	415	1,037	334	834	888	2,220
Park	0	0	2	5	0	0	2	5
Church	13	34	10	25	13	33	37	92
Cemetery	2	6	6	15	1	3	10	24
Railroad	0	0	0	0	5	13	5	13
School	0	0	15	37	0	0	15	37

Source: Zambrana Engineering, Inc., 2001.

No formal land use planning or land use controls exist in the study corridor with the exception of the 1986 Mark Twain Land and Resource Management Plan adopted by the USFS to guide forest management within the MTNF (including amendments through August 2002) and the Final Wappapello Lake Master Plan (USACE, 2000) that guides the orderly development and management of land and water resources at Wappapello Lake. The City of Poplar Bluff has an adopted land use plan and administers zoning and subdivision regulations, however, these land use tools do not apply to any portion of the socioeconomic study area. Land use development has occurred in the areas of the socioeconomic study area that are outside the MTNF without formal planning, and a linear development pattern has resulted. The U.S. 67 corridor is used for primary access for these land uses.

The most prominent developed land use influences within Madison County are found in the unincorporated area known as Cherokee Pass, which consists of various retail travel and seasonal establishments such as camping sites, fireworks stands, restaurants, and gas stations with convenience stores. South of Cherokee Pass, land uses in Madison County include undeveloped forested land, or land which includes national and state forests, MDC landholdings; and some limited residential and commercial uses. MTNF comprises 488 ha (1,206 ac), accounting for approximately 15 percent of the study corridor in Madison County.

Wayne County is largely a rural area containing a significant portion of land owned by the MTNF, the MDC and the USACE, which owns and manages the WWMA. Almost one-half of the Wayne County portion of the socioeconomic study area is in national forest or conservation land. MTNF covers 836 ha (2,065 ac), accounting for 21 percent of the study corridor, while land owned by USACE (i.e., WWMA) comprises 884 ha (2,184 ac), or approximately 22 percent of the study corridor. MDC owned and managed Coldwater Conservation Area encompasses 50 ha (124 ac), approximately 1 percent of the study corridor.

U.S. 67 traverses through large stretches of vacant land that are included in the national forest and recreational holdings. Among these holdings is “Old Greenville,” a NRHP site, located on the USACE property southwest of the present City of Greenville. Concentrations of residential and commercial land uses exist in the community of Greenville. The unincorporated area known as Silva is located approximately 6.4 km (4 mi) north of Greenville. Approximately 60 single-family residences and several commercial land uses are located in proximity to U.S. 67 at Silva. Other land uses, principally residential uses, are scattered along the corridor.

Much of the socioeconomic study area in northern Butler County (north of Poplar Bluff) is located along the existing four-lane right of way. MTNF land is located in this area, comprising 236 ha (583 ac) or approximately 7.5 percent of the study corridor. South of Poplar Bluff, land uses are primarily large farms with scattered residential and highway commercial uses. In this area, terrain changes dramatically from the rolling hills in the northern portion of the corridor to a flat plateau consisting of large areas of agricultural uses. The southern terminus of the socioeconomic study area is located approximately 1.6 km (1 mi) south of Neelyville. Land uses within Neelyville consist of residential with some public/semi-public and commercial uses.

3.2.2 Parks, Recreation Areas, National Historic Sites, and Other Public Lands

U.S. 67 is located on the eastern edge of the Ozark Mountains. Given, in part, the proximity of U.S. 67 to the Ozark region, many parks, recreation areas, and public lands have been established throughout the corridor. The following discusses those parks, recreation areas, National Historic Sites, and other public lands within the study corridor and references Figure 3-1.

Parks

A small roadside park is located just west of the existing U.S. 67 in Lodi. Lodi Roadside Park consists of several picnic tables and is managed by MoDOT. The Greenville City Park was built in 1941 and is located within the town of Greenville. The park consists of several pavilions, picnic tables, and restrooms.

The Greenville ballpark was constructed in the late 1970s and is located on a 4.85-ha (12-ac) parcel leased from the USACE. This site is immediately adjacent to, and west of, existing U.S. 67 in Greenville and within North Greenville Recreation Area. Approximately 2.18 ha (5.4 ac) of the 4.86-ha (12.0-ac) parcel was developed with funds from the Land and Water Conservation Fund (LWCF) Act of 1965 [16 United States Code (USC) 460L-4] to include a lighted ballfield, bleachers, a fountain/hydrant, a parking area, concession stand and restrooms. The remainder of the park is wooded. The primary purpose of the park is to provide a ballfield for baseball and softball sporting events and is used by organized leagues for children and adults.

Recreation Areas

North Greenville Recreation Area is located east of the St. Francis River and southwest of the City of Greenville. North Greenville Recreation Area consists of 60.7 ha (150 ac) and is managed by the USACE. The site includes four hunting and fishing accesses and the 4.85-ha (12-ac) site (e.g., Greenville ballpark) leased to the City of Greenville. Besides the Greenville ballpark, there are no other developed recreational facilities. Major recreational activities to this site, excluding the 4.86-ha (12-ac park), include fishing, hunting, hiking, sightseeing, and canoeing.

Greenville Recreation Area is located 1.6 km (1 mi) south of Greenville and adjacent to Old Greenville National Historic Site. Managed by the USACE, Greenville Recreation Area consists of 65.56 ha (162 ac) located on both sides of U.S. 67 at the northern end of Wappapello Lake and immediately northeast of the St. Francis River. Approximately 19 ha (47 ac) overlap with Old Greenville and the campground is located in this area. Other facilities include picnic areas, playground equipment, a boat ramp, and dock. Major recreational activities include visiting Old Greenville National Historic Site, camping, fishing, picnicking, hiking, swimming, and canoeing.

Privately Owned Recreation Areas

Lakeview Golf Course is a privately owned recreational facility located north of Neelyville and east of U.S. 67. This golf course is open to the public.

National Historic Sites

The Old Greenville National Historic Site (Old Greenville) is located 1.6 km (1 mi) south of existing Greenville, and immediately adjacent to Greenville Recreation Area. Old Greenville consists of 55.44 ha (137 ac) managed by the USACE. Old Greenville is the former site of the City of Greenville which was moved to its present site in 1942 because the flood control project, Wappapello Lake and Dam, positioned Old Greenville in the flood zone of the lake. On account of the archaeological and historic significance associated with the old town of Greenville, this site was listed on the NRHP in 1990.

Old Greenville includes some of the original village streets, building foundations, steps to the courthouse, and sidewalks associated with the original town. Memory Lane is a 1.6 km (1 mi), self-guided, walking trail through Old Greenville. Interpretive plaques identify the locations and descriptions of approximately 20 historic homes and a gazebo presents the history of Greenville. Out of the 55.44 ha (137 ac) comprising this historic site, 19.0 ha (47 ac) of Old Greenville overlap with Greenville Recreation Area that includes the campground. Major recreational activities include sightseeing, hiking, and visiting Greenville Recreation Area.

Other Public Lands

Mark Twain National Forest (MTNF)

Two districts of the MTNF, Fredericktown and Poplar Bluff, are located within the study corridor. The Fredericktown District, located south of Fredericktown, consists of 3,257 ha (80,478 ac). The Poplar Bluff District is located north of Poplar Bluff and consists of 62,521 ha (154,488 ac). Nearly 50 percent of the Fredericktown and Poplar Bluff Districts, which includes the MTNF land located within the study corridor, are primarily managed for shortleaf pine timber products (USDA, 1986). Other management purposes include hardwood timber production, mineral production, livestock forage, wildlife habitat, and recreation opportunities. Recreational activities include hunting, hiking, sightseeing, and primitive camping.

Funds from the LWCF Act were used to purchase property within the Fredericktown and Poplar Bluff Districts. Two areas, adjacent to U.S. 67 in the Fredericktown District, were purchased with LWCF. There are no developed facilities at these sites. Three areas, adjacent to U.S. 67 in the Poplar Bluff District, were purchased with funds from the LWCF. Two of these areas are undeveloped. The third area is primarily undeveloped and designated by the MTNF as a multi-use area. The only developed recreational facility, Hendrickson Recreation Area, is a boat ramp, parking lot, and vault toilets located on a portion of this third area. This facility is located south of the Missouri Pacific Railroad, east of the old Black River bridge, and immediately north of the Black River. A picnic area is proposed for this area (MTNF, 1996).

The Victory Section of the Ozark Trail traverses MTNF property beginning approximately at Highway 172 and continues southwest to Highway V north of Ellsinore, for a distance of approximately 48.2 km (30 mi). A trail head is located at Hendrickson Recreation Area. There is currently a short gap in the Victory Section of the trail at the U.S. 67 and Black River crossing. There has never been a designated Ozark Trail connection over the Black River at U.S. 67 and the existing bridge is not pedestrian, bicycle, or equestrian friendly. The MTNF is currently proposing a Black River crossing to connect the Ozark Trail (Hendrickson Recreation Area EA, 1996). MDNR and MTNF are pursuing a connection that incorporates the old U.S. 67 steel truss bridge over the Black River and is in an early developmental stage ("The Ozark Trail Victory Section," Ozark Trail Association, October 25, 2004).

Other USACE Property

St. Francis East and St. Francis West are two "Multiple Resource Management-Vegetative Management" areas located south of the Routes 67 and 34 intersection (USACE, 2000). Vegetative management areas protect and develop forest and vegetative cover and wetland restoration. Recreational activities for all vegetative management areas include hunting, fishing, hiking, and sightseeing. St. Francis West is a

1,262.7-ha (3,120-ac) area that typifies various stages of early bottomland succession associated with creek and riverine habitats and upland forest. There are nine parking areas and a boat ramp that provide access throughout this 1,262.7-ha (3,120-ac) area. The state-endangered plant *Clematis vioma*, a leather flower, is listed as being located within this area. The Ozark Trail is also located within this area. St. Francis East is a 1,032.8-ha (2,552-ac) area similar in topography and habitat to St. Francis West. Eight parking areas provide access throughout the site. Other than the boat ramp and parking areas, there are no other developed recreational facilities at St. Francis East and St. Francis West areas.

Laconia is a 373-ha (922-ac) parcel southeast of Old Greenville and U.S. 67, classified as "Multiple Resource Management-Vegetative Management" (USACE, 2000). This area consists primarily of early succession bottomland forest. Developed facilities include one parking area, a spur trail off the Johnson Tract Trail, and an interpretive display. Pleasant Valley is located south of Old Greenville and is classified by the USACE (2000) as a "Multiple Resource Management-Vegetative Management" area. This 741-ha (1,832 ac) area is primarily upland forest and contains three cemetery inholdings (Wight, Pleasant Valley, and A.E. Jones), three parking lots to provide access to the area, the Ozark Trail, and the Civil War Grave Memorial.

The Civil War Grave Memorial is located north of the Ozark Trail crossing at U.S. 67 and east of U.S. 67. The memorial consists of a plaque for an unknown Civil War soldier, a lone pine tree, flagpole, light, and bulletin boards. These improvements were made by the local community on property managed by the USACE at Pleasant Valley. The parking lot that provides access to the Ozark Trail also provides access to the memorial. There are no other developed recreational facilities at Pleasant Valley.

The Ozark Trail crosses U.S. 67 approximately 1.6 km (1 mi) south of the St. Francis River at Pleasant Valley. At this point, the trail is located on property managed by the USACE on both sides of U.S. 67. The Ozark Trail was established by the Ozark Trail Council in 1977. The trail is approximately 804.5 km (500 mi) in length and extends from the St. Louis Metropolitan Area southwesterly through the Missouri Ozark Mountains to the Arkansas border. At the Arkansas border, the trail connects to the Ozark Highlands Trail in Arkansas.

The Wappapello Lake Section of the Ozark Trail is 50 km (31.1 mi) in length, located on public and private lands, and considered primitive and rugged. This section of the trail is open to hikers, bicyclists, and horseback riders. The Wappapello Lake Section begins approximately 1.6 km (1 mi) south of Sam A. Baker Park on Highway 143 and continues south and west of U.S. 67. Approximately 1.6 km (1 mi) south of the U.S. 67 and FF intersection, the Wappapello Lake section crosses U.S. 67, extends to Wappapello Lake, and terminates at Highway 172. Directly east of the U.S. 67 crossing is a parking area that provides access to the Ozark Trail and the Civil War Grave Memorial. Primitive camping is allowed on the section of the Ozark Trail within the study area; however this section is primarily utilized for day use (personal communication, USACE 2001). The Victory Section of the Ozark Trail is discussed under Mark Twain National Forest, above.

Otter Creek is located north of the U.S. 67 intersection with Highway 49 and 172 and on the Otter Creek arm of the Wappapello Lake. This 1,586-ha (3,919-ac) area is classified "Multiple Resource Management Area-Recreation Low Density" (USACE, 2000). Lands that are zoned in this category provide unstructured natural settings to the public as an alternative to intensively developed recreation areas. Recreational activities include fishing, hunting, hiking, and nature studies. There are five accesses for fishing and hunting. The Ozark Trail is routed through this area and primitive camping is allowed within 91.4 m (300 ft) of the trail. There are no other developed recreational facilities at Otter Creek. This area provides a mixture of fields, bottomland timber, and oak-hickory forest making this area ideal for all types of hunting. The Mississippi River Transmission Corporation pipeline dissects the eastern portion of

this area in two locations. The pipeline easement has encouraged numerous unauthorized off-road vehicle trails to be established resulting in erosion and poaching at Otter Creek.

North of the Wayne/Butler County line is the Taskee Historic Area, which has been classified by the USACE as "Environmentally Sensitive Area-Cultural Area." This 48.6-ha (120-ac) parcel includes the first known railroad station within the Wappapello Lake area. The USACE plans to evaluate this area for eligibility to the NRHP because of its significance as a railroad center during the 1800s. Several foundations can still be located within this area. Currently, there are no developed facilities at Taskee Historic Area. Recreational activities would include hiking and sightseeing.

MDC Property

Coldwater Conservation area is a 3,832.5 ha (9,470 ac) forested tract located south of Coldwater and managed by the MDC (1997). The function of this area is open recreational use to include hunting, bird watching, hiking, and primitive camping, and to provide fish, forest, and wildlife habitat. A fishing access is provided immediately adjacent to U.S. 67 at Cedar Creek. There are no developed recreational facilities in this area. Pittman-Robertson funds established by the Federal Aid in Wildlife Restoration Act were used to purchase a portion of the Coldwater Conservation Area that is located within the study corridor (Appendix C, MDC letter dated October 30, 2000).

The Corkwood Conservation Area is located immediately south of Route 142 and west of existing U.S. 67 in Butler County. The MDC manages this 175.6-ha (434-ac) area that comprises forested dune and swale topography, and open marsh habitat. Recreational activities include hunting, fishing, horseback riding, and hiking. Developed facilities include a parking lot, interpretive plaque, and foot trails. Two state-rare plant species, water canna (*Thalia dealbata*) and corkwood (*Leitneria floridana*), are found within this area.

3.3 Agriculture

According to the Missouri Agriculture Statistics Service (MASS) (1999), approximately 65 percent of the land in Missouri is used for agricultural purposes. Average farm size in Missouri is 118.17 ha (292 ac). Dominant crops in Missouri are corn and soybean.

The USDA defines prime farmland as soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. In 1997, Missouri had a total of 5,782,434.5 ha (14,288,200 ac) of prime farmland within the state (National Resources Inventory, 1997).

Prime farmland within the corridor was quantified using soil types and slopes specified as prime by the USDA NRCS. This produced an estimated value of prime farmland within the study corridor. Prime farmland occurred within forested areas, old field, pasture, crop land, and tree farm cover types. Total prime farmland in the study corridor is an estimated 1,159.31 ha (2,864.72 ac). State and county information is summarized in Table 3-8.

Table 3-8. Agricultural Statistics

	Missouri	Madison	Wayne	Butler
Number of Farms	98,860	386	380	678
Average Size of Farms, ha (ac)	118.17 (292)	115.34 (285)	104 (257)	152.16 (376)
Percent Agricultural Lands	65	35	19	57
Market Value of Agriculture Products Sold	$4,303,000,000	$7,339,000	$4,476,000	$47,021,000
Prime Farmland, ha (ac)	5,782,229.4 (14,288,200)	6,593.14 (16,292)	Not available	118,714.53 (293,350)

Agricultural land within the study corridor largely occurs as cropland in Butler County. Other agricultural lands include pasture and old field in Madison and Wayne counties. These lands comprise approximately 22.5 percent of the cover types within the study corridor (refer to Table 3-15).

3.3.1 Madison County

According to the 1997 Census of Agriculture, approximately one-third of the land in Madison County is used for agricultural purposes. There are 386 farms in Madison County with a total of 44,552.65 ha (110,092 ac) of land. The average farm size is 115.34 ha (285 ac) valued at approximately $1,745 per ha ($707 per ac) of farm land and buildings (Census of Agriculture, 1997).

No data is available for estimated yield or livestock value for Madison County (personal communication, Madison County Soil and Water Conservation District, January 25, 2000). Madison County is not ranked for corn or soybean production within the state.

Madison County has approximately 6,593.14 ha (16,292 ac) of prime farmland (personal communication, Dan Childress, January 27, 2000). within the study corridor, there is approximately 271.42 ha (670.69 ac) of prime farmland. Total agricultural land within the study corridor of Madison County is approximately 230.66 ha (569.97 ac). This is primarily pasture and old field.

3.3.2 Wayne County

Approximately 20 percent of the land in Wayne County is used for agricultural purposes. Limitations on agricultural land uses in the county include less suitable soil types, variable terrain, and large amounts of public land. There are 380 farms in Wayne County, comprising a total of 39,523.22 ha (97,664 ac) of land. The average farm size is 104 ha (257 ac), valued at an average of $1,925 per ha ($780 per ac) of land and buildings (Census of Agriculture, 1997).

The dominant crops in Wayne County are corn and soybeans. Wayne County harvested an estimated 728.43 ha (1,800 ac) of corn in 1998 at approximately 8,213.73 liters (L) per ha (94.4 bushels per ac). This produced approximately 5,990,641.9 L (170,000 bushels) of corn. Soybean harvest totaled 1,416.4 ha (3,500 ac) of land, with an estimated yield of 2,836.52 L per ha (32.6 bushels per ac). Total soybean production was 4,017,253.98 L (114,000 bushels). Out of the 114 counties in Missouri, Wayne County ranks 82nd in corn production and 82nd in soybean production within the state of Missouri (MASS, 1999).

Total cash receipts for Wayne County in 1997 for crop and livestock were $4,476,000. Cash receipts for crops totaled $1,182,000, and for livestock $3,294,000 (MASS, 1999).

According to the Soil Survey Office (personal communication, Dan Childress, January 27, 2000), the NRCS is currently in the process of documenting soil surveys for Wayne County. Prime farmland within the study corridor in Wayne County is estimated at 320.31 ha (791.5 ac). Total agricultural lands in Wayne County within the study corridor account for approximately 313.48 ha (774.63 ac). This is primarily pasture and old field.

3.3.3 Butler County

Since Butler County lies primarily on level floodplains, agriculture is an important economic resource to the area. More than half of the land in Butler County is used for agricultural purposes. There are 678 farms in Butler County, with a total of 103,221.95 ha (255,067 ac) of land. The average farm size is 152.16 ha (376 ac), valued at approximately $2,940 per ha ($1,191 per ac) of farm buildings and land (Census of Agriculture, 1997).

Approximately 7,324.81 ha (18,100 ac) of corn were harvested in 1998, at 9,240.45 L per ha (106.2 bushels per ac). Corn production in 1998 was 67,764,731 L (1,923,000 bushels). Total harvest for soybeans in 1998 was 40,266.22 ha (99,500 ac) of land, with an average of 2,262.26 L per ha (26 bushels per ac). This yielded a total of 91,198,713.16 L (2,588,000 bushels) of soybeans for Butler County. Out of 114 counties in Missouri, Butler County ranks 49 in corn production and 12 in soybean production within the state of Missouri (MASS, 1999). Total cash receipts for crops and livestock in 1997 were $47,021,000. Total crop cash receipts were $43,483,000, and livestock valued $3,538,000 (MASS, 1999).

Butler County has an estimated 118,714.53 ha (293,350 ac) of prime farmland. According to the Soil Survey Office, approximately 90 percent of this prime farmland is contained within the Bootheel of Missouri (personal communication, Dan Childress, January 27, 2000). The study corridor in Butler County contains approximately 567.58 ha (1,402.52 ac) of prime farmland.

The study corridor within Butler County contains an estimated 637.19 ha (1,574.53 ac) of agricultural land, which is primarily cropland.

3.4 Traffic, Transportation, and Safety

This section presents both existing and projected traffic conditions within the study area, and provides the methods used to analyze the traffic data. Other data presented in this section relate to travel patterns within the study area.

3.4.1 Existing Traffic Conditions

Existing traffic volumes within the study area are presented in Figure 3-2. These data represent 2002 counts compiled from MoDOT. These traffic values represent ADT. The design hour volume (DHV) is expressed as a percentage of the ADT. For this project, DHV was assumed to be 10 percent of the ADT. The DHV considers total vehicles in the traffic stream which include passenger cars, light trucks, and semi-trailer trucks. For all analyses, there was no differentiation made between a morning or an afternoon peak hour traffic flow. In all cases, the DHV was assumed to be the peak hour traffic flow for each analysis.

Existing traffic volumes were analyzed to determine the LOS along segments of the project corridor. The corridor was divided into the following sections:

1. from the northern project terminus (just north of Cherokee Pass) to Route C at Cherokee Pass in Madison County;
2. from Route C in Madison County to Route EE in Wayne County;
3. from Route EE to Route 34 in Wayne County;
4. from Route 34 to Route A in Wayne County;
5. from Route A to Route 49 in Wayne County;
6. from Route 49 in Wayne County to Route 60-west in Butler County;
7. from Route 60-west to Route 60-east in Butler County;
8. from just north of Cane Creek to Route 160 in Butler County;
9. from Route 160 to Route 142 in Butler County; and
10. from Route 142 to the southern project terminus in Butler County.

Given that no at-grade intersections will exist for the ultimate design (i.e., freeway), no at-grade intersection analyses were performed for the ultimate condition. However, at some point before the ultimate facility is in place, it may be necessary to study specific intersections for capacity issues given an interim, or expressway, condition. See Section 1.2.2 for an explanation of interim conditions and ultimate facility. A discussion pertaining to this issue can be found in Section 4.6.1.1.

Highway segments were analyzed using the procedures set forth in the Highway Capacity Manual (HCM), 2000. Capacity analyses were conducted to determine the LOS along each roadway segment. Each existing segment was analyzed as a two-lane rural highway (with varying shoulder widths, percent no-passing zones, and percent heavy trucks) based on Chapter 20 of the HCM ("two-lane highways"). The LOS for each roadway segment under current traffic conditions is listed on Table 3-9. An explanation of the different LOS can be found in Section 1.3.1.

Table 3-9. Roadway Segment Capacity Analysis (2002 Traffic Volumes)

Segment of U.S. 67	ADT	LOS	Remarks
North Terminus to Route C	5,990	C	Two-lane with 2.4 m (8 ft) gravel shoulders. Runs through Cherokee Pass; numerous points of access and rolling terrain.
Route C to Route EE	4,260	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain.
Route EE to Route 34	4,200	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain*.
Route 34 to Route A	5,400	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain.
Route A to Route 49	4,410	C	Two-lane with 1.8 m (6 ft) gravel shoulder and rolling terrain.
Route 49 to Beginning Divided Pavement	7.150	C	Two-lane with gravel shoulders for 4.8 km (3 mi). Two-lane with paved 2.4-m (8-ft) shoulders for 4.8 km (3 mi) and rolling terrain.
Begin Divided Pavement to Route 60-West	7,400	A	Four-lane divided with 3 m (10 ft) surfaced shoulders and rolling terrain.
Route 60-West to Route 60-East	12,900	A	Four-lane divided with 3 m (10 ft) surfaced shoulders and rolling terrain.
Just North of Cane Creek to Route 160	8,500	C	Two-lane with 2.4 m (8 ft) shoulders and rolling terrain.
Route 160 to Route 142	4,450	C	Two-lane with 2.4 m (8 ft) gravel shoulders and level terrain.
Route 142 to South Terminus	3,510	B	Two-lane with 2.4 m (8 ft) gravel shoulders and level terrain.
** U.S. 67 between the two Route 34 junctions has been widened to three lanes to accommodate turning movements.* *Source: MACTEC, 2004.*			

LOS for existing conditions on the two-lane portions of U.S. 67 range from a LOS B to LOS C. A LOS B is a good condition by HCM standards and a LOS C is acceptable for a two-lane highway (see Section 1.3.1). The segment with the most favorable level of service is the portion south of Route 142 to the south terminus, which has a LOS B. This section is on level terrain and has relatively low volume. The rest of the existing two-lane portions of highway have a LOS C. The area with the highest volume is from just north of Cane Creek to Route 60 in Butler County. This section has relatively higher traffic volume and is associated with denser development south of Poplar Bluff. Level of service for the four-lane divided highway portions of U.S. 67 in Butler County are a Level A. Free-flow conditions exist on the existing four-lane divided portions of U.S. 67.

Several elements are considered in the determination of LOS for a two-lane highway. These include roadway cross-section, type of terrain, traffic volumes, percentage of heavy vehicles, and percentage of passing zones. These elements are the basis for establishing Percent Time-Spent-Following and Average Travel Speed. Combination of any or all of these, which contribute to slower average travel speeds and/or more time spent following, will decrease the LOS. For example, LOS can be poor (LOS D or E) because of roadway conditions such as poor geometry, lack of shoulders, and no passing zones even though traffic volumes are relatively low.

Several segments of U.S. 67 are also characterized by high accident rates. A summary of the accident analyses of U.S. 67 in each county is provided in Table 3-10. The statewide average accident rate for a two-lane highway is 140 accidents per hundred million vehicle kilometers traveled (HMVKT) [226 accidents per hundred million vehicle miles traveled (HMVMT)]. Based on this number, the stretch of U.S. 67 at Cherokee Pass in Madison County has an accident rate above the statewide average. There are three areas in Wayne County over the statewide average: at Route K, between the Route 34 junctions, and at Route 49. However, the section between the two Route 34 junctions was widened to three lanes in 2003 and the accident rate is likely to decrease. Butler County has two areas that are more than three times the statewide accident rate: at Route 160 and at Route 142. The stretch of highway between Routes 160 and 142 also is characterized by a high fatality accident rate. At Route 160, the fatality rate is 55.0 accidents per HMVMT. This compares to a statewide average for a two-lane highway of 2.97 per HMVMT.

Table 3-10. Accident Summary

Segment	Log Mile		Mileage	2002 ADT	1998				1999				2000	2001							2002				Total				Acc.	PDO	Injury	Fatal	F/I
	Beg	End			P	I	F	Tot	P	I	F	Tot	P	I	F	Tot	P	I	F	Tot	P	I	F	Tot	P	I	F	Tot	Rate	Rate	Rate	Rate	Ratio
Madison County																																	
North Terminus - Cherokee Pass	116.90	118.22	1.32	5,992	0	0	0	0	0	1	0	1	3	0	0	3	2	0	0	2	2	0	0	2	7	1	0	8	55.4	48.5	6.9	0.0	0.0%
Cherokee Pass	118.22	119.06	0.84	5,992	3	1	0	4	3	3	0	6	3	1	0	4	5	2	1	8	3	9	0	12	17	16	1	34	370.1	185.1	174.2	10.9	6.3%
Cherokee Pass - Route JJ	119.06	124.20	5.14	5,992	7	2	2	11	8	5	1	14	5	1	1	7	10	9	0	19	3	1	1	5	33	18	5	56	99.6	58.7	32.0	8.9	27.8%
Route JJ	124.20	124.70	0.50	4,136	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3	79.5	26.5	53.0	0.0	0.0%
Route JJ - Route N	124.70	129.68	4.98	4,136	7	3	0	10	4	3	0	7	3	1	0	4	6	2	0	8	4	0	1	5	24	9	1	34	90.4	63.8	23.9	2.7	11.1%
Route N	129.68	130.18	0.50	4,264	1	2	0	3	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	3	2	0	5	128.5	77.1	51.4	0.0	0.0%
Route N - County Line	130.18	132.70	2.52	4264	1	1	0	2	2	1	1	4	6	1	0	7	2	3	0	5	3	2	0	5	14	8	1	23	117.3	71.4	40.8	5.1	12.5%
County Totals			15.80	4,968	20	11	2	33	17	13	2	32	20	4	1	25	27	16	1	44	15	12	2	29	99	56	8	163	113.8	69.1	39.1	5.6	14.3%
Wayne County																																	
County Line - Route EE	132.70	133.50	0.80	4,264	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4	0	0	4	64.3	64.3	0.0	0.0	0.0%
Route EE	133.50	134.00	0.50	4,200	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	1	3	0	0	3	78.3	78.3	0.0	0.0	0.0%
Route EE - Route K	134.00	140.41	6.41	4,200	6	3	1	10	5	1	1	7	11	3	0	14	2	5	0	7	9	4	0	13	33	16	2	51	103.8	67.2	32.6	4.1	12.5%
Route K	140.41	140.91	0.50	4,276	2	0	0	2	0	0	0	0	4	1	0	5	1	1	0	2	0	0	0	0	7	2	0	9	230.7	179.4	51.3	0.0	0.0%
Route K - Route 34 Junctions	140.91	142.84	1.93	4,276	2	0	0	2	2	0	0	2	4	0	0	4	1	0	0	1	5	0	0	5	14	0	0	14	93.0	93.0	0.0	0.0	0.0%
Route 34 Junctions	142.84	143.65	0.81	5,566	4	1	0	5	4	0	0	4	9	2	0	11	0	2	0	2	3	2	0	5	20	7	0	27	328.1	243.1	85.1	0.0	0.0%
Route 34 Junctions - Greenville	143.65	147.35	3.70	5,396	5	1	0	6	4	1	0	5	2	0	0	2	2	0	0	2	7	1	0	8	20	3	0	23	63.1	54.9	8.2	0.0	0.0%
Greenville	147.35	148.58	1.23	5,396	3	1	1	5	3	0	0	3	5	2	0	7	3	0	0	3	1	1	1	3	15	4	2	21	173.4	123.8	33.0	16.5	50.0%
Greenville - Route D	148.58	149.49	0.91	5,396	4	1	0	5	3	2	0	5	4	0	0	4	2	0	0	2	2	1	1	4	15	4	1	20	223.2	167.4	44.6	11.2	25.0%
Route D (incl. Rte. FF)	149.49	150.72	1.23	5,378	3	0	0	3	2	1	0	3	1	3	0	4	3	1	1	5	3	3	0	6	12	8	1	21	174.0	99.4	66.3	8.3	12.5%
Route D - Route A	150.72	152.01	1.29	5,184	0	3	0	3	4	0	0	4	2	0	0	2	2	1	0	3	2	2	0	4	10	6	0	16	131.1	81.9	49.2	0.0	0.0%
Route A	152.01	152.51	0.50	4,478	2	2	0	4	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	2	4	3	0	7	171.3	97.9	73.4	0.0	0.0%
Route A - Route 49/172	152.51	161.88	9.37	4,412	8	3	1	12	10	2	0	12	13	6	0	19	15	2	0	17	8	8	0	16	54	21	1	76	100.7	71.6	27.8	1.3	4.8%
Route 49/172	161.88	162.38	0.50	4,630	4	3	0	7	2	0	0	2	4	1	1	6	0	2	0	2	1	0	0	1	11	6	1	18	426.0	260.4	142.0	23.7	16.7%
Route 49/172 - County Line	162.38	163.25	0.87	6,012	1	1	0	2	2	1	0	3	3	1	0	4	1	0	0	1	1	2	0	3	8	5	0	13	136.2	83.8	52.4	0.0	0.0%
County Totals			30.55	4,871	45	19	3	67	41	8	1	50	64	19	1	84	33	14	1	48	47	25	2	74	230	85	8	323	118.9	84.7	31.3	2.9	9.4%
Butler County																																	
County Line - Route JJ	163.25	165.42	2.17	7,150	5	1	0	6	4	0	0	4	5	1	0	6	2	0	0	2	5	2	0	7	21	4	0	25	88.3	74.2	14.1	0.0	0.0%
Route JJ	165.42	165.92	0.50	7,246	2	1	0	3	1	3	0	4	2	0	0	2	1	0	0	1	0	0	0	0	6	4	0	10	151.2	90.7	60.5	0.0	0.0%
Route JJ - Beg. Div Pvmnt.	165.92	167.30	1.38	7,246	2	1	0	3	2	0	0	2	2	0	0	2	6	2	0	8	0	1	0	1	12	4	0	16	87.7	65.8	21.9	0.0	0.0%
Beg. Div. Pvmnt. - Route 60 W Junc.	167.30	170.16	2.86	7,398	2	0	0	2	2	1	0	3	3	0	0	3	1	0	0	1	0	0	0	0	8	1	0	9	23.3	20.7	2.6	0.0	0.0%
Route 60 W Junc. - Route 60 E Junc.	170.16	174.79	4.63	12,900	5	3	0	8	12	7	0	19	8	2	0	10	8	4	1	13	7	4	0	11	40	20	1	61	56.0	36.7	18.3	0.9	5.0%
Poplar Bluff Bypass																																	
S End of PB Bypass - Route 160	183.86	187.52	3.66	8,501	6	5	1	12	11	9	0	20	12	6	0	18	15	5	1	21	12	9	1	22	56	34	3	93	163.8	98.6	59.9	5.3	8.8%
Route 160 and Route V	187.52	188.17	0.65	4,596	5	5	2	12	7	3	0	10	3	1	1	5	9	5	0	14	6	5	0	11	30	19	3	52	953.8	550.3	348.5	55.0	15.8%
Route V - Route MM	188.17	192.53	4.36	4,449	2	0	0	2	6	0	0	6	4	3	0	7	6	1	0	7	6	0	1	7	24	4	1	29	81.9	67.8	11.3	2.8	25.0%
Route MM	192.53	193.03	0.50	4,931	0	2	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	3	0	4	88.9	22.2	66.7	0.0	0.0%
Route MM - Route 142	193.03	194.57	1.54	4,931	0	0	0	0	2	0	0	2	1	1	0	2	1	0	0	1	2	2	0	4	6	3	0	9	64.9	43.3	21.6	0.0	0.0%
Route 142	194.57	195.07	0.50	3,511	5	3	0	8	2	2	0	4	2	2	0	4	1	1	0	2	3	2	0	5	13	10	0	23	717.9	405.8	312.1	0.0	0.0%
Route 142 - State Line	195.07	199.49	4.42	3,511	6	7	0	13	10	4	0	14	9	4	1	14	6	2	0	8	3	1	1	5	34	18	2	54	190.7	120.0	63.6	7.1	11.1%
County Totals			15.63	6,364	40	28	3	71	60	29	0	89	51	20	2	73	56	20	2	78	44	27	3	74	251	124	10	385	212.1	138.3	68.3	5.5	8.1%

P = Property Damage Only
I = Injury
F = Fatality

1. Statewide average accident rate for 2-lane highway is 226.07 per HMVMT.
Statewide average accident rate for expressway is 182.30 per HMVMT.
Statewide average accident rate for 4-lane freeway is 127.32 per HMVMT.

2. Statewide fatality accident rate for 2-lane highway is 2.97 per HMVMT.
Statewide fatality accident rate for expressway is 1.34 per HMVMT.
Statewide injury accident rate for 2-lane highway is 76.15 per HMVMT.
Statewide injury accident rate for expressway is 46.51 per HMVMT

3. Statewide Fatality / Injury Accident ratio for 2-lane highways is 3.85%.

Source: MACTEC, 2004.

3.4.2 Traffic Volume Forecasts (2025)

Traffic forecasts for the design year (2025) were developed from a straight-line extrapolation of existing data by reviewing historical trends of the past 10 years. These forecasts considered the improvement of U.S. 67 to a freeway. These projections were developed with the assistance of MoDOT. The projected traffic volumes for the design year are presented in Figure 3-2.

3.4.3 Existing and Proposed Mass Transit

SMTS operates a van service in the study area that serves primarily handicapped individuals and people over age 60. The service provides a means of transportation for those individuals to and from doctors' offices, medical centers, and shopping centers. SMTS serves 21 counties in Southeast Missouri including Butler, Madison, and Wayne counties.

SMTS runs approximately four vans per day in the study area plus an additional 8 to 10 trips per month. Trips are primarily local within the major population centers such as Poplar Bluff and Fredericktown. No other mass transit is known to exist in the study area. In addition, the two regional planning agencies covering the study area, Ozark Foothills Regional Planning in Kennett and Southeast Regional Planning in Perryville, have no plans to implement a mass transit system in the study area in the future.

3.4.4 Travel Patterns

Travel patterns in the study area were internally developed by the study team based on traffic count data supplied by MoDOT dating to 2002. These data were compared with data developed as part of an origin and destination survey for Southeast Missouri conducted in 1991. The major traffic generators along U.S. 67 in the study area are Cherokee Pass, the Route 34-east and Route 34-west junctions, Greenville, the developed area extending approximately 1.6 km (1.0 mi) north of Route 60-east in Butler County, and Poplar Bluff (see Figure 3-2).

Because of the nature of the study area (long, linear and rural), the distinction between a local trip and a through trip is difficult to determine. For example, if a trip begins in Greenville and ends in Poplar Bluff, it is entirely within the study area and could be considered a local trip, although a long one [43.2 km (26.9 mi)]. Conversely, if the same trip were to begin in Silva, 6 km (3.7 mi) north of Greenville, and end in Poplar Bluff, it is still entirely within the study area and could be considered a local trip; however, this same trip is a through trip relative to Greenville. For the purposes of this study, if a trip is considered a through trip relative to the study area, it needs to begin north of, or in Fredericktown, in Madison County, and end south of Neelyville. Since this project is mostly in rural undeveloped land, with only a few major generators scattered throughout the study area, the study team developed a facility that best meets the needs of the through traffic in the study area while also meeting the needs of the individual traffic generators. This is done by providing grade-separated crossings or interchanges where traffic levels from adjacent generators are justified due to safety issues. The safety issues may be related to heavy volume, poor geometry, frequent breaks in access, or a combination of these. Therefore, interchanges are proposed accordingly throughout the study area to account for high traffic generators and safety.

Traffic volumes are relatively higher (5,990 vpd) at the northern limit of the study area, from the north terminus to Route C in Cherokee Pass. This is primarily due to the interaction of Routes A and C with U.S. 67, the influence of Fredericktown, and the businesses and residences of Cherokee Pass. South of Route C, traffic volumes decline (to around 4,140 vpd). This volume level is considered to be near the base flow volume, or the minimum volume one would expect to encounter regardless of the location within the study area. This volume is more of an intra-regional volume. That is, a volume characteristic of longer trips possibly having origins or destinations outside of the study area. Theoretically, because of regional traffic characteristics, traffic volumes never fall below the base flow.

As mentioned earlier, Route 34 influences traffic volumes and travel patterns on U.S. 67. The volume north of Route 34-west is 4,200 vpd (base flow), and it is 5,400 vpd from Route 34-east to Greenville (a 28 percent increase in volume). Along U.S. 67 between the Route 34-west and Route 34-east junctions, which is a stretch of 0.8 km (0.5 mi), there is an additional 500 to 800 vehicles present resulting from east-west traffic from Route 34. Because of the 0.8-km (0.5-mi) spacing between the Route 34 intersections, Route 34 traffic is required to use the 0.8-km (0.5-mi) stretch of U.S. 67. The increase in volume south of Route 34 is due in part to Greenville and recreation associated with Wappapello Lake.

From Greenville to Route A, the volume remains relatively constant at 5,180 vpd. However, volumes decline to 4,410 vpd south of Route A (a 17 percent decrease). This indicates as much as 800 vpd turning onto and off of U.S. 67 at Route A. Route A serves Williamsville, the Black River area below Clearwater Lake, and eventually Ellsinore in Carter County (which lies on Route 60).

Between Route A and Routes 49/172, the volume is fairly constant at 4,410 vpd (which is very near the base flow mentioned above). South of Routes 49/172, there is a 36 percent increase in volume to 6,010 vpd. This increase is presumed to be from Route 172 and the Wappapello Lake area to the east, and Route 49 to the west, which serves Williamsville and Piedmont in Wayne County. The majority of this increased traffic has an origin or destination in Poplar Bluff, which serves as the regional commerce center for much of the study area.

Traffic continues to increase as U.S. 67 approaches Poplar Bluff indicating the regional influence of Poplar Bluff on traffic flows. Just north of the interchange with Route 60-west, the volume is 7,400 vpd. South of this interchange, the volume nearly doubles to 12,900 vpd. This is attributed to the flow of traffic coming from Route 60-west to Poplar Bluff, or Route 60-east. This condition also occurs on the stretch of highway that is already four-lane divided.

South of Poplar Bluff, from south of Route M to Route 160, traffic flows are around 8,500 vpd. This indicates that Poplar Bluff has a heavier influence on traffic to/from the north. Traffic volumes drop to approximately 4,450 vpd south of Route 160. This reduction in volume is directly due to Route 160, which serves areas west of U.S. 67 into Ripley County including the community of Doniphan.

Traffic levels remain constant north of Neelyville at around 4,450 vpd. South of Neelyville the volume drops to 3,510 vpd resulting in a 27 percent decrease. Poplar Bluff is the regional influence for this traffic as well. Most traffic originating in Neelyville or along Route 142 in Butler County has a destination in Poplar Bluff. The traffic volume at the Arkansas state line is approximately 3,510 vpd.

3.4.5 Existing and Projected Truck Traffic

Trucks comprise a significant portion of the traffic stream throughout the study area. There is a base flow of heavy truck traffic of 800 vpd in the study area resulting in a range in the percentage of heavy truck traffic from approximately 6 percent north of Route 60-east to approximately 19 percent in northern Wayne County. The higher percentage is due to a lower base traffic flow and the dependency of heavy trucks on U.S. 67. The lumber industry is a major contributor to the truck traffic in this area. Delivery trucks are another contributor for commercial and retail commerce (e.g., WalMart). Truck traffic along U.S. 67 is projected to increase over the next 20 years. However it is difficult to predict the exact nature of this increase as truck traffic in this area may be affected by growth outside of the study area. A conservative estimate may be as much as 2 percent per year. Depending on the base traffic flow, truck percentages may actually decrease in the future. By 2025, truck traffic may increase to 1,420 trucks per day.

3.4.6 Bicycle, Pedestrian, and Equestrian Use

Pursuant to 23 Code of Federal Regulations (CFR) Part 652, an inventory and analysis of existing bicycle routes and pedestrian walkways was conducted within the study area. Potential bicycle and pedestrian use in the study area is primarily limited to the immediate areas of Cherokee Pass, Greenville, Poplar Bluff, and Neelyville. Pedestrian walkways are defined by the existing sidewalks in Greenville. There are no known planned cycling events in the study area. No defined bicycle paths, routes, or lanes exist in the study area except for the Ozark Trail. There is access to the Ozark Trail south of Greenville at the St. Francis River crossing in Wayne County and at the Hendrickson Recreation Area in Butler County. These sections of the Ozark Trail are open to hikers, bicyclists, and horseback riders. Other trail systems occur within the MTNF, the Coldwater Conservation Area, and the Corkwood Conservation Area. The Ozark Trail is the only trail in the study area that crosses existing U.S. 67 and parallels some portions of existing U.S. 67.

3.5 Air Quality

According to the MDNR-Air Conservation Commission, Madison, Wayne and Butler counties are considered to be attainment areas for each of the primary air pollutants listed in Table 3-11. The control requirements for an attainment area are less stringent than those for non-attainment areas. Pollutants of common concern in highway planning studies are carbon monoxide, ozone, and nitrous oxides.

Table 3-11. Ambient Air Quality Standards

Pollutant	Concentration	Remarks
Particulate Matter 10	50 µg/cubic meter annual arithmetic mean	
	150 µg/cubic meter 24-hour average concentration	As determined by 40 CFR Part 5Q
Fine Inhalable Particulates	15.0 µg/cubic meter arithmetic mean	1 year not to be exceeded more than once per year
	65 µg/cubic meter 24-hour average concentration	24-hour not to be exceeded more than once per year
Sulfur Dioxide	0.03 ppm (80 µg/cubic meter)	Annual arithmetic mean not to be exceeded
	0.14 ppm (365 µg/cubic meter)	24-hour average not to be exceeded more than once per year
	0.5 ppm (1,300 µg/cubic meter)	3-hour average not to be exceeded more than once per year
Carbon Monoxide	9 ppm (10,000 µg/cubic meter)	8-hour average not to be exceeded more than once per year
	35 ppm (40,000 µg/cubic meter)	1-hour average not to be exceeded more than once per year
Photochemical oxidants (Ozone)	0.12 ppm (235 µg/cubic meter)	1-hour average not to be exceeded more than once per year (old standard)
	0.08 ppm	8-hour average not to be exceeded more than once per year (new standard)
Nitrous Oxides	0.05 ppm (100 µg/cubic meter)	Annual arithmetic mean not to be exceeded
Hydrogen Sulfide	0.05 ppm (70 µg/cubic meter)	0.5-hour average not to be exceeded more than 2 times per year
	0.03 ppm (42 µg/cubic meter)	0.5-hour average not to be exceeded more than 2 times in any 5 consecutive days
Sulfuric Acid	10 µg/cubic meter	24-hour average not to be exceeded more than once in any 90 consecutive days
	30 µg/cubic meter	1-hour average not to be exceeded more than once in any 2 consecutive days
Lead	1.5 µg/cubic meter	Calendar quarter arithmetic mean not to be exceeded

Source: MDNR Division 10-Air Conservation Commission.

Based on a cooperative agreement between FHWA, MoDOT, and MDNR, an air quality analysis should be performed if the ADT exceeds 54,000. Traffic on U.S. 67 has been determined to potentially increase to 23,000 ADT. Therefore, this project is not expected to require further analysis.

The three counties of Madison, Wayne and Butler that include the U.S. 67 Study Corridor are in attainment for the National Ambient Air Quality Standards.

Two area county sites are in non-attainment of the National Ambient Air Quality Standards for lead, Iron County's Dent, Liberty and Arcadia Townships sites and a Jefferson County site in the town of Herculaneum, Missouri. Iron County is adjacent to Madison County, and Jefferson County site is located approximately 80.47 km (50 mi) north of Fredericktown. The sources of the exceedances are lead smelting operations and a resource recovery center.

3.6 Aesthetics

The 114-km (71-mi) corridor is located within a primarily rural area that is either forested or used for pasture or cropland. The study corridor is located in two natural physiographic provinces that affect the visible landscape character of the project. Starting from the northern end of the project, the study corridor is in the Ozark Plateau for approximately 120 km (75 mi) and the Mississippi Embayment for 16 km (10 mi) (Fenneman, 1938) The Ozark Plateau is further subdivided into two different sub-regions: the St. Francois Mountains sub-region from north of Cherokee Pass to the southern edge of Silva, Missouri in northern Wayne County, approximately 40 km (25 mi) in length; and the Salem Plateau from Silva south to near the intersection of Routes 67 and 160 in southern Butler County approximately 11 km (7 mi) south of Poplar Bluff, approximately 80 km (50 mi) in length.

The landforms and vegetation in the St. Francois Mountain region are characterized by rolling hills with broad pastures and narrow stream valleys in predominately Oak-Hickory-Pine forested areas. The Salem Plateau is gently rolling to moderately hilly with many karst topography features. Oak-Hickory and Oak-Hickory Pine forests are the common vegetation visible in, and from, the study corridor. A large portion of the corridor is in the valleys and tributary stream valleys of the major rivers in this section, the St. Francois River and the Black River. In comparison to the forested rolling hills of the Ozark Plateau, the Mississippi Embayment or coastal plain province is a flat-farmed landscape growing row crops. The flat landform consists of silt and sandy soils deposited by the Mississippi River. Only remnants of the native vegetation remain (MTNF, 1981). The study corridor also transects or bypasses six rural small towns: Cherokee Pass, Coldwater, Lodi, Silva, Greenville, and Neelyville. These small towns and scattered residential units have developed in a linear development pattern to the existing road.

The scenic attractiveness of the Ozark Plateau and the Mississippi Embayment, with the exception of the linear small towns, is very uniform throughout the length of the corridor with close foreground views of forests areas and open cropland views. Although scenic, the character of the landscape is uniform and not particularly distinctive.

3.7 Geology

The study corridor occurs within two major geologic/topographic subdivisions of the Ozark Plateau physiographic province (St. Francois Mountains and Salem Plateau) and one subdivision of the Interior Lowlands (Mississippi Embayment) (Fenneman, 1938). A topographic view of the study corridor is provided on Figure 3-3. Starting at the northern end of the study corridor and proceeding south, these major subdivisions are described as follows:

- St. Francois Mountains – Volcanic and intrusive igneous rocks at higher elevations surrounded by limestones/dolomites at the lower elevations and river valleys. This subdivision extends from the northern end of the study corridor, Cherokee Pass, to approximately Silva, Missouri.
- Salem Plateau – Broad dissected uplands composed of limestones/dolomites that are exposed in the river valleys, which are generally capped with a resistant sandstone on the ridge tops. This subdivision extends from approximately Silva, Missouri to near the U.S. 67/Route 160 intersection.
- Mississippi Embayment Lowlands – Low bottom lands consisting of sands/silts and clays originating from the ancient Mississippi River. Minor areas of terraces and sand dunes are also present. This subdivision extends from near the U.S. 67/Route 160 intersection to the southern end of the study corridor.

3.7.1 Bedrock

The bedrock geology of the study corridor is presented in Figure 3-4 (MDNR, 1979). A generalized stratigraphic column of the bedrock formations in the study corridor is presented in Figure 3-5 (MDNR, 1995).

Precambrian Igneous Rocks

- The Precambrian igneous rocks consist predominantly of rhyolite with minor areas of granite. The igneous rocks typically do not produce usable groundwater supplies.

Cambrian System

- Lamotte Sandstone – Not exposed at the surface within the study corridor, but is locally present in the subsurface. The Lamotte consists of a white to red, coarse grained sandstone that locally contains conglomerates. Red to purple silty shale is locally present. The Lamotte is considered part of the St. Francois Aquifer. Moderate groundwater yields in the range of 70 to 125 gallons per minute (gpm) are typical of the Lamotte (MDNR, 1997).
- Bonneterre Formation – Not exposed at the surface within the study corridor but is locally present in the subsurface. The Bonneterre consists of a light gray, medium to finely crystalline dolomite. Locally parts of the Bonneterre are shaly. The Bonneterre is the host rock for lead ore deposits in the Lead Belt and the Viburnum Trend. The Bonneterre is considered part of the St. Francois Aquifer, but generally produces low groundwater yields (10 to 15 gpm).
- Elvins Group – Consists of the Davis and Derby-Doerun Formations. Together these two formations comprise the St. Francois Confining Unit. The Davis contains shale, siltstone, fine grained sandstone, dolomite, and limestone. Shale is the dominant lithology in the St. Francois Mountain area. The Davis is considered to be a non-water bearing unit. The Derby-Doerun consists of alternating thin beds of dolomite and siltstone/shale. Although local yield in the upper part of the Derby-Doerun can reach the 30 to 50 gpm range, it is usually not a significant aquifer.
- Potosi Dolomite – Consists of a light gray, massive, vuggy, crystalline dolomite which contains abundant quartz druse and chert. The Potosi gives off a bituminous odor when freshly broken. A deep red, sticky, residual clay develops on weathered Potosi outcrop surfaces. The Potosi is a significant component of the Ozark Aquifer and can generate groundwater yield in the 200 to 1,000 gpm range.
- Eminence Dolomite – Composite of a light gray, massive, dolomite with small amounts of chert. Small amounts of quartz druse are also noted. In some areas, the Eminence Dolomite contains large chert boulders up to 6 feet in diameter. The Eminence Dolomite is part of the Ozark Aquifer and can generate groundwater yields in the 75 to 250 gpm range.
- Stromatolite/Mud Facies – A distinctive lithologic unit composed predominantly of dolomite has been mapped in close proximity to the precambrian igneous rocks (Howe, 1968). The stromatolite facies consist of limestone or dolomite planar laminae, and the mud facies consist of relict burrows in carbonate mud. Minor amounts of shale and clay are also present in this map unit.

Ordovician System

- Gasconade Dolomite – Predominantly a light gray, massive, crystalline dolomite. In some areas, parts of the Gasconade may contain up to 50 percent chert. The upper Gasconade, however, is nearly chert-free. The base of the Gasconade usually contains a sandstone unit designated the Gunter Sandstone Member but is not always present. The Gasconade typically forms vertical bluffs and cliffs along streams, with abundant caves and springs. The Gasconade is part of the Ozark Aquifer with typical groundwater yields in the 50 to 75 gpm range. The typical yields in the Gunter Sandstone Member are in the 40 to 50 gpm range, but locally may reach the 200 to 500 gpm range.
- Roubidoux Formation – Consists of dolomite, sandstone, and gradation of these two lithologies (i.e., sandy dolomite, etc.). The sandstone is comprised of fine to medium grained quartz sand, which is typically red at the surface. The dolomite is finely crystalline, light gray, and contains

chert. The Roubidoux sandstone is noted for well preserved ripple marks, mud cracks, and cross bedding. The Roubidoux is also considered part of the Ozark Aquifer and typically yields 15 to 35 gpm where shallow and 50 to 75 gpm where deeply buried.

3.7.2 Quaternary Geology and Overburden

Most of the study corridor contains a cover of unconsolidated overburden material. This cover ranges from 0 to 100+ feet in thickness. The types of overburden can be classified into the following units (MDNR, 1995).

- Residuum -- Surficial material formed by the in-place weathering of bedrock, typically composed predominantly of low permeability clay and chert.
- Alluvium -- Unconsolidated sand, gravel, clay, and silt deposed by streams and rivers. The stream valleys in the study corridor typically contain predominantly gravel and sands with minor amounts of clay/silt. The Mississippi Embayment contains more fine grained material (clay/silt).
- Loess -- Windblown silt, clay, and sand-sized material derived from Pleistocene glacial-outwash alluvium. Loess typically has a moderate permeability. Loess is present over much of the project area as a thin (less than 1 m) cover over the residuum. Loess is generally absent in the river valleys due to erosion.

3.7.3 Aquifer Types

The general extent of the different groundwater aquifers in the project area are presented in Figure 3-6 (USGS, 1990). The two principal aquifers in the Ozark Plateau are the:

- St. Francois Aquifer composed of the Lamotte Sandstone and the Bonneterre Formation, and
- Ozark Aquifer composed of the Potosi Dolomite, Eminence Dolomite, Gasconade Dolomite, and the Roubidoux Formation.

These two aquifers are separated by the St. Francois Confining Unit (Elvins Group). A detailed description of the above formations and typical groundwater yields is presented in Section 3.7.1. The Mississippi Embayment is underlain by several unconsolidated sand and gravel aquifers with high groundwater yields (MDNR, 1997).

There have been no Sole Source Aquifer designations by the USEPA in Missouri. At this time, the MDNR establishes Wellhead Protection Areas (WHPAs) for public water supply wells (service on average of 25 persons per day) at a 1-mile radius from the well. There are no regulations at the time concerning land use within Missouri WHPAs. The study corridor is within the following WHPAs: Cherokee Pass Restaurant, Madison County PWSD #1-South, Wayne County PWSD #1, Wappapello Res-Old Greenville, Butler County PWSD #1-South, and Neelyville.

3.7.4 Karst

Karst is defined by American Society of Testing Materials (ASTM) as a landscape and its subsurface characterized by flow through dissolutionally modified bedrock and characterized by a variable suite of surface landforms and subsurface features, not all of which may be present or obvious. These include sinkholes, springs, caves, sinking streams, dissolutionally enlarged joints or bedding planes, or both, and other dissolution features. Most karsts develop in limestone or dolomite, or both, but may also develop in gypsum, salt, carbonate-cemented sandstones and other soluble rocks (ASTM, 1995).

In the study corridor, most of the St. Francois Mountains and Salem Plateau sections are underlain by carbonate (limestone/dolomite) bedrock aquifers that discharge, in part, to springs or gaining stream sections. Therefore, these areas are considered to be within “karst terrain.” The Mississippi Embayment is

underlain by a thick sequence of sand, gravel, silt, and clay and, therefore, is not considered to be in a karst area.

Karst terraces exist in a variety of forms, with some areas consisting of systems dominated by open conduit and rapid flow from discrete recharge points (sinkholes, etc.) to springs and other systems consisting of more immature systems, dominated by diffuse recharge and fracture/small conduit, and slower flow rates (Smart and Hobbs, 1986; ASTM, 1995; Ford and Williams, 1989; and Aley, 1978).

The mature karst systems typically contain numerous sinkholes and caves which allow the rapid inflow of surface water, rapid transport through the subsurface (i.e., cave streams) to large volume springs. No caves or sinkholes were observed in the study corridor during the site reconnaissance or on aerial photographs, or topographic maps. A search of the Missouri Speleological Survey files, which contains records of most reported caves within the state, found no listed caves within the study corridor (Thomson, 1999). Numerous springs (approximately 25), however, have been identified as well as gaining and losing streams. Clearly, most of the study corridor in the St. Francois and Salem Plateau sections are underlain by karst aquifer systems, but does not appear to be a fully mature system, similar to some section of the Ozarks (i.e., Eleven Point/Current River areas). The study corridor karst systems are considered to consist of less mature systems in which groundwater entry, flow, and discharge are typically less rapid than the fully mature systems.

3.7.5 Earthquake Potential

The study area is within the New Madrid Seismic Zone (Thenhaus, 1990). The potential impacts from an earthquake include liquefaction of unconsolidated materials, collapse of structures, and landslides.

3.7.6 Detailed Study Corridor Description

From north to south, the following paragraphs detail the geology and hydrology for the U.S. 67 study corridor.

St. Francois Mountains

The study corridor starts 3.2 km (2 mi) south of Fredericktown, in the Mill Creek valley. Mill Creek valley is underlain by dolomite bedrock (stromatolite/mud facies). Topography is relatively flat within the Mill Creek Valley with elevations of 740 to 800 ft mean sea level (msl).

Cherokee Pass is located on a broad, relatively flat structural ridge (Cox Flat). This ridge is capped by 100+ feet of cherty residuum. The elevations in proximity to Cherokee Pass are 900 to 1,000 ft msl. The higher hills in the Cherokee Pass area (Matthews Mountains, Burns Mountains) are composed of igneous (rhyolite) rock. Igneous rocks are exposed in close proximity to the study corridor north and west of Cherokee Pass.

At the southern end of Cherokee Pass, U.S. 67 enters the Twelvemile Creek drainage basin (typical elevations are 700 to 800 ft msl). The Twelvemile Creek valley is underlain by the Elvins Group (combined Derby-Doerun and Davis Formations), and the stromatolite/mud facies. Several springs were noted along the Twelvemile Creek section of the project corridor and is known as both a groundwater gaining and loosing stream. South of the Twelvemile Creek valley the corridor enters the Cedar Creek drainage, and the underlying bedrock consists of the Potosi Dolomite. In the immediate vicinity of Coldwater, Missouri, the Cedar Creek valley is underlain by the Derby-Doerun Formation. Several springs were noted during field reconnaissance in the vicinity of Coldwater originating at the Potosi/Derby-Doerun contact. Typical elevations in this area are 500 to 600 ft msl.

South of Coldwater, Missouri, U.S. 67 crosses an upland area (elevations up to 700 ft msl), which consists of the Potosi Formation, residuum, and a granite outcrop. Beyond this upland area, U.S. 67 enters

the Hunter and Bennett Creek valley bottom at Lodi, Missouri elevation approximately 450 ft msl). This area is underlain by the Potosi Dolomite. A small spring is located on the south side of Bennett Creek near the Lodi Roadside Park. This spring is occasionally used as drinking water supply.

To the south of Lodi, Missouri, U.S. 67 enters an upland area (elevations up to 600 ft msl) and then the Hubble Creek valley (elevations 400 to 500 ft msl). The Hubble Creek valley extends approximately 1.6 km (1 mi) to the south of Silva, Missouri. The predominant bedrock in the project area from Lodi to Silva is the Potosi Dolomite. Several springs were observed in the Hubble Creek valley. The most notable were in the vicinity of Bounds, Missouri and in the stream located between Silva and U.S. 67. The stream adjacent to Silva appears to be the former Hubble Creek channel that was re-located to the west of U.S. 67. The Greenville Fault is located between Silva and Greenville, Missouri.

Salem Plateau

At the southern edge of Silva (Greenville Fault), the bedrock geology along U.S. 67 changes to the Eminence Dolomite. Outcrops of the Eminence Dolomite, located approximately 1.6 km (1 mi) north of Greenville, were very vuggy (porous). The study corridor, from Silva to the St. Francois River crossing south of Greenville, is located within the Eminence Dolomite (typical elevations about 400 ft msl). The St. Francis River floodplain in proximity to U.S. 67 has elevations in the range of 380 to 400 ft msl. A reconnaissance effort identified Eva Spring just south of the St. Francis River bridge in the floodplain. A spring was also noted in the Eminence Dolomite at the Ozark Trailhead.

After crossing the St. Francois River, U.S. 67 enters Pleasant Valley, with a known losing stream (elevation of 380 to 500 ft msl), and crosses an upland area (elevations up to 670 ft msl) before entering Smoot Hollow, followed by Otter Creek (elevations of 380 to 400 ft msl). The uplands between the St. Francis River and Otter Creek are underlain by the Roubidoux and Gasconade formations and the stream valleys are underlain by Eminence Dolomite. Box Spring, issuing from the Eminence Dolomite, is located approximately 1.28 km (0.8 mi) south of the Otter Creek crossing on the west side of U.S. 67.

In general, the area from Greenville to the Mississippi Embayment consisting of broad uplands (typical elevations of 500 to 600 ft msl) capped with the Roubidoux Sandstone, with the major valleys (i.e., Black River, Cane Creek) underlain by the Gasconade Dolomite (typical elevations of 380 to 400 ft msl). The Cane Creek U.S. 67 crossing has an elevation of approximately 330 ft msl.

Mississippi Embayment

South of the intersection of Routes 67/160, the project area enters the Mississippi Embayment (Interior Lowlands). In this subdivision, the bedrock is covered by a thick mantle of unconsolidated sands, silts and clays. Typical elevations in proximity to U.S. 67 are approximately 300 to 310 ft msl. These deposits consist of mostly silt or sand alluvium, deposited by the Mississippi River. These alluvial deposits are dated as Early or Late Wisconsin. Dune sands (Holocene and Late Wisconsin) are also noted in the broad terraces in the vicinity of U.S. 67. These unconsolidated dune sand deposits comprise the Mackintosh, Harris, and Sharecropper Ridges, located west and northwest of Neelyville.

3.7.7 Mines and Mineral Resources

The Division of Geology and Land Survey (DGLS) Inventory of Mines, Occurrences, and Prospects (IMOP) Database [MDNR-Geological Survey and Resource Assessment Division (GSRAD) Database, 2001] and the Mineral Industry Locator System (MILS) Database [MDNR-Division of Environmental Quality (DEQ) MILS Database, 1999] were reviewed for the study area.

The U.S. 67 study corridor passes through two principal mining or potential mining areas. These mining areas are based on a series of publications of MDNR and USGS (Pratt, 1991; Pratt et al., 1984; Miller, 1982; and Rueff, 1987). The mining areas along the U.S. 67 corridor can be divided into two broad regions:

A – Old Lead Belt, and

B – Greenville Iron Ores.

Region A consists of a broad region around Bonne Terre and Fredericktown. These mines produced base-metal sulfides (lead, zinc, copper, nickel, cobalt) from limestones and dolomites. Region A is currently inactive and all mines are located well outside of the study corridor, with the closest mine activity over 0.4 km (0.25 mi) from the corridor.

Region B consists of an area of the study corridor primarily between the towns of Greenville and Poplar Bluff. These mines produced iron ore from iron rich clays. Based on information obtained from the MDNR, the mines were small open-pit surface mines with no underground mines known to exist within the study corridor. These open-pit mines have been inactive for decades.

The other mineral resources in the study corridor consist of limestone and gravel. The only active limestone quarry within the study corridor is the Williams Quarry near the Black River. There are no known active gravel quarries in the study corridor.

3.7.8 Soils

Soils within the study corridor have developed as a result of three processes: deposition of wind-borne materials (loess), deposition of water-borne materials (alluvium), and weathering in-place of the existing bedrock material (residuum). The silty loam loess materials are found on the flat hilltops, and are a minor soil component in the study corridor, generally being less than 0.6 m (2.0 ft) thick. Alluvial materials are generally restricted to stream beds and floodplains. The major soil component is the residuum, which is primarily a cherty clay loam. The residuum may be up to 30 m (98.4 ft) thick in places.

At this point, the Madison County and Wayne County NRCS Soil Surveys are not yet complete. In Wayne County, the hydric soils list and the soil associations were not yet available. In Madison County only the soil associations list was not yet available. Soils occurring within the study corridor are listed in Table 3-12.

Soil associations are distinct in terms of predominant soil types, relief, and drainage patterns. Each association is named for the predominant soil type(s) that characterize a particular area. The following soil associations are found within the study corridor in Butler County. The descriptions of the soil associations are derived from the NRCS "Soil Survey of Butler County and Part of Ripley County, Missouri," issued November 1983.

Loring-Captina-Clarksville
This soil association is found on partly wooded, broad ridges and somewhat benched and dissected side slopes. Small streams drain the areas of this association. The association is composed primarily of Loring silt loams, Captina silt loams, and Clarksville very cherty silt loams. The association is characterized as gently sloping to steep, moderately well drained (Loring and Captina) and somewhat excessively drained (Clarksville), silty and very cherty soils.

Clarksville-Captina
This association is characterized by partly wooded, narrow ridgetops and wooded side slopes that are adjacent to streams. The association is composed primarily of the Clarksville and Captina soils. The association is characterized by gently sloping to steep, somewhat excessively drained and moderately well drained, very cherty and silty soils.

Tuckerman-Bosket
This association is characterized by drainageways, basins, wide, low terraces, and low mounds of natural levees. The levees are drained by a system of low channels and depressions. The association is composed primarily of Tuckerman and Bosket soils. The association is nearly level to moderately sloping, poorly drained and well drained, loamy soils. The association may be located on low terraces and ridges and mounds of natural levees.

Table 3-12. Soil Associations of the Study Corridor

ID	Soil Name	Association*	Hydric†	Highly Erodible**	Prime Farmland‡
Madison County					
13	Clarksville gravelly silt loam	--	No	Yes	Yes
15	Firebaugh silt loam	--	No	Yes	Yes
18	Courtois silt loam	--	No	Yes	Yes
19	Crider silt loam	--	No	Yes	Yes
20	Marquand silt loam	--	No	Yes	Yes
26	Freeburg silt loam	--	No	No	Yes
28	Cornwall silt loam	--	No	Yes	Yes
29	Viraton silt loam	--	No	Yes	Yes
32	Caneyville silt loam	--	No	Yes	Yes
52	Secesh silt loam	--	No	No	Yes
57	Poynor gravelly silt loam	--	No	Yes	No
65	Elk silt loam	--	No	No	Yes
82	Relfe sandy loam	--	No	No	Yes
88	Captina silt loam	--	No	Yes	Yes
98	Waben silt loam	--	No	No	Yes
Wayne County					
11	Alred-Goss complex	--	Incomplete***	Yes	Incomplete
13	Poyner-Noark-Doniphan complex	--	Incomplete	Yes	Incomplete
14	Clarksville-Scholten complex	--	Incomplete	Yes	Incomplete
19	Crider silt loam	--	Incomplete	Yes when >3% slope	Incomplete
20	Marquand silt loam	--	Incomplete	Yes when >3% slope	Incomplete
21	Cornwall silt loam	--	Incomplete	Yes when >3% slope	Incomplete
22	Cornwall-Buckhorn silt loams	--	Incomplete	Yes	Incomplete
23	Captina-Scholten complex	--	Incomplete	Yes	Incomplete
25	Tonti-Scholten complex	--	Incomplete	Yes	Incomplete
30	Gladden silt loam	--	Incomplete	No	Incomplete
31	Kaintuck loam	--	Incomplete	No	Incomplete
32	Bardley-Crider complex	--	Incomplete	Yes	Incomplete
33	Gatewood-Crider-Rock outcrop complex	--	Incomplete	Yes	Incomplete
52	Secesh silt loam	--	Incomplete	No	Incomplete
57	Alred-Reuter complex	--	Incomplete	Yes	Incomplete
65	Bearthicket silt loam	--	Incomplete	No	Incomplete
67	Wilbur silt loam	--	Incomplete	No	Incomplete
71	Freeburg silt loam	--	Incomplete	No	Incomplete
73	Haymond silt loam	--	Incomplete	No	Incomplete
76	Moniteau silt loam	--	Incomplete	No	Incomplete
82	Elsah loam	--	Incomplete	No	Incomplete
84	Tilk	--	Incomplete	Yes	Incomplete
91	Udorthents-Urban Land	--	Incomplete	No	Incomplete
98	Tilk-Secesh complex	--	Incomplete	No	Incomplete
Butler County					
3	Adler silt loam	Loring-Captina-Clarksville	No	No	Yes
	Elk silt loam	Clarksville-Captina	No	No	Yes
5	Bosket fine sandy loam	Tuckerman-Bosket	No	No	Yes
7	Calhoun silt loam	Calhoun-Amagon	Yes	No	Yes
8	Captina silt loam	Clarksville-Captina	No	No	Yes
9	Clarksville very cherty silt loam	Clarksville-Captina	No	No	No
19	Hontas silt loam	Clarksville-Captina	No	No	Yes
23	Loring silt loam	Loring-Captina-Clarksville	No	No	Yes
28	Tuckerman fine sandy loam	Tuckerman-Bosket	Yes	No	Yes
29	Tuckerman-Bosket fine sandy loams	Tuckerman-Bosket	Varies	No	Yes
30	Wideman fine sandy loam	Clarksville-Captina	No	No	Yes
32	Pits	--	No	No	No

* *Association--A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.*

† *Hydric Soil--A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (USDA-SCS, 1985). Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.*

** *Highly Erodible--These lands have been defined in order to identify areas on which erosion control efforts should be concentrated. The definition is based on Erosion Indexes derived from certain variables of the Universal Soil Loss Equation (Wischmeier and Smith, 1978) and the Wind Erosion equation (Woodruff and Siddoway, 1965). The indexes are the quotient of tons of soil loss by erosion predicted for bare ground divided by the sustainable soil loss (T factor).*

‡ *Prime Farmland--Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses (NRCS, 1999).*

*** *Indicates that mapping is currently incomplete.*

Calhoun-Amagon
This association is characterized by low, broad terraces and floodplains. The terraces are drained by a system of old sloughs. The association is composed primarily of the Calhoun silt loam and the Amagon silt loam. The association is characterized by nearly level, poorly drained, silty soils located on low terraces and flood plains.

3.8 Water Quality and Aquatic Ecology

3.8.1 Surface Water

The Wild and Scenic Rivers list was examined to determine the occurrence of a listed watercourse in the study corridor. There are no designated Wild and Scenic Rivers in the study area. The project corridor crosses several watersheds within Madison, Wayne, and Butler counties (Figure 3-7). The primary hydrologic features within the study corridor (north to south) include Twelvemile Creek, Coon Creek, Cedar Creek, Wilmore Creek, Hunter Creek, Bennett Creek, Hubble Creek, Peters Branch, Frazier Creek, Bounds Creek, St. Francis River, Pleasant Valley Creek, Widows Creek, Wolf Run Creek, Magill Hollow, Otter Creek, Black River, Cane Creek, and a network of irrigation ditches in the Mississippi lowlands. The two largest watersheds associated with the study corridor are the St. Francis River and Black River systems. The largest water body in the region of the study corridor is Wappapello Lake which was authorized to provide flood control for the St. Francis River and its tributaries. Surface water features within the study corridor include flowing water (lotic) systems and nonflowing (lentic) systems.

Flowing, or lotic, water systems include rivers, streams, creeks, springs, and man-made irrigation ditches. Flowing water systems occur throughout the landscape within the study corridor. Streams in the project area can vary in characteristics between small, high gradient streams in narrow valleys or ravines, to large, low gradient rivers with well developed floodplains. The volume and duration of flow within the systems depend on season, rainfall patterns, and groundwater discharge. Flow within some of these systems is highly variable.

Flowing resources in the study area range from sinuous (Twelvemile Creek) to heavily channelized (Neelyville Ditch) systems. The MDNR classifies most of the local streams in the corridor as either "Class P" or "Class C" streams. Class P streams are streams that maintain permanent flow even in drought periods [Code of State Regulations (CSR), 1994]. Class C streams are characterized as those streams which may cease flow in dry periods but maintain permanent pools which support aquatic life.

Both the St. Francis River and the Black River are considered Class P streams throughout their flowage. The majority of streams located within the project corridor contain stream sections which are considered Class P and sections considered Class C such as the Little St. Francis River, Mill Creek, Twelvemile Creek, Hubble Creek, Otter Creek, and Cane Creek. These streams are capable of sustaining diverse aquatic warm-water communities even during dry periods. These drainages commonly occur within forested areas or near the edge of forested-pastured parcels. Substrates are typically rock-gravel with scattered cobbles and boulders. Instream structure is variable, with well defined pools and riffles.

Streams classified as Class C streams include Peters Branch, Bounds Creek, and Harviell Ditch (see Figure 3-7). However, most of these stream sections are connected to other permanent waterways and likely sustain permanent aquatic communities.

Twelvemile Creek is a perennial stream with typical channel widths of 8 m (26 ft) and depths typically less than 2 m (6 ft). Substrate composition includes sand, gravel, and cobble with variable stream side cover. Flowing habitats include riffles, runs, and pools with various woody debris and snags. Adjacent land use is predominantly forested mixed with scattered agricultural land.

The St. Francis River is a medium to large sized river with typical channel widths of 10 to 15 m (33 to 50 ft) wide. Channel depths are typically less than 2 m (6 ft) deep. At the U.S. 67 crossing, however, the St. Francis River is influenced by the backwater of Wappapello Lake and has a wider channel [60.7 to 91.4 m (200 to 300 feet)] and is deeper than 2 m (6 ft). Substrate composition includes silt, sand, gravel, and cobble. Stream habitats include riffles, runs, and pools, and adjacent land use is primarily forested and agricultural. The St. Francis River valley makes up the main portion of Wappapello Lake.

Hubble Creek is a perennial stream with channel widths typically in the 5 m (16 ft) range and depths less than 1 m (3 ft). Substrate composition includes silt, sand, gravel, and cobble with woody debris including snags. Adjacent land usage includes agricultural, residential, and commercial. Stream habitat includes riffles, runs, and pools.

The Black River is a medium to large river with channel widths between 10 to 15 m (33 to 50 ft) wide. Channel depths typically range between 1 and 2 m (3 to 6 ft). Substrate composition includes silt, sand, gravel, and cobble. Stream habitats include riffles, runs, and pools. Adjacent land use is typically forest land and agricultural land.

Cane Creek is a perennial stream with channel widths ranging between 10 and 12 m (33 to 40 ft). Stream depths vary between 1 to 2 m (3 to 6 ft). Substrate composition includes silt, sand, gravel, and cobble. Adjacent land use is dominated by agricultural land, and habitat is confined to runs and pools.

The Harviell Ditch is located near the southern boundary of the study corridor and is primarily a source of irrigation for adjacent farmland. Channel widths range between 3 and 5 m (10 to 16 ft) and overall channel depth is typically less than 1 m (3 ft). Channel substrates are typically composed of soft material such as silt and sand. The predominant habitat type is pool with little or no flow.

After selection of the Preferred Alternative, the jurisdictional streams within proposed right of way were delineated in accordance with USACE methodology. The results of this delineation were presented in the Wetland and Stream Delineation Technical Memorandum for the U.S. 67 EIS (Wetland TM) (MACTEC, 2003). The field determination of jurisdictional streams was based upon the presence of an ordinary high water mark (OHWM), bed/bank, and a surface water connection to navigable water of the United States.

Nonflowing Systems

Nonflowing, or lentic, water systems include lakes, ponds, and impoundments. Nonflowing water systems are scattered throughout the length of the project corridor. A large majority of these lentic systems are man-made. These ponds are typically less than 30.5 m (100 ft) in diameter and less than 2 m (6 ft) deep, although others are larger and may be deeper. Most of these systems are relatively isolated within the landscape. Water flow and exchange are primarily determined by sheet flow and storm water runoff from surrounding areas, and direct precipitation. The impoundments and excavated ponds are often utilized for livestock watering purposes; however, depending on their size, many have been stocked with fish at some time. The largest impoundment located near the study area is Wappapello Lake.

Wappapello Lake is a reservoir with the main portion being formed by the St. Francis River valley. The dam was completed in 1941 and is approximately 13 km (8 mi) east of the study corridor. Wappapello Lake has a drainage area of 3,393 square km (1,310 square mi) and a water surface area of 3,400 ha (8,401 ac). The maximum recorded depth for the reservoir was 14.3 m (47 ft).

The availability of aquatic ecological data for the project corridor is limited. Historic aquatic community data for the project corridor is limited with respect to water quality, benthic macroinvertebrates, and fishery resources. The deficiency of this type of data makes it difficult to fully characterize the aquatic resources within the study corridor. Although water quality data for a particular water body commonly varies due to seasonal fluctuations (i.e., daylight length and rainfall), extreme variations within short

periods of time are indicative of the introduction of foreign substances which can be harmful to aquatic life.

Water Quality Data

Water quality standards and their associated information were obtained from Murdoch et al. (1996). Typical water quality parameters measured include pH, alkalinity, temperature, dissolved oxygen, conductivity, and nitrate levels. in general, water quality in the project corridor is considered good. Most creeks and streams flow through rural landscapes and are spring fed and are therefore typically low in turbidity. A pH range of 6.5 to 8.2 is considered the optimal range for most aquatic life. Alkalinity refers to a stream's ability to neutralize acids and resist changes in pH. Alkalinity levels between 20 and 200 milligrams per liter (mg/L) are typically measured in fresh water. Temperature affects the solubility and toxicity of other water quality parameters. Generally, the solubility of solids increases with increasing temperature, while gases tend to be more soluble in cold water. Thus, temperature is directly related to the dissolved oxygen content of water. The optimal temperature range for aquatic live is 5 to 25 degrees Celsius (°C). Dissolved oxygen is the amount of gaseous oxygen dissolved in an aqueous solution. Streams with high dissolved oxygen concentrations (>8 mg/L) are considered healthy streams. Conductivity is a measure of the ability of a water body to pass an electrical current. The conductivity range of streams supporting healthy fish populations is generally between 150 to 500 microsiemens per centimeter (µS/cm). Nitrates are the oxidized chemical forms of nitrogen found in natural systems. Nitrates stimulate the growth of algae and other plankton, and can cause the eutrophication of a water body (the process by which water becomes enriched with nutrients) if present in excess amounts. Nitrate levels in aquatic ecosystems typically measure less than one mg/L. The chemical water quality of a water body is considered "good" if naturally occurring substances are present in the concentrations appropriate for the particular aquatic ecosystem in question and the life it supports (Murdoch et al., 1996).

Water quality data has been collected by USACE personnel at Wappapello Lake at several sites (Appendix D). According to Mr. James Gracey of the Wappapello Lake District, water quality is described as "good" for Wappapello Lake (personal communication, 2000). Other water quality data is limited to volunteer water quality monitoring data for Butler, Madison, and Wayne Counties (Table 3-13).

Table 3-13. Volunteer Water Quality Monitoring Data for Madison, Wayne, and Butler Counties

	Date	Water Temp. (°C)	Oxygen (mg/L)	pH	Nitrate as N (mg/L)	Conductivity (µS/cm)	Flow (cfs)	QA/QC	Water Quality Rating*
Stream/Site									
Madison County									
Greasy Creek	7/1/95	24	9	8.2	0.25	220	0.82	1	--
Marble Creek – 200 ft upstream from confluence with St. Francis River	5/8/96	20	10	8.4	0	140	67.87	1	24
Wayne County									
Clark Creek – Lebanon Church	2/12/97	5	13	8.5	0.25	180	22.3	1	--
McKenzie Creek – Piedmont	9/6/96	24.4	15	7.9	1	420	0	1	28
Butler County									
Ten Mile Creek – Upstream from Route TT	1/20/97	2	--	7.2	0.25	--	20.3	1	--

* *Water quality rating is based on methods used by Isaak Walton League of America's "Save Our Streams." Water quality is described by the rating as follows: Poor (<11-16), Good (17-22), Excellent (>22).*

QA/QC = quality assurance/quality control *°C = degrees Celsius* *cfs = cubic feet per second.*
mg/L = milligrams per liter *µS/cm = microsiemens per centimeter*

Source: MDC, 1998.

The overall representative water quality of a stream is typically determined after conducting baseline monitoring for a minimum of 2 years due to the natural variation that occurs over time in these aquatic systems (Murdoch et al., 1996). No other water quality data for the project corridor were available.

Spring Water Chemistry

The study corridor springs are located in the Black River and St. Francis River basins. According to Vineyard (1982), the spring waters in the area are classified as moderately mineralized calcium magnesium bicarbonate type. Water is generally hard, with total hardness ranging from 49 to 319 mg/L. The dissolved solids content range from 55 to 277 mg/L, iron content ranges from not detected to 0.3 mg/L, and the nitrate content ranges from not detected to 3.0 mg/L.

3.8.2 Wetlands

Wetland communities represent transitional areas between aquatic and terrestrial habitats and reflect aspects of both communities. Wetlands occur within a variety of landscapes including forest, pasture, cropland, rivers, ponds, and old fields. Wetland habitats are generally highly productive and may maintain relatively diverse floral and faunal assemblages. Wetlands provide a variety of beneficial functions which include:

- **Hydrologic Functions** – Short- and long-term surface water storage, groundwater storage and flow moderation, and energy dissipation (erosion control).
- **Water Quality Functions** – Cycling of nutrients, retention of sediment, removal of pollutants, and the export of carbon.
- **Wildlife Habitat Functions** – Preservation of plant and animal communities including rare species.

Wetlands are considered jurisdictional wetlands if they meet all three wetland criteria (USACE, 1987):

1. **Vegetation** – The prevalent vegetation consists of species that are typically adapted to inundated or saturated soil conditions. This criterion does not need to be met if the area has been disturbed (farmed, etc.) and the natural vegetation has been removed.
2. **Soil** – Soils are present and have been classified as hydric or they possess characteristics that are associated with reduced soil conditions.
3. **Hydrology** – The area is inundated either permanently or periodically or the soil is saturated to the surface at some time during the growing season (i.e., 15-day inundations or greater).

In addition, wetlands must be hydraulically connected or adjacent to jurisdictional waters of the United States in order to be classified as jurisdictional wetlands [U.S. Supreme Court ruling, Solid Waste Agency of Northern Cook County (SWANCC)]. Typically, this includes wetlands located within the floodplain of a jurisdictional water.

The wetlands within the study area consist of palustrine and farmed wetlands. These principal types are further divided based on hydrology, landscape position, and vegetation (USFWS, 1979).

Palustrine Wetlands

Palustrine wetlands cover less than 8.1 ha (20 ac), lack active wave-formed or bedrock shoreline features, and have water depths at low water of less than 1.8 m (6 ft). Palustrine wetlands are subsequently classified according to dominant vegetation:

- Palustrine unconsolidated bottom (PUB) are characterized by particles smaller than stone and a vegetative cover less than 30 percent. This classification is typically applied to small “pond-like” wetlands.
- Palustrine emergent wetlands (PEM) are characterized by herbaceous (non-woody) plants. Emergent wetlands are also known as marshes, meadows, fens, etc.
- Palustrine scrub-shrub (PSS) wetlands are characterized by woody vegetation that is less than 6 m (19.6 ft) tall.
- Palustrine forested wetlands (PFO) are characterized by woody vegetation that is 6 m (19.6 ft) tall or taller.

Farmed Wetlands

The NRCS has jurisdiction over the determination of farmed wetlands, which consist of active row crop or pasture. These areas meet the wetland soils and hydrology criteria but are currently used for agriculture. The NRCS has several classifications within this group [prior converted cropland (PC), farmed wetland (FW), wetland pasture (WP), etc.]. Farmed wetlands typically are not used every year due to excess moisture. Farmed wetlands typically have lower plant diversity and other functional values compared to other wetland types. Prior cropland is agricultural land that was manipulated and drained before December 1985 and is no longer considered a wetland area.

Regulatory Requirements

Wetland systems are designated as "waters of the state" or "waters of the United States" and are afforded regulatory protection on both the federal and state levels. The regulations, under CWA, have assigned the USACE and the MDNR with regulatory jurisdiction over the waters of Missouri. The CWA requires that all actions involving dredge and fill activities within special aquatic sites including jurisdictional wetlands must first be authorized by a Section 404 permit. The USACE reviews project plans and issues Section 404 permits for dredge and fill activities within wetlands. Section 401 (CWA) requires that water quality certification be obtained for any activity that results in discharge into streams or wetlands; this program is overseen in Missouri by the MDNR. USACE has a cooperative agreement with MDNR to process water quality certification (Section 401) jointly with Section 404 permit applications. In addition, Executive Order 11990, Protection of Wetlands, mandates that federal agencies avoid and minimize impacts to wetlands during the planning of federally funded projects.

Identification and Delineation of Wetlands

In response to these regulatory mandates, a thorough wetlands inventory was conducted as part of the natural resource investigation within the study corridor. Potentially jurisdictional wetlands were identified during the corridor and study alternate development stages as components of developing the natural resource constraints mapping.

Wetlands occurring within the project corridor were identified utilizing a variety of existing data sources, which includes:

- NWI maps;
- USGS 7.5 minute topographic quadrangle maps (Section 7.0);
- Aerial photography (1997);
- FEMA Flood Insurance Rate Maps (FIRMs); and
- Madison, Wayne (limited data available), and Butler counties soil surveys and hydric soils lists (NRCS).

Wetlands were initially identified using NWI and NRCS maps. Streams were identified on USGS maps. Subsequent field reconnaissance was conducted to confirm mapped resources and identify additional resources. In general, the field reconnaissance was limited to an approximate 305-m (1,000-ft) band on either side of the centerline of the proposed alternatives.

The NRCS was contacted to determine if farmed wetlands had been mapped within the study corridor. Mr. Thomas Johnson of the NRCS Bollinger County office stated that no wetlands had been mapped by NRCS in proximity to U.S. 67 in Madison and Wayne counties. Mr. Thomas Robins of the NRCS Poplar Bluff office provided information and maps concerning NRCS mapped wetlands in Butler County.

The wetlands within the study corridor are composed of a variety of types and have a wide range of hydrological, floral, and soil characteristics. For purposes of this report, the study corridor wetlands are placed into the following five basic groups:

1. High gradient stream wetlands;
2. Springfed wetlands and fens;
3. Major river floodplain wetlands;
4. Mississippi lowland wetlands; and
5. Excavated ponds and impoundments.

There is some overlap in this basic grouping of the study corridor wetland types (i.e., some excavated ponds receive hydrology from springs, etc.) but this general grouping assists in the description and understanding of project wetlands.

High Gradient Stream Wetlands

These wetlands are associated with the high gradient streams and creeks within the Ozark section of the study corridor. Typically, these streams have sand/gravel/cobble substrates and receive, in part, groundwater discharge as a hydrology source. These streams include Twelvemile Creek, Hubble Creek, Peters Branch, Bounds Creek, Pleasant Valley Creek, Widows Creek, Otter Creek, and Magill Hollow. In general, these streams have high gradients and energy levels and, therefore, have limited potential for wetland development. These stream systems, however, also include side overflow channels or relict channels that can retain water for extended periods and may receive groundwater discharge as a hydrology source. In some areas, multiple separate channels (braided stream systems) carry surface water during high flow periods. Typically, the dominant hydrology source for these wetlands is groundwater discharge, but overbank flooding from the adjacent streams is also important at several of these wetlands. Most of these wetlands are classified as PFO, but also include PSS and PEM wetlands.

Typical tree and shrub species at the smaller stream wetlands include sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), muscle wood (*Carpinus caroliniana*), alder (*Alnus serrulata*), red maple (*Acer rubrum*), box elder (*Acer negundo*), green ash, (*Fraxinus pennsylvanica*), Ozark witch hazel (*Hamamelis vernalis*), buttonbush (*Cephalonthus occidentalis*), and various willows [sandbar willow (*Salix exigua*), black willow (*S. nigra*), and Carolina willow (*S. caroliniana*)]. Herbaceous species include common boneset (*Eupatorium perfoliatum*), deer tongue (*Dichanthelium clandestinum*), in-land sea oats (*Chasnanthium latifolium*), tear-thumb (*Polygonum sagittatium*), false nettle (*Boehmeria cylindrical*), and touch-me-nots (*Impatiens capensis*).

Springfed Wetlands and Fens

Approximately 25 springs and four fens have been identified in the project corridor. Most of the study corridor springs are single point discharges in high gradient (high energy) environments and, therefore, lack conditions suitable for wetland development. The MDNR spring database and maps were reviewed for the study area during a visit to the MDNR Rolla office and no additional springs were noted in the corridor. New springs observed during the field effort were added to the MDNR database. Although they may have well developed, vegetated riparian corridors, only a few of the springs have associated wetlands that could be considered jurisdictional. The obvious hydrology source for these areas is groundwater discharge, either as (1) single or multi-point discharges or (2) diffuse discharge. It is only in topographically low areas, or where spring water flow is impeded, that wetlands have developed. In several cases, excavations/impoundments have allowed spring fed ponds and wetlands to develop. Several of the springs flow some distance before forming or supplying the hydrology for wetland complexes. Most of these wetlands are classified as PEM or occasionally as PFO.

Surveys of Missouri springs have shown that specialized species utilize the cold, clear water as habitats (Steyermark, 1941; Vineyard, 1982, and Gardner, 1986). These surveys have not included the springs within the study corridor. These surveys did, however, include other springs in the Madison, Wayne, and

Butler counties and did identify isolated springs that contain species identified at only one or a few locations. As an example, a rare and endangered species of crustacea, the isopod *Caecidotea dimorpha* is known from a single spring seep in Wayne County (Gardner, 1986). Typical fauna found in Missouri springs are flatworms (*Turbellaria*), crustacea (amphipods, isopods, and crayfish), snails, salamanders (i.e., long tailed and cave), frogs (pickerel), and fishes (southern redbelly-dace, sculpins).

Steyermark (1941) found many species of flora limited to Missouri springs due to the cold water temperatures. Ivy-leaved duckweed is an example of flora found in only four springs (Steyermark, 1941). The most common flora identified in Missouri springs are water cress (*Nasturtium-aquaticum*), water milfoil (*Miriophyllum heterophyllum*), and water starwort (*Callitriche heterophylla*). Steyermark (1941) reported 60 plant species in the springs of Missouri. The presence of some of these species (i.e., watercress) are indicator species due to the occurrence of cold spring water; they can not exist in the surrounding warmer waters.

Examples of spring fed areas that support wetlands include Cherokee Pass Springs, Twelvemile Springs, Geronimo Spring, Alexander Spring, and Box Spring (see Figure 3-7). These areas typically have relatively diverse flora communities, and in several cases represent and/or are in association with potential unique habitats (below). The plant communities typically consist of an emergent fringe, aquatic macrophytes, and occasional shrub and tree species.

Fens are formed by diffuse groundwater discharge saturating a broad area. Several areas of diffuse groundwater discharge were noted in the study corridor, but due to lack of flora and other conditions are not considered fens. The following four areas were considered to meet the criteria of a fen: Jessie Fen; Self Fen; Alexander Fen; and Bounds Fen (see Figure 3-7). These areas are continuously saturated and appear as distinct features in the landscape. The flora diversity is generally high, with dominant vegetation as emergent and shrub species. Some of the interesting plants identified in the fens include two "glacial relic" species: prairie straw sedge (*Carex suberecta*), and silky willow (*Salix sericea*). As the climate warmed after the last ice age, these plants remained in pockets of cool (spring-fed) moist soils. A partial list of plant species identified in springs/springfed wetlands is presented in Table 3-14.

Table 3-14. Common Plant Species Observed in Springs, Spring-Fed Wetlands, and Fens within the U.S. 67 Study Corridor

Common Name	Scientific Name	Common Name	Scientific Name
Sweet flag	*Acorus calamus*	Sensitive fern	*Onoclea sensibilis*
Swamp agrimony	*Agrimonia parviflora*	Tear thumb	*Polygonum sagittatum*
Alder	*Alnus servulata*	Swamp rose	*Rosa palustris*
Sedge	*Carex spp., Cyperus* spp.	Arrowhead	*Sagittaria* sp.
Button bush	*Cephalanthus occidentalis*	Willows	*Salix* spp.
Soft rush	*Juncus effusus*	Common cattail	*Typha latifolia*
Blue lobelia	*Lobelia siphilitica*	Narrow-leaved cattail	*Typha angustifolia*
Watercress	*Nasturtium-aquaticum*	Wild celery	*Vallisneria americana*

Major River Floodplain Wetlands

The major river floodplains within the study area are associated with the St Francis and Black rivers. Cane Creek is considered part of the Mississippi lowlands. The major river wetlands are developed in relic scars, overflow channels, and other depressional areas within the floodplains. The dominant hydrology source for these wetlands is overbank flooding and ponding of direct precipitation. Locally, groundwater discharge also influences wetland hydrology. Most of the floodplain wetlands are classified as PFO, but PSS, PEM, PUB and FW are also present.

Typical tree and shrub species are box elder, cottonwood, green ash, silver maple (*Acer saccharinum*), sycamore, black willow, red maple, buttonbush, river birch (*Betula nigra*), and deciduous holly (*Ilex*

deciduas). Herbaceous species include beggars-tick (*Bidens frondosa*), clear-weed (*Pilea pumila*), false nettle, in-land sea oats, and, in wetter areas, lizard's tail (*Saururus cernuus*).

Mississippi Lowlands

Due to the distinctive terrain, hydrology, and flora, the Mississippi lowland wetlands are discussed separately. In presettlement times, most of the area was forested wetlands which were subsequently cleared and drained for agriculture. The area is characterized by flat terrain, dissected by (manmade) drainage ditches, which to varying degrees are maintained by routine dredging. There are several areas of slightly raised terrain (generally less than 10 feet) consisting of terraces and sand dunes.

The Mississippi lowland wetlands are placed into the following general groups:

- Drainage ditch wetlands;
- Old field wetlands; and
- Forested wetlands including dune/swale wetlands.

In general the hydrology source for the "drainage ditch" wetlands is seasonal overbank flooding and direct precipitation. The gradients on the ditches are very low and occasionally result in areas of standing water. Wetland vegetation communities have developed in some areas of standing water.

The principal vegetated drainage ditches include Epps Ditch, Harviell Ditch, Hart Ditch, and Neelyville Ditch (see Figure 3-7). Several tributary ditches flow into these principal ditches. The extent of wetland vegetative community development depends, in part, on local gradients, bank slope, and maintenance history. Those ditches that had recently been maintained (i.e., dredged) contain little, if any, in-channel, near bank wetland vegetative communities. Several areas, however, have well developed fringe herbaceous tree and emergent communities. Species include rose mallow, willow (*Salix* spp.), buttonbush, sedges (*Carex* spp.), and bulrush (*Scirpus* spp.).

Some of the fallow farm fields (old field) have developed vegetation consisting predominantly of wetland communities. Several of the fields have topographic variations with clear topographic lows that have well developed wetland plant communities and hydric soils and higher areas with well drained sandy soils and upland communities (dune and swale wetlands). Several of the old field wetlands, however, have little or no topographic relief. The predominant wetland types occurring in the old field wetlands are emergent (PEM) and scrub-shrub (PSS). The following species were noted: rose mallow (*Hibiscus lasiocarpos*), smartweed (*Polygonum* spp.), soft rush (*Juncus effuses*), and common cattail (*Typha latifolia*). The state listed corkwood (*Leitneria floridana*) was noted in several PEM or PSS wetlands in this area. The state listed water canna (*Thalia dealbata*) was observed in a PEM wetland developed along a drainage ditch. Several plant species that are generally restricted to the Mississippi Lowlands [ladies' eardrops (*Brunnichia ovata*), cross vine (*Bignonia capreolata*)], and copper iris (*Iris fulva*) were observed in the PEM/PSS wetlands.

The forested wetlands were dominated by willow oak (*Quercus phellos*), pin oak (*Quercus palustris*), and sweet gum (*Liquidambar styraciflua*), but also included deciduous holly, green ash, cottonwood, and black willow. One of the dominate shrub species was Hercules club (*Aralia apinosa*). Herbaceous species included soft rush, in-land sea oats, smartweed (*Polygunum* spp.), and sedges (*Carex* spp. and *Cyperus* spp.). In some cases, the extensive forest canopy limited the understory and herbaceous layer development. The state listed water oak (*Quercus nigra*) was observed in two forested wetlands.

The forested wetlands receive hydrology by direct precipitation, local runoff, and occasionally overbank flooding from adjacent drainage ditches. Water marks and buttressed trunks were noted in several of the forested wetlands. Several of these areas were observed to be flooded in June 1999.

The dune/swale forested wetlands represent a distinct wetland type. The dunes consist, in part, of Pleistocene age, eolian (wind blown) sand/silt deposits which form local topographic highs [generally less than 1.5 m (5 ft)]. Water tends to collect in the topographic lows between the dunes. The result is alternating areas of wetland and dry forests. The MDC Corkwood Conservation Area near Neelyville was established, in part, to protect dune/swale forested wetlands (see Figure 3-7). Mature dune/swale wetland forests are considered potential unique habitats.

Excavated Ponds and Impoundments

Excavated ponds and impoundments were typically created for recreation and livestock watering. These potential wetlands are located throughout the study corridor, ranging from steep terrain in the Ozarks to the flat Mississippi lowlands. The excavated ponds and impoundments were generally classified as palustrine, unconsolidated bottom (PUB). Many of the excavated ponds and impoundments are located in upland areas and are not hydraulically connected to jurisdictional waters or within a floodplain. Therefore, many of these water resources are not considered jurisdictional waters of the United States.

PUB wetlands have a wide range of characteristics (i.e., extent of vegetated fringe, water depth, intensity of use, etc.). The dominant hydrology source to the PUBs is direct precipitation and local runoff from adjacent areas. In some cases, the PUBs receive runoff from relatively large areas [approximately 3.3+ ha (10+ ac)], and consist of impoundments of intermittent streams. Diffuse groundwater discharge is likely a source of hydrology for some of the PUBs. In several areas, it was determined that the PUB hydrology was at least partially maintained by point discharge from springs.

The pond age and its current use (i.e., livestock, etc.) often determines the extent and composition of the vegetation. PUB vegetation typically consists of predominantly fringe and emergent communities which encircle the open water. A number of variables influence community composition, size, and structure: intensity of use (mowed, livestock, etc.); bank slope; littoral zone presence; and water depth. Excavated ponds/impoundments that are relatively new and have steep banks and little or no littoral zones, contain relatively small and simple vegetation communities. Vegetative structure in these areas consists of narrow (if any) emergent fringe. Ponds used frequently for livestock are usually characterized by degraded or eroded banks and littoral zones, with a limited vegetative fringe. PUBs that contain no, or very limited, wetland plant communities are generally not considered to be jurisdictional wetlands, and, therefore do not fall under USACE regulatory control.

PUBs that have been in existence for some time (over 10 years) and receive limited or no use generally contain wider emergent zones and bank floral assemblages of greater diversity. Emergent species include willows (*Salix* spp.), cattails (*Typhus* spp.), sedge (*Cyperus* spp.), and bulrush (*Scirpus* spp.). Several of the impoundments appear to be abandoned and are characterized by less open water, a larger more diverse emergent community, aquatic macrophytes, and bank communities of herb, shrub, and tree species.

PUBs that contain extensive wetland vegetative communities (vegetative fringes, emergent communities, and aquatic macrophytes) and are connected to waters of the United States are considered jurisdictional wetlands under USACE regulatory control.

3.8.3 Floodplains

Natural river floodplains are important resources with numerous natural and beneficial values. One primary function is to diminish flooding impacts downstream by dissipating excess water over a large area. Floodplains decrease soil erosion by reducing flow velocity and retaining water-carried silt. Since vegetation and soil trap sediments, pollutants, and excess nutrients, floodplains enhance water quality by acting as a natural water filtration system.

Undisturbed floodplains can contain relatively diverse habitat types and distinct floral and faunal assemblages. Consequently, natural floodplain ecosystems are areas of high biodiversity providing a

number of fish and amphibian species with spawning areas and migratory birds with resting, feeding, and nesting habitats.

FEMA and FHWA guidelines 23 CFR 650 have identified the base (100-year) flood as the flood having a 1 percent probability of being equaled or exceeded in any given year. The base floodplain is the area of 100-year flood hazard within a county or community. The regulatory floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge can be conveyed without increasing the base flood elevation more than a specified amount. FEMA has mandated that projects can cause no rise in the regulatory floodway, and a 0.3 m (1-ft) cumulative rise for all projects in the base (100-year) floodplain. For projects that involve the state of Missouri, State Emergency Management Agency (SEMA) issues floodplain development permits. In the case of projects proposed within regulatory floodways, a Ano-rise≅ certificate, if applicable, should be obtained prior to issuance of a permit.

All available FIRMs from the FEMA for the project area were obtained and reviewed. These maps indicate that Zone A (100-year) floodplains occur in the study corridor and are primarily associated with Twelvemile Creek and its tributaries, St. Francis River and its tributaries, Wappapello Lake, Cane Creek, and the Black River. According to FEMA, Madison, Wayne, and Butler counties participate in the National Flood Insurance Program (NFIP) (1998 letter). This information was incorporated into a GIS and used to quantify floodplain occurrence.

Land use within the floodplains of Madison, Wayne and Butler counties is primarily agricultural. Floodplain development within the study corridor is mostly forested and agricultural, including some cropland and pasture (see Section 3.2).

There are 170.66 ha (421.70 ac) of floodplains located within the study corridor in Madison County (see Figure 3-7). These are associated with Mill Creek, Twelvemile Creek and its tributaries.

There are 337.26 ha (833.39 ac) of floodplains located within the study corridor in Wayne County (see Figure 3-7). These are associated with the St. Francis River and its tributaries in the vicinity of Wappapello Lake. The lake was authorized for development by the Flood Control Act of 1936, and construction was completed in June 1941. The objective of the lake is to provide flood protection to downstream interests, which would include the southern portion of the study corridor in Wayne County and northern Butler County. There are no floodway maps available for Wayne County.

Wappapello Lake is located within the St. Francis Basin on the Upper St. Francis River. This area has historically been subject to periodic flooding, with most of the flood damage confined to agricultural areas. Prior to construction of the dam, significant flooding occurred on the upper St. Francis River in August 1915 and May 1933. After the dam was constructed, flooding occurred in 1943 and 1945, however, flood damages were significantly reduced (USACE, 1999).

There are 107.04 ha (265.39 ac) of floodplains located within the study corridor in Butler County, primarily associated with the Black River, Cane Creek, and tributaries (see Figure 3-7). Clearwater Dam is located about 45 river mi upstream from Poplar Bluff, and has greatly reduced flood flows on the Black River since its construction in 1948. The dam provides flood protection to 2325.8 square km (898 square mi) of the drainage area upstream from Poplar Bluff. Since completion of the dam, the largest floods have occurred in March 1964, January 1969, and March 1977. All of these floods resulted from rainfall centered upstream from Poplar Bluff that was particularly severe downstream from Clearwater Dam (USACE, 1995).

The study corridor crosses Cane Creek just south of Poplar Bluff. This area contains a system of ditches intended to drain agricultural lands subject to frequent overflow by the Black River and Cane Creek. They have been maintained at varying levels of capacity and are currently considered to be in a fairly good state

of repair. However, the channel capacities of the ditches are inadequate to carry the flow from large floods, resulting in the flooding of highways, roads, and fields (USACE, 1995).

The Little River Drainage District also protects the study corridor from flooding of the Mississippi River. The district extends from Cape Girardeau to Kennett, just east of the study corridor, extending into parts of seven counties, including Bollinger, Cape Girardeau, Dunklin, New Madrid, Pemiscot, Scott, and Stoddard. This drainage district acts as a barrier between the study corridor and the Mississippi River, servicing 485,623 ha (1.2 million ac) of land. The Little River Drainage District comprises an extensive system of levees and ditches constructed in 1928, providing flood protection to southeast Missouri and northern Arkansas (The Little River Drainage District of Southeast Missouri, 1989).

3.8.4 Aquatic Ecology

3.8.4.1 Ecological Characterization

Streams occurring in the study area fall within two different faunal regions: the Ozark-Southeast and the Ozark-Mississippi (Pflieger, 1989). Each faunal region is characterized by fish taxa endemic to their geographic location (Appendix D). The majority of stream systems in the project area are classified as Ozark-Southeast faunal streams. The Aquatic Community Classification System for Missouri has established four principal faunal regions within the state based largely upon fish species presence, distribution, and ranges. There are at least 211 species and subspecies of native fish fauna within Missouri according to the Aquatic Community Classification System. The Ozark faunal region is considered to support the most diverse fish assemblage.

Pflieger (1989) classified Missouri's aquatic communities based primarily on fish distributions. Fish were utilized because they exhibit patterns of distribution that are strongly correlated with environmental factors such as bedrock geology, topographic relief, and stream size. These factors generally are thought to be important in controlling the distributions of aquatic organisms. Other watercourse specific parameters affecting aquatic community composition include water chemistry, stream flow characteristics, channel structure, bank structure and composition, stream gradient, water clarity, adjacent land use practices, and micro habitat availability. The Aquatic Community Classification System for Missouri has established four principal faunal regions within the state based largely upon fish species presence, distribution, and ranges. Drainages within the project corridor belong to three different aquatic community classifications or faunal regions. These faunal regions include the Ozark-Black, Ozark-Southeast, and Lowland faunal regions.

The Ozark faunal region is characterized by older bedrocks, higher elevations, and greater relief. Streams in the region typically occupy narrow, steep-sided valleys, often bordered by high bluffs. Stream channels consist of defined riffles, runs, and pools. Substrates include coarse gravel, rubble, boulders, and bedrock. Water is generally clear and base flows are often maintained by springs. Streams in this region often are influenced by spring seepage and can support cool-water organisms. In the project corridor, streams in the Ozark faunal region belong to either the Ozark-Black faunal region or the Ozark-Southeast faunal region. The Ozark-Black faunal region contains streams with high gradients with clear water. The Black River belongs to this region along with numerous springs. In contrast, the Ozark-Southeast faunal region has streams with gently rolling basins and few springs. The St. Francis River belongs to the Ozark-Southeast faunal region.

The Lowland faunal region is a broad alluvial plain with little relief that is generally less than 0.3 m (10 ft). Historically, the region contained extensive swamps and some Ozark streams drained into the region. However, the drainage of the Little River was disrupted by construction of a diversion canal and a network of ditches and irrigation canals now drains areas formerly covered by swamps. The principal habitat for aquatic life in the region is comprised of ditches, natural streams, and swamps. There are approximately 1,931 km (1,200 mi) of ditches in the region. Gradients are generally less than 0.3 m (1 ft)

per mile. Some ditches contain clear water and others remain highly turbid. Substrates in ditches vary from sand bottoms with some gravel to others with only silt.

Aquatic community composition is determined by site-specific factors such as water depth, disturbance, and water chemistry. These factors can have an effect on both floral and faunal communities. Active livestock watering, for instance, can have an adverse effect on aquatic macrophyte vegetative presence and composition, and emergent and bank vegetation. Generally, older abandoned ponds possess a more diverse faunal and floral composition. Actively used stock ponds tend to contain more open water areas and typically have little or no aquatic macrophyte growth. Those stock ponds directly observed contained narrow and irregular emergent fringes. The occurrence and density of vegetation along the banks range from sparse to dense.

3.8.4.2 Faunal Communities

Faunal occurrence within lentic systems is also a function of use and levels of abandonment. Impoundments of this type can support a variety of fish species such as bluegill, green sunfish, bass, and catfish. Additionally, many of the ponds provide recreational opportunities for local anglers. Herpetofaunal species potentially occurring in these ponds include the green frog, bullfrog, box turtle species, red eared slider, garter snake, northern water snake, spotted salamander, and eastern tiger salamander. Macroinvertebrate community diversity may be limited by livestock usage. Potential benthic macroinvertebrate taxa include Diptera, Odonata, Coleoptera, and Hemiptera. More tolerant macroinvertebrates (Diptera) may be naturally selected through disturbances to the habitat by livestock usage.

Historic fisheries data was collected by MDC personnel for several streams located within or near the project corridor. These streams include Twelvemile Creek, St. Francis River, Otter Creek, Black River, and Cane Creek (see Figure 3-7). Twelvemile Creek has been periodically sampled by MDC personnel since 1941. Historical collections document 41 species of fish representing 10 different families (see Appendix D). The St. Francis River has been sampled since 1936 and historically contained 102 species of fish representing 16 families. Historical records for Otter Creek indicate the collection of 24 species belonging to 9 families. The Black River historical records document 110 species of fish representing 20 families. Cane Creek historical fish sampling records document 62 species of fish representing 11 families. The St. Francis River and the Black River had the largest species diversity with 102 and 110 species, respectively.

Historic benthic macroinvertebrate data is limited for project area aquatic ecosystems in the project area. Macroinvertebrate data has been determined to be useful when analyzing aquatic ecosystems as the diversity of collected taxa and the respective pollution tolerance of representative taxa are indicative of stream health. Streams with high macroinvertebrate diversity are generally considered healthier than those with low diversity. Pollution often causes a decline in macroinvertebrate diversity because a large number of pollution sensitive taxa are out competed by a fewer number of pollution tolerant taxa. Macroinvertebrate pollution tolerance is typically related to low dissolved oxygen concentrations that occur when the pollution in question is excess nutrients or sediments. The orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) typically have the lowest pollution tolerance. In contrast, midges (family Chironomidae), blackflies (family Simuliidae), crustaceans (class Crustacea), aquatic worms (class Oligochaeta), leeches (class Hirudinea), and snails (class Gastropoda) generally have the highest pollution tolerance.

Historic benthic macroinvertebrate sampling data were collected by MDC personnel from sites on the Little St. Francis River, St. Francis River, and Black River (see Appendix D). Eleven sites were sampled at stream mile 10, and 12 sites at stream miles 15 and 16 on the Little St. Francis River. Ninety-six different macroinvertebrate taxa were collected from the Little St. Francis River in 1977. Sixty-seven different taxa were collected in 1975 at three and four sites on the St. Francis River (river miles 167 and

216, respectively). Sampling in the Black River near stream mile 77 in 1975 resulted in the collection of 60 invertebrate taxa. The dominant taxon for both the Little St. Francis River and the St. Francis River was the family Chironomidae. In contrast, sites on the Black River were dominated by organisms from the order Ephemeroptera. The overall macroinvertebrate taxa diversity and the number of representative pollution sensitive taxa of the sampled rivers in the study corridor indicate reasonably good water quality. Although there has been a significant amount of natural resource study within the Ozarks, the availability of aquatic ecological data for the project corridor is limited.

Historic aquatic community data for the study corridor is limited with respect to water quality, benthic macroinvertebrates, and fishery resources. The deficiency of this type of data makes it difficult to characterize any shifts or changes in aquatic resource health within these watercourses over time. The fisheries and macroinvertebrates sampling information from the surface water resources in the study corridor indicates reasonably good historic water quality.

3.9 Terrestrial Ecology and Cover Types

3.9.1 Terrestrial Ecological Characterization

To provide a better understanding of Missouri's ecology and natural history, the MDC has divided the state into ecological sections, subsections, and landtype associations (LTA) (MDC, 2002). These divisions are based upon differences in geology, hydrology, soil, topography, and flora/fauna. The U.S. 67 study corridor is located within two sections, three subsections, and seven LTAs (Figure 3-8):

1. Section – Ozark Highlands
   Subsection – St. Francois Knobs and Basins
   LTA – St. Francois Igneous Glade/Oak Forest Knobs (OZ10a)
   LTA – St. Francois Oak-Pine Woodland/Forest Hills (OZ10d)
   Subsection – Black River Ozark Border
   LTA – Grandin Pine-Oak Woodland Dissected Plain (OZ14a)
   LTA – Southeastern Oak Savana/Woodland Plain (OZ14b)
   LTA – Wappapello Oak-Pine Woodland/Forest Hills (OZ14c)
2. Section – Mississippi River Alluvial Basin
   Subsection – Black River Alluvial Plain
   LTA – Black River Silty Lowland (MB1a)
   LTA – Ash Hill Low Sand Hills and Terraces (MB1b)

The U.S. 67 study corridor from the northern terminus (near Fredericktown) to approximately Route 34 is within the St. Francois Knobs and Basins subsection. This area is characterized by typically steep forested hills and relatively flat valley bottoms which have been converted to pasture. The forest types consist of deciduous (oak-hickory) or mixed oak-hickory with pine, and in a few locations planted pine monocultures. The characteristic flora in this area includes oaks (*Quercus* spp.), hickory (*Carya* spp.), elm (*Ulmus* spp.), and short-leaf pine (*Pinus echinata*).

The U.S. 67 study corridor from near the Route 34 intersection to just south of the Route 160 intersection is within the Black River Ozark Border subsection. The area is composed of relatively flat upland plains, dissected by rivers and streams. The flora observed is generally similar in the St. Francois Knobs and Basins subsection, but with a generally increasing amount of short-leaf pine.

The U.S. 67 study corridor from near the Route 160 intersection to the southern terminus is located within the Black River Alluvial Plain subsection. The topography is flat and is drained by a series of manmade ditches. Several sandy low hills or terraces rise slightly [generally less than 3.3 m (10 feet)] above the surrounding alluvial plain. The forest type is oak/hickory with willow oak (*Quercus phellos*) as the clear dominant. The understory includes Hercules club (*Aralia spinosa*).

3.9.2 Terrestrial Cover Types and Vegetation

Due to the natural resource and topographic differences between the northern and southern terminus of the study corridor, the U.S. 67 landscape encompassed a variety of ecological cover types and vegetation. Terrestrial cover types were initially identified by integrating aerial photography, topographic mapping (i.e., USGS) and wetland mapping (i.e., NWI and NRCS). This analysis was supplemented by performing literature reviews and qualitative field surveys to confirm the occurrence of each cover type.

The designation of a particular parcel of land as a specific cover type was based on the dominant vegetative composition that occurred within that parcel. The terrestrial cover types identified and quantified in the study corridor included forest (deciduous-mixed and coniferous-mixed), urban, cropland, pasture, old field, open water and tree farm (Figure 3-9). All cover type information was incorporated into a GIS file for quantification.

Forest was the dominant cover type and comprised approximately 53 percent of the study corridor (Table 3-15). MTNF, Coldwater Conservation Area, and privately owned forested lands occur throughout the study corridor. Three subunits of forest cover type were identified during field surveys: (1) deciduous-mixed forest, (2) coniferous-mixed forest and (3) tree farm. Deciduous-mixed and coniferous-mixed forests were determined by the overall predominance of either deciduous or coniferous species within a given area. The tree farm was comprised of scotch pine trees (*Pinus sylvestris*) planted in rows on private land.

Table 3-15. Relative Composition of Ecological Cover Types in the U.S. 67 Study Corridor

	Total Area		Percent of Total Area
Habitat	ha	ac	
Forest			
Deciduous-Mixed	2,453	6,061	46.65
Coniferous-Mixed	343	848	6.50
Tree Farm	4	10	0.09
Old Field	286	707	5.45
Pasture	440	1,087	8.38
Urban	1,157	2,859	22.0
Cropland	455	1,124	8.65
Open Water	120	297	2.28
Total	5,258	12,993	100.0

Source: MACTEC, 2004.

Deciduous-Mixed Forest

Forested areas that were predominated by deciduous tree species occur along ridgetops, side slopes, and within some of the low-lying ravines and bottomland areas. This cover type totals 2,453 ha (6,061 ac) and comprises approximately 46.7 percent of the total study corridor (Figure 3-9 and Table 3-15). Dominant canopy species on the drier ridgetops and upper slopes include white oak, black oak (*Quercus velutina*), post oak, and black hickory (*Carya texana*). Understory tree species and species that occur near the base of slopes and along drainages include American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*), box elder (*Acer negundo*), sugar maple (*Acer saccharum*), American sycamore (*Platanus occidentalis*), and green ash (*Fraxinus pennsylvanica*).

Herb layer species were generally sparse within the upland areas due to a dense covering of leaf litter on dry substrate, and occasional to common within the lower-lying areas for each of the forest types. Herb species include wild garlic (*Allium canadense*), multiflora rose (*Rosa multiflora*), and poison ivy (*Toxicodendron radicans*). Shrub and herb layers were more evident within bottom land areas and along dry creek channels. Shrub species include black willow (*Salix nigra*), Carolina buckthorn (*Rhamnus caroliniana*), spice bush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), and hornbeam

(*Carpinus caroliniana*). Common herb layer species include smartweed (*Polygonum* spp.) and sedges (*Carex* spp.).

Coniferous-Mixed Forest

The forested areas predominated by pine tree species occurs sporadically and accounts for 343 ha (848 ac) or approximately 6.5 percent of the study corridor (Figure 3-9 and Table 3-15). These stands are found in strips within open areas adjacent to the existing highway and in the dry, upland areas in relatively small stands within the larger deciduous-mixed landscape. The predominant species observed within the coniferous-mixed cover type was shortleaf pine. Additional tree species associated with this type of forest community include red cedars (*Juniperus virginiana*), oaks (*Quercus* spp.), and hickories (*Carya* spp.). Herb layer species in this cover type were nonexistent due to shading from a dense layer of pine needles and leaf litter on the dry, rocky substrate.

Tree Farm

The tree farm consists of scotch pine trees (*Pinus sylvestris*) planted in rows on private land. This cover type is minor, with an area of 4 ha (10 ac) or 0.09 percent of the study corridor (Figure 3-9 and Table 3-15).

Old Field

The old field designation is reserved for land that has been historically farmed, logged, or cleared and has since been abandoned. Vegetative composition within this cover type is variable and depends on the amount of time elapsed since the abandonment of the previous land use. The old field cover type constitutes approximately 286 ha (707 ac) or 5.4 percent of the study corridor and was predominated by annual and perennial herbs, shrubs, and immature fast growing tree species (Figure 3-9 and Table 3-15). Species commonly encountered included goldenrod (*Solidago* spp.), sumac (*Rhus* spp.), ragweed (*Ambrosia* spp.), fescue (*Festuca* spp.), asters, and red cedars.

Pasture

The vegetative composition of pasture is similar to that of old field. Many of the old field habitats observed were likely once pastures. Pasture is predominated by nonwoody species such as annual and perennial grasses with shrubs, herbs, and forbs scattered throughout parcels and along parcel boundaries. The primary contrast between pasture and old field is that pasture is actively managed, disturbed habitat dedicated to browse for cattle and hay production. Pastureland occupies 440 ha (1,087 ac) or 8.4 percent of the study corridor and was typically located in the level to moderately level bottomland, and moderately level to rolling upland areas (Figure 3-9 and Table 3-15).

Urban

The urban cover type was used to define areas directly associated with the "active" infrastructure within the study corridor. This designation included the existing transportation network, commercial and retail services, industrial/manufacturing businesses, and residential areas. The developed areas within the project corridor are associated with the established communities of Fredericktown and Poplar Bluff and the smaller, less populated areas along U.S. 67. Additional developed areas include small businesses and relatively isolated homesteads and farms along the study corridor. The urban cover type collectively accounts for 1,157 ha (2,859 ac) and 22.0 percent of the total project area (Table 3-15).

Cropland

The majority of cropland occurs in Butler County [419.25 ha (1,036 ac)] and typically includes soybeans, wheat and sorghum (Section 3.3). In addition to the cultivated species, weedy species that occur within these areas included fescue, foxtail (*Setaria glauca*), brome grass (*Bromus* spp.), clover (*Trifolium* and *Melilotus* spp.), and ragweed. Cropland accounts for 455 ha (1,124 ac) or 8.7 percent of the study corridor (Figure 3-9 and Table 3-15).

Open Water

For the purposes of defining open water habitats within the project area, "open water" was considered to be large bodies of open water mapped as lacustrine or riverine systems as mapped by NWI. Impoundments, stock ponds, and excavated water bodies are not included in this cover type designation (Section 3.8). This cover type accounts for 120 ha (297 ac) or 2.3 percent of the project area (Figure 3-9 and Table 3-15).

3.9.3 Terrestrial Wildlife

The landscape within the U.S. 67 study corridor encompasses a variety of ecological cover types and habitats, including numerous wetlands of various classifications (Section 3.8.2). The diversity of wildlife species likely occurring within the corridor is directly related to the number, size, and quality of the habitats occurring in a given area.

Forested cover is the dominant habitat type throughout the study corridor. The value of large, continuous forested tracts of land is well documented for wildlife reproductive success, movement patterns, forage and cover. Extensively forested regions are more likely to support viable populations of neotropical birds that exist in the vicinity of the study corridor including numerous sparrow and warbler species, ovenbirds, tanagers, wood thrushes, and indigo buntings (Robinson et al., 1995). Additional avian species likely to occur in the forested areas of the project area include: wild turkey, turkey vulture, red-tailed hawk, eastern screech owl, summer tanager, yellow-throated warbler, Kentucky warbler, black-and-white warbler, red-eyed vireo, white breasted nuthatch, tufted titmouse, American kestrel, song sparrow, red tailed hawk, and downy and pileated woodpeckers.

The study area is located within the Mississippi River flyway, which is an important migratory corridor utilized by avian species to access breeding areas in the north and wintering areas in the south (Bellrose, 1968). The term "flyway" is an administrative concept primarily used to track waterfowl migrations (Jim Wilson, MDC Ornithologist). Although certain general directions of flight are consistently followed by migratory birds, the term "migration route" is to some extent a theoretical concept that refers to the general lines of travel by a species, rather than the exact course followed by individual birds or a path followed by a species with specific geographic or ecological boundaries (Lincoln et al., 1998). Consequently, certain species may exhibit annual variation in the specific routes taken (Rudebeck, 1950). Many of Missouri's popular songbirds, including thrushes, flycatchers, vireos, warblers, and orioles, are neotropical migrants which utilize the Mississippi River flyway to migrate to Missouri from the tropics for the summer nesting season. Locations in the vicinity of the study area that are well timbered and contain surface water provide important stop-over habitats for numerous migrating species of ducks, geese, shorebirds, blackbirds, and sparrows. A population of cliff swallows (*Petrochelidon pyrrhonota*) nest under the U.S. 67 bridge over the Black River (MTNF, personal communication, 2004). These birds next communally inmud nests under bridges and in barns and caves. Cliff swallows are neotropical migrants, spending the winter in South or Central America and nesting in North America in the summer.

Amphibian and reptile species (herpetiles) potentially occurring within the project area are characteristic of both upland and bottom land forest areas. Herpetile species include green frog, American toad, spotted salamander, three-toed box turtle, ground and broadheaded skinks, northern fence lizard, Osage copperhead, hognose snake, timber rattlesnake, marbled salamander, longtail salamander, Fowler's toad, Cope's gray treefrog, southern leopard frog, black rat snake, midland brown snake, western ribbon and eastern garter snakes (Johnson, 1997).

Mammal species that potentially inhabit forested areas include: bobcat, black bear, gray fox, white-tailed deer, raccoon, opossum, eastern gray squirrel, eastern fox squirrel, southern flying squirrel, eastern chipmunk, silver-haired bat, red bat, hoary bat, evening bat, pine mice, and white-footed mice (Schwartz and Schwartz, 1981). Bottom land forest species include beaver, muskrat, and swamp rabbit.

The MTNF accounts for 530 ha (1,310 ac) or 10.4 percent of the land use within the U.S. 67 study area (Section 3.2) (Figure 3-9). MTNF lands are predominantly forest, but include a variety of habitat types that support numerous species of fish and wildlife. MTNF has developed a document entitled "Land and Resource Management Plan," (1986) hereafter referred to as the Forest Plan. The Forest Plan provides direction for multiple use management, with a strong emphasis on fish and wildlife habitat management, and the sustained yield of goods and services from MTNF lands in an environmentally sound manner. Fish and wildlife species that are considered sensitive by MTNF personnel are discussed in Section 3.9.4.

In addition to forested areas, wetland ecosystems within the study corridor support a diverse mix of wildlife species. Avian species encountered within wetland ecosystems include wood duck, mallard, Canada goose, lesser scaup, American coot, great blue heron, great egret, kingfisher, red-winged blackbird, warbling vireo, and northern oriole. Herpetile species likely to occur in wetlands in the study corridor include Blanchard's cricket frog, bullfrog, green frog, common snapping turtle, western painted turtle, three-toed box turtle, green water snake, broad-banded water snake, and the northern water snake. Mammal species generally associated with wetland habitats include beaver, muskrat, raccoon, and river otter.

Open area cover types such as old field or pasture provide little cover for larger species of wildlife and are thus less likely to be frequented by as many species as forested areas. Old fence lines containing random tree or shrub cover typically border these areas and provide limited cover for terrestrial species. Old field and pasture do provide forage and nesting areas for a variety of small mammals and bird species. Animals generally found inhabiting these areas include skunk, wood chuck, eastern cottontail rabbit, opossum, eastern chipmunk, squirrel, white-tailed deer, vole, house mouse, red-tailed hawk, turkey vulture, wild turkey, common bobwhite, and a variety of perching birds and songbirds such as jays, thrushes, woodpeckers, vireos, warblers, and sparrows.

Reduced habitat diversity in developed areas included in the urban cover type designation typically limits the occurrence and variety of wildlife inhabitants. Mammal species include cottontail rabbit, eastern chipmunk, eastern gray squirrel, eastern fox squirrel, and white-tailed deer. Bird species typically encountered in these habitats include mourning dove, downy woodpecker, chimney swift, blue jay, American robin, cedar waxwing, European starling, northern cardinal, and American goldfinch. The most predominant herpetile species encountered would likely be the American toad and eastern garter snake.

3.9.4 Ecologically Sensitive Areas/Unique Habitats

A number of locations were preliminarily identified during field reconnaissance efforts as ecologically sensitive and/or potentially unique habitats. None of these locations had been previously mapped, and were not identified in the agency correspondence.

Springs and Fens

Approximately 25 springs and four fens have been identified in the project corridor. A description of these resources is presented in Section 3.8.2, Wetlands. The springs and fens are considered potentially unique due to the potential to provide listed species and/or glacial relic species habitat. No listed species were observed in the U.S. 67 study corridor springs/fens. Two glacial relic species and one R9 species, however, were observed in the fens (see Section 3.8.2). In general, fens are considered relatively uncommon. Fens SE Missouri (including Madison County) were studied by Orzell (1983). The springs/fens are considered sensitive areas due to the potential for indirect impacts such as changes in groundwater hydrology. These features may also be state listed: Limestone/Dolomite Spring (S3) and Ozark Fen (S2) (MDC, 2004).

Dune and Swale Wetlands

Dune and swale wetlands are located in the study corridor within the Mississippi lowlands (southern Butler County). The undulating topography in these wetlands is caused by either windblown silt from the

ancestral Mississippi River (Saucier, 1978) or as "sand blows" due to earthquake events (Tuttle et al., 1999). Regardless of their origins, the dunes in the study corridor can be grouped into:

- large-linear dunes, typically 100+ feet wide and several hundred feet long with local relief of 5 to 10+ feet; and
- small circular dunes typically less than 100 feet in diameter with local relief of 5 feet or less. Sometimes referred to as "prairie mounds."

Intermixed within the dunes are depressions in which rainwater collects, forming wetlands. The MDC Corkwood and Sand Ponds Conservation Areas were created, in part, to protect this relatively rare wetland type which, within the conservation areas, includes federal and state listed species.

The dune/swale wetlands within the study corridor are currently either old fields (BCWL-42 and BCWL-43) or mature forests (BCWL-38, BCWL-51, and BCWL-53). The mature forested dune/swale wetlands are considered potentially unique habitats and may be state listed: Wet-Mesic Bottomland Forest – S3 (MDC, 2004).

Glades

Glades typically have thin, rapidly drained, rocky soils interspersed with exposed bedrock. Glades are dry (xeric) in the summer and saturated in the spring (Nelson, 1985). Glades are characteristically dominated by grasses and typically contain stunted woody vegetation and herbaceous plants. A small dolomite glade was observed within the study corridor, approximately 1.6 km (1 mi) south of Greenville on the St. Francis River bluffs near SR FF. Dolomite glades are less common than limestone glades. Characteristic plants include bluestem (*Andropogon* spp.), sideoats grama (*Bouteloua curtipendula*), Missouri evening primrose (*Oenothera missouriensis*), and a variety of asters (*Aster* spp.). All Missouri glade types are decreasing in coverage due to grazing and the invasion of woody vegetation caused by fire suppression (Nelson, 1985).

The following lists those areas observed within the study area that have been preliminarily identified as ecologically sensitive and/or potentially unique habitats. None of these locations have been previously designated by MDC as unique habitat areas.

- Cherokee Pass Springs and Fen – four springs, wetlands, and a fen in steep topography and forms the headwaters (first perennial flow) of Twelvemile Creek;
- Twelvemile Springs and Wetlands – three springs and several wetlands;
- Self Fen – a large 1.2+ ha (3+ ac) emergent and scrub-shrub fen with glacial relic species with diverse flora;
- Geronimo Spring--large volume (>100 gpm) spring with spring pool and associated emergent wetland;
- Alexander Fen--Spring and fen complex;
- Bounds Springs and Fens – complex of springs, wetlands, and a fen with glacial relic and R9 species observed;
- St. Francis River bluff – dolomite glade;
- Box Spring – large volume (>50 gpm) spring and associated emergent/scrub-shrub wetland;
- Cane Creek Crossing – backwater slough with bald cypress and aquatic flora;
- Old Oaks – old growth oak upland forest;
- CR338 Wetlands (BCWL-38) – mature dune/swale forested wetland;
- Highway 142 Wetlands (BCWL-51 and BCWL-52) – mature dune/swale forested wetlands that are adjacent to the MDC Corkwood Conservation Area; and
- CR272 Mixed Wetland Complex – scrub-shrub, dune/swale forest and emergent wetlands. Diverse flora with state listed species (corkwood).

3.10 Threatened and Endangered Species, and Species of Conservation Concern

The existence of federal and state listed species in the study corridor was ascertained through agency consultation, literature review, and field observation (Figure 3-10 and Table 3-16). Correspondence with the USFWS and MDC resulted in the identification of several listed species that have been identified or may potentially occur in the study corridor (Appendix C, MDC agency letter dated April 22, 1998 and USFWS agency letter dated March 13, 1998). The following discussion is limited to those species reported to occur within the immediate study corridor vicinity.

Table 3-16. State and Federal Listed Species within the U.S. 67 Study Corridor

		Status*		State
Common Name	Scientific Name	Federal	State	Rank
Birds				
Cooper's hawk	*Accipiter cooperii*	-	-	S3
Bald eagle	*Haliaeetus leucocephalus*	T	E	S2
Mammals				
Indiana bat	*Myotis sodalis*	E	E	S1
Gray bat	*Myotis grisescens*	E	E	S3
Swamp rabbit	*Sylvilagus aquaticus*	-	-	S2
Plants				
Leather flower	*Clematis viorna*	-	-	S1
Smallflower fumewort	*Corydalis micrantha spp. australis*	-	-	S2
Sedge	*Cyperus retroflexus*	-	-	S1
Finger dog-shade	*Cynosciadium digitatum*	-	-	S2
Strawberry bush	*Euonymus americanus*	-	-	S2
Pale avens	*Geum virginianum*	-	-	S1
Corkwood	*Leitneria floridana*	-	-	S2
Loesel's twayblade	*Liparis loeselii*	-	-	S2
Juniper Leaf	*Polypremum procumbens*	-	-	S2
Water oak	*Quercus nigra*	-	-	S2
Water canna	*Thalia dealbata*	-	-	S2
Crane-fly orchid	*Tipularia discolor*	-	-	S1
Mussels				
Elktoe	*Alasmidonta marginata*	--	--	S2?
Western fanshell	*Cyprogenia aberti*	-	-	S1S2
Ebonyshell	*Fusconaia ebena*	--	--	S1?
Pink mucket	*Lampsilis abrupta*	E	E	S2
Fish				
Highfin carpsucker	*Carpiodes velifer*	-	-	S2
Crystal darter	*Crystallaria asprella*	-	E	S1
Blue sucker	*Cycleptus elongatus*	-	-	S3
Swamp darter	*Etheostoma fusiforme*	-	E	S1
Harlequin darter	*Etheostoma histrio*	-	E	S2
Scaly sand darter	*Etheostoma vivax*	-	-	S3
Starhead topminnow	*Fundulus dispar*	-	-	S2
Mooneye	*Hiodon tergisus*	-	-	S3
Mississippi silvery minnow	*Hybognathus nuchalis*	-	-	S3S4
Pugnose minnow	*Opsopoeodus emiliae*	-	-	S4
Eastern slim minnow	*Pimephales tenellus parviceps*	-	-	S2S3

* *E* = *Endangered*
S1 = *Critically imperiled in the state (typically 5 or fewer occurrences or very few remaining individuals)*
S2 = *Imperiled in the state (6 to 20 occurrences or few remaining individuals)*
S3 = *Rare and uncommon in the state (21 to 100 occurrences)*
S4 = *Widespread, abundant, and apparently secure in state, with many occurrences, but the species is of long-term concern (usually more than 100 occurrences)*

Source: MDC, 2000.

Species-specific information contained in the listed fauna section was obtained from the Missouri Fish and Wildlife Information System (MOFWIS) except where noted. The locations of species within the project corridor were obtained from a Heritage database report provided by MDC (Appendix C, MDC agency letter dated April 22, 1998). Species rankings and their corresponding definitions were obtained from the 2004 Missouri Species and Communities of Conservation Concern Checklist published by MDC.

Updated correspondence with the MDC has resulted in the generation of more current Heritage Database Report (Appendix C, MDC agency letter dated February 25, 2000). Four additional species that may potentially occur within the U.S. 67 corridor have been identified and include:

Scientific Name	Common Name	State Status	State Rank
Orconectes peruncus	Big creek crayfish	--	S2
Ptychobranchus occidentalis	Quachita kidneyshell	--	S2S3
Helodium paludosm	Helodium moss	--	S1
Panicum hians	Gaping panic grass	--	S3

A number of biological studies have been previously completed within Wayne County in the vicinity of existing U.S. 67 to determine the potential for impact to listed species. The following discussion provides an overview of the projects and the findings of these studies.

An EA was proposed in Wayne County by M&A Electric Power Cooperative, February, 1999 to assess the potential environmental impacts from the construction of a transmission line from the existing Patterson, Missouri Substation to a proposed substation located approximately 0.42 km (0.67 mi) south of Silva, Missouri and 91.4 km (300 ft) west of U.S. 67 on USACE Wappapello Lake property. Potential impacts to threatened or endangered species including Curtis' pearly mussel, pink mucket pearly mussel, Swainson's warbler, and the bald eagle were addressed. The bald eagle was the only species with the potential of being impacted by construction activities due to the presence of roost trees [>12 in. diameter at breast height (DBH)] along Rings Creek, Clark Creek, Hubble Creek, and the St. Francis River. It was determined that clearing roost-size trees along the streams would "not likely" adversely affect the bald eagle due to the presence of abundant roosting habitat in the vicinity of the project including Wappapello Lake and Mingo National Wildlife Refuge.

An EA was performed by the USFS in 1995 in an area of the MTNF identified as "Twelvemile Hills." This area is under the jurisdictional management of the Potosi/Fredericktown Ranger District and is located approximately 9.6 km (6 mi) south of Fredericktown, Missouri. A Biological Evaluation (BE) was completed by USFS biologists and USFWS personnel as part of the EA. The objective of the BE was to determine the potential effects on federally-listed threatened and endangered species. The BE determined that none of these areas were known habitats for any federal or state listed species and a Decision Notice and Finding of No Significant Impact was issued on September 8, 1995.

The MTNF has completed Programmatic Biological Assessment (BA) and formal consultation with the USFWS to evaluate the effects of ongoing management practices on ten federally listed threatened and endangered species known to occur or which may occur on MTNF. The USFWS issued a Biological Opinion (BO) on June 23, 1999. The BO states that forest management and other activities authorized, funded or carried out on the MTNF would be likely to adversely affect, but not likely jeopardize the continued existence of the Indiana bat, gray bat, bald eagle, and Mead's milkweed. The BO also stated that Forest Plan management activities would have no effect on the pink mucket pearly mussel and Curtis' pearly mussel.

A biological analysis was conducted 1994-1995 as part of the USACE Wappapello Lake Road Relocation Project. Threatened, endangered, and candidate faunal species reported to potentially occur within the project area included the bald eagle, alligator snapping turtle, crystal darter, longnose darter, stargazing darter, Curtis' pearly mussel, pink mucket pearly mussel, snuffbox mussel, and western fanshell mussel. Listed plant species included pondberry, leather flower (*C. viorna*), running buffalo clover, few-lobed grape fern, Canada rush, leafy bulrush, Loesel's twayblade, and the purple fringeless orchid. Five species considered most likely to occur within the project area included the alligator snapping turtle, crystal darter, longnose darter, western fanshell mussel, and bald eagle. USACE Wappapello Lake staff confirmed that all areas associated with the Wappapello Lake Road Relocation Project were outside of the known eagle breeding protection zones.

The biological analysis included a survey of wildlife habitat viability at 20 road relocation sites and 22 potential borrow sites. Seventy-three trees located at 14 of the road relocation sites were identified as potential Indiana bat habitat. The sites containing potential Indiana bat habitat are not indicated within the proposed right of way of the Preferred Alternative.

Floral and faunal studies are being completed at the Wappapello Lake USACE Management Unit by Southern Illinois University, Edwardsville. These surveys began in 2003 and are anticipated to be completed in 2004. The purpose of these surveys is to document the existing flora, birds, mammals, amphibians, reptiles, and fish currently utilizing Wappapello Lake property. The initial surveys have documented the following listed species in proximity to the study corridor: Indiana bat and gray bat.

Surveys were also conducted for R9 species on MTNF property in 2000 and 2003 (see Section 4.17, USFS Eastern Region Sensitive Species).

3.10.1 Terrestrial Species

Listed Fauna

The distribution of the federally threatened bald eagle (*Haliaeetus leucocephalus*) in Missouri is considered statewide during their migration. Migrating bald eagles have been observed west of the project corridor over the Current River and may occasionally use suitable sites in the project corridor as temporary winter roosts. Common winter habitats in Missouri include large bodies of water (e.g., Wappapello Lake) and particularly large rivers such as the Missouri and Mississippi where they utilize large, open areas for foraging.

Although the number of young bald eagles fledged in Missouri has increased, it is thought to be in danger of extinction throughout all or a significant portion of its range. Thus, this casual summer resident is state listed as an endangered species. Bald eagles are known to occur in Madison, Wayne, and Butler counties. The average territory size of the bald eagle is estimated to 9.34 ha (23.06 ac) (Snow, 1973), and the mean winter range for adults [18.8 square miles (mi^2)] and immatures (18.3 mi^2) may vary due to prey abundance (Griffin and Baskett, 1985). Migrating bald eagles have been observed west of the project corridor over the Current River and may occasionally use suitable sites in the project corridor as temporary winter roosts. Established nests were reported in approximately 33 counties as of 1997, including Wayne County. Nesting areas reported within the vicinity of the study corridor are located southeast of the Preferred Alternative in Wappapello Lake, via the St. Francis River (Appendix C, MDC agency letter dated April 22, 1998). No bald eagles were observed during field reconnaissance of the study corridor.

The swamp rabbit (*Sylvilagus aquaticus*) is a state listed mammal that is physically similar to the eastern cottontail, and the largest member of its genus. This species is state ranked as S2, indicating that it is imperiled due to extreme rarity or because some factor(s) make(s) it very vulnerable to extirpation from the state. Preferred habitats include forested wetlands, bottomlands, cypress swamps, and canebrakes where it rests under thick brush and hides in hollow logs or the burrows of other animals (Niering, 1998). Swamp rabbits are restricted to small, isolated tracts of habitat in Missouri, and only occur west of Neelyville at a single location within the study corridor. No swamp rabbits were observed during field reconnaissance of the project corridor.

Cooper's hawk (*Accipiter cooperii*) is a seasonally rare and uncommon resident (S3) associated with terrestrial habitats. It is likely to exist statewide in Missouri except during nesting season when it primarily inhabits pine and oak-hickory forests in a few select counties. This hawk species has been reported to occur at only one site near the study corridor in Butler County. A possible, but unconfirmed, siting of a Cooper's hawk occurred during field reconnaissance efforts south of Butler County, due north of Neelyville.

Indiana bat (*Myotis sodalis*) summer roosting/breeding habitat includes mature floodplain, riparian and adjacent upland forests, preferably with a full canopy and open understory (MDC, 1998). Indiana bats have been found to roost and establish maternity colonies primarily beneath loose (exfoliating) bark of hickory (*Carya* spp.), oak (*Quercus* spp.), elm (*Ulmus* spp.), ash (*Fraxinus* spp.), and other trees. Indiana bats also roost in the cavities of living and dead/dying trees (MDC, 1998). Physical characteristics more than species type dictate suitability of trees as roosts. These characteristics include bark that separates from the main trunk of dead, dying, or injured trees. Some tree species, such as some of the hickories and oaks, provide adequate bark characteristics in living trees.

Although it is well known that Indiana bats use floodplain and riparian forests as their primary habitat during the summer, research has also indicated the importance of upland forest in the Indiana bat's natural history. Upland forests have been found to be important areas for roost locations (Clark *et al*., 1987; Gardner *et al*., 1991; Callahan *et al*., 1997). Indiana bats tend to exhibit site fidelity, returning to the same roosting and hibernation areas, and often the same maternity trees on an annual basis (MDC, 1998).

Indiana bats feed at night on flying aquatic and terrestrial insects, including moths, mosquitoes and flies. The foraging areas of Indiana bats include floodplain, riparian and upland forests, particularly areas in and around the tree canopies. In riparian areas, Indiana bats forage along stream corridors and associated bottomland forests. Streams, impounded bodies of water such as ponds, and their associated forests are considered preferred foraging areas for pregnant and lactating female Indiana bats (USFWS, 1999). In upland areas, Indiana bats forage among the canopies of upland forests, upland ponds and waterholes, and oftentimes along the borders of agricultural fields and pastures (USFWS, 1999). Indiana bats exhibit fidelity to their foraging areas as well, often returning nightly (Gardner et al., 1991).

As part of the faunal studies completed at the Wappapello Lake Management Unit, Indiana bats, a state and federally endangered species with a state rank of S1, were observed and captured within 3.2 km (2 mi) of the study corridor near Greenville, Missouri (USACE, 2004). An Indiana bat maternity colony was also documented approximately 2.4 km (1.5 mi) from existing U.S. 67 in the vicinity of the St. Francis River (MTNF, 2004a). The maternity roost tree was located in a mature (90-year old) upland oak-pine forest within a small canopy gap (MTNF, 2004b). The roost tree stand has an abundance of large snags of oak and pine. The maternity roost is located approximately 2.4 km (1.5 mi) from the St. Francis River, approximately 2 km (1.25 mi) from Big Lake Creek, and less than 1.6 km (1 mi) from large bottomland fields (MTNF, 2004a). These areas are presumed to provide suitable foraging habitat.

To assist in protecting the Indiana bat maternity colony, the MTNF Plan was amended to establish the Brown's Hollow Area of Influence (AOI) (MTNF, 2004b). The Brown's Hollow AOI will be specifically managed to protect Indiana bats by providing a continuous supply of suitable roost trees and suitable foraging habitat. The plan includes limits on tree removal (i.e., retain a minimum average of 24 potential roost trees per forested acre) and timing of the removals (only during a season when roosting bats are absent) among other restriction. These restrictions apply only to National Forest land and would not apply to private or USACE lands.

Based upon a literature review of Indiana bat habitat preference, the results of bat studies conducted in the area (USACE, 2004 and MTNF, 2004a and b) and the study area field reconnaissance, suitable summer foraging and potential breeding habitat is considered to exist within the study corridor in the vicinity of Greenville, Missouri.

During the winter, Indiana bats hibernate only in caves or mines with appropriate temperatures, ideally a range of 37 to 43 degrees Fahrenheit (°F) (USFWS, 1999). Relative humidity in preferred caves is usually above 74 percent, but below saturation. Both temperature and humidity appear to play important roles in successful hibernation of the Indiana bat. No suitable Indiana bat winter habitat (hibernacula) is reported within or in proximity to the study corridor.

As part of the faunal studies completed at Wappapello Lake Management Unit, gray bats (*Myotis grisescens*), a state and federally endangered species with a state rank of S3, were observed and captured within 1.6 km (1 mi) of the study corridor.

Gray bat colonies are restricted entirely to caves or cave-like habitats. During summer months, the bats are highly selective for caves that provide specific temperature and roost conditions. Usually these caves are all located within a kilometer of a river or reservoir. In winter, gray bats utilize only deep, vertical caves having a temperature of 43 to 52°F. Due to their preference for a narrow range of temperatures, few caves in any area are, or can be used regularly for roosting (Tuttle, 1975).

Summer caves must be warm, between 57 and 77°F, or have small rooms or domes that can trap the body heat of roosting bats (USFWS, 1999). Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly as far as 19.2 km (12 mi) from their colony to feed, generally foraging along well-defined stream, river, or lake corridors.

Gray bats are known to migrate between winter and summer caves, often traveling over 320 km (200 mi) (USFWS, 1982; Tuttle, 1976). Banding studies indicate that these bats occupy a rather definite summer range in relation to the roosting site and nearby foraging areas over large streams and reservoirs. Due to protective measures taken at high priority maternity caves and hibernacula in the late 1970s and throughout the 1980s, earlier precipitous declines have been interrupted at some major sites. Those populations are now stable, or increasing slightly (Mitchell, 1998).

Listed Flora

No federally-listed plant endangered species were reported to exist in the study corridor.

Three species of plants that occur in the project corridor are state ranked as S1. These species are considered critically imperiled in Missouri due to extreme rarity or because some factor(s) makes them especially vulnerable to extirpation from the state.

The leather flower (*Clematis viorna*) is a member of the crowfoot family (Ranunculaceae) that occurs in rocky woods and in the vicinity of limestone bluffs in southern Missouri (Steyermark, 1963). This species occurs south of Greenville in Wayne County. No observations of this perennial herbaceous species were reported during field reconnaissance of the study area.

The crane-fly orchid (*Tipularia discolor*) is an inhabitant of coniferous and deciduous, mesic bottomland forests. This perennial is uncommon in Missouri and restricted to the Ozarks and Mississippi Lowlands Division (Yatskievych, 1999). Its distribution in the study corridor is limited to Butler County. No observations of this plant species were reported during field investigations.

Cyperus retroflexus is a sedge that is found exclusively in areas of dry, sandy soil. Although this species is found in disturbed sites including fallow fields, roadsides, fencerows, and railroads, it is restricted to the Mississippi Lowlands Division and found only in Butler County within the study corridor (Yatskievych, 1999).

Pale avens (*Geum virginianum*) was reported for the St. Francis River floodplain, east of the Old Greenville Recreation Area in low-moist woods and forested wetlands. A reconnaissance for this species was conducted in May 2000 but no plants were located.

Eight plant species known to occur in the study corridor are state ranked by MDC as S2. These species are imperiled due to extreme rarity or because some factor(s) make(s) them very vulnerable to extirpation from the state.

Finger dog-shade (*Cynosciadium digitatum*) is a herbaceous forb and a rare member of the carrot family (Apiaceae) in Missouri. This species is found in moist areas and occurs in swamps and low, wet woods

bordering bayous, sloughs and slow streams (Steyermark, 1963). *C. digitatum* occurs in Butler County within the study corridor, but its occurrence was not verified in the field.

Water canna (*Thalia dealbata*) is an emergent aquatic plant whose historical distribution is associated with natural lakes and lowland swamps. This species is presently known to additionally occur in ponds, streams and ditches in five Missouri Counties (Yatskievych, 1999). This species was observed during field investigations and wetland delineation in Butler County at Wetland BCWL-54 (Figure 3-10).

Juniper leaf (*Polypremum procumbens*) is a herbaceous forb that occurs in sandy, open ground (Steyermark, 1963). The range of this species in Missouri has expanded in the last four decades and presently includes seven counties. *P. procumbens* occurs within the study corridor in Butler County, but its existence was not visually verified.

Corkwood (*Leitneria floridana*) is a woody shrub or small tree that inhabits wooded or open swamps and wet thickets and ditches along roadsides in Missouri's southeast lowlands (Steyermark, 1963). Numerous specimens were identified at a several locations during field reconnaissance and wetland delineation of the project area in Butler County (Figure 3-10).

Loesel's twayblade (*Liparis loeselii*) occurs in calcareous swampy meadows (fens), mesic bottomland forests, and the forested margins of sinkhole ponds. This orchid was previously thought to exist exclusively in Shannon, Carter and Bollinger Counties, but new sites have been discovered in the past 20 years (Yatskievych, 1999). Sites within the study corridor are located in Wayne and Butler counties. No individuals of this species were observed during field reconnaissance.

Strawberry bush (*Euonymus americanus*) is a woody shrub that is found in low sandy woods and along moist spring branches and stream banks (Steyermark, 1963). This perennial is reported to exist within the study corridor in Wayne and Butler counties. No individuals of this species were observed during field reconnaissance.

The smallflower fumewort (*Corydalis micrantha* spp. *australis*) is an annual herbaceous forb located north of Neelyville within the study corridor. This subspecies occurs in a few select Missouri counties and inhabits rocky woods and open ground (Steyermark, 1963). No individuals of this species were observed during field reconnaissance of the study corridor.

Water oak (*Quercus nigra*) is a medium to large sized (up to 80 feet tall) tree found only in wet bottomland forests and the edges of swamps in the southeastern lowlands (bootheel). It is classified as rare due to loss of habitat from extensive clearing, row cropping, ditching, and draining of the bootheel (MDC, 2003). Water oak was observed during the wetland delineation at two wetlands near Neelyville.

3.10.2 Aquatic Species

One federally and state endangered species and several state listed species have been historically collected or observed near the project area (see Table 3-16).

Freshwater Mussels

The federally endangered pink mucket (*Lampsilis abrupta*) has been collected near the project area. This species is state listed endangered with an S2 state rank. General occurrences near the project area include the Little Black, Black, and St. Francis Rivers. Habitat requirements include streams with cobble-gravel substrates in water depths ranging from 0.31 to 3.1 m (1 to 10 ft).

The western fanshell (*Cyprogenia aberti*) has a S1S2 state rank and was a former C2 species federally. This species has locally abundant populations occurring in both the St. Francis River and Black River near the project area. The western fanshell prefers shallow water with mixed gravel and mud bottoms.

Curtis' pearly mussel (*Epioblasma florentina curtisi*) is a federal and state listed endangered species that has been documented to occur in the Black River and Cane Creek south of Williamsville, Missouri (Buchanan, 1982 and 1996). Suitable habitat for Curtis' pearly mussel includes shallow flowing water (<36 inches) with a stable substrate. This species is usually found in transition zones between headwaters and lowland waters of streams.

The USFWS indicated an approximate 3.1-km (5-mi) stretch of suitable Curtis' pearly mussel habitat in Cane Creek between Routes PP and M (USFWS agency letter dated March 18, 1998). However, this stretch of Cane Creek is located outside of the project area and will not be impacted by the construction and operation of the proposed Preferred Alternative.

Mussel surveys performed by the USFWS and USACE in the late 1970s preceding the construction of the existing Cane Creek crossing indicated that the substrates of Cane Creek and associated overflow channel were not suitable habitat for mussel colonization. No specimens of Curtis' pearly mussel were found during the surveys.

Unionid Surveys

Due to the possible presence of the federally listed endangered pink mucket (*Lampsilis abrupta*) and Curtis' pearly mussel (*Epioblasma florentina curtisi*) in the project area, the USFWS requested that qualitative unionid surveys be conducted at selected river crossings within the project corridor. Given the range of these species within Missouri, surveys were conducted in the vicinities where the Preferred Alternative is proposed for crossing the St. Francis River, Black River, and Cane Creek.

Qualitative unionid surveys were performed upstream and downstream at each of the three potential U.S. 67 river/creek crossings. The primary objective of the surveys was to determine if either the pink mucket or Curtis= pearly mussel currently occur upstream or downstream of the proposed crossings. In order to perform comprehensive dive surveys within the Black and St. Francis Rivers, surface-supplied air diving and wade searches were conducted. Snorkeling and wading searches were sufficient to conduct unionid survey activities within Cane Creek due to the shallowness of the creek channel.

Black River

A unionid dive survey within the Black River was performed between October 24 and October 26, 2000. All microhabitats within an approximate 250-m (820-ft) reach were surveyed. Survey efforts began upstream approximately 40 m (131 ft) from the present U.S. 67 bridge at the mouth of a tributary stream, and ended approximately 205 m (672 ft) downstream at the old U.S. 67 bridge. Nearly 15 person hours were spent searching along 19 transect lines and three additional areas during this survey. A total of 80 unionids representing 19 species were collected during sampling (Table 3-17). Six specimens were collected as either fresh or weathered dead, and 74 were collected as live (Table 3-18). Fragile papershell (*L. fragilis*) were only collected as dead shells during this survey. Unionids collected from this reach averaged 8 years of age, ranging from 2 to 14 years (Table 3-18).

No federally listed unionids were collected during this investigation; however, three species with a Missouri S-ranking were collected. These were elktoe (*Alasmidonta marginata*) (S2), western fanshell (*C. aberti*) (S1S2), and ebony shell (*Fusconaia ebena*) (S1). One live specimen of elktoe and ebony shell were collected during this investigation while western fanshell was the third most abundant unionid collected, accounting for 13 percent of live unionids collected (see Table 3-17). The Asiatic clam (*Corbicula fluminea*), a non-native invasive species, was present and common.

Although definite unionid beds did not appear to be present within the Black River study area, unionids were present in most areas surveyed and there did appear to be areas of higher concentration. Additional search time was spent in these areas and they have been referred to as Search Areas 1 through 3.

Table 3-17. Unionid Species Sampled within the Vicinity of the Existing U.S. 67 Black River Crossing

Common Name	Scientific Name	Dead	Live	Total	Missouri SRANK Status	Federal Status
Mucket	*Actinonaias ligamentina*	0	7	7	--	--
Elktoe	*Alasmidonta marginata*	2	1	3	S2?	--
Purple wartyback	*Cyclonaias tuberculata*	0	1	1	0	--
Western fanshell	*Cyprogenia aberti*	0	10	10	S1S2	*
Spike	*Elliptio dilatata*	0	3	3	--	--
Ebonyshell	*Fusconaia ebena*	0	1	1	S1	--
Wabash pigtoe	*Fusconaia flava*	0	4	4	--	--
Plain pocketbook	*Lampsilis carcium*	0	12	12	--	--
White heelsplitter	*Lasmigona complanata*	0	1	1	--	--
Fragile papershell	*Leptodea fragilis*	2	0	2	--	--
Round pigtoe	*Pleurobema sintoxia*	2	5	7	--	--
Bleufer	*Potamilus purpuratus*	0	4	4	--	--
Monkeyface	*Quadrula metanevra*	0	11	11	--	--
Pimpleback	*Quadrula pustulosa*	0	5	5	--	--
Creeper	*Strophitus undulatus*	0	4	4	--	--
Pistolgrip	*Tritogonia verrucosa*	0	1	1	--	--
Fawnsfoot	*Truncilla donaciformis*	0	1	1	--	--
Deertoe	*Truncilla truncata*	0	2	2	--	--
Little Spectaclecase	*Villosa lienosa*	0	1	1	--	--
Total		6	74	80	--	--

* *Former C2 species.*

Source: MACTEC, 2004.

Table 3-18. Number, Sample Percent Composition, Age, and Length of Unionids Species Sampled within the Vicinity of the Existing U.S. 67 Black River Crossing

	Number Collected	Percent Composition	Age				Length		
			Mean	Min	Max		Mean	Min	Max
Mucket	7	9	10	3	14		89	40	115
Elktoe	3	4	10	10	10		75	75	75
Purple wartyback	1	1	10	10	10		50	50	50
Western fanshell	10	13	8	6	13		37	30	45
Spike	3	4	4	2	7		58	32	85
Ebonyshell	1	1	7	7	7		45	45	45
Wabash pigtoe	4	5	8	6	10		49	34	65
Plain pocketbook	12	15	8	4	10		100	67	121
White heelsplitter	1	1	11	11	11		105	105	105
Fragile papershell	2	3							
Round pigtoe	7	9	10	7	13		70	52	91
Bleufer	4	5	9	6	11		90	61	121
Monkeyface	11	14	8	4	11		57	35	72
Pimpleback	5	6	7	4	10		36	21	55
Creeper	4	5	7	3	9		67	35	85
Pistolgrip	1	1	5	5	5		72	72	72
Fawnsfoot	1	1	10	10	10		40	40	04
Deertoe	2	3	9	8	10		41	39	42
Little Spectaclecase	1	1	7	7	7		59	59	59

Source: MACTEC, 2004.

St. Francis River

A unionid dive survey was performed between October 31 and November 1, 2000 within the St. Francis River. All microhabitats within an approximate 250-m (820 ft) reach were surveyed beginning 220 m (722 ft) downstream of the present U.S. 67 bridge and ending approximately 30 m (98 ft) upstream of the present U.S. 67 bridge. Approximately 8 person hours were spent searching along 10 transect lines, as well as within the area under the existing bridge and within the two proposed bridge sites.

No live unionids were collected during this survey. Only weathered dead or relic specimens of mucket (*Actinonaias carinata*), three-ridge (*Amblema plicata*), washboard (*Megalonaias nervosa)*, giant floater (*Pyganodon grandis*), and one unidentified partial relic valve were collected. This river reach is the upper end of Wappapello Lake, which is characterized by reduced flow and increased siltation. The lentic conditions within this reach may attribute to the lack of unionids. Asian clams (*Corbicula fluminea*) were present and common in the St. Francis study area.

Cane Creek

A unionid dive survey was performed on November 21, 2000 within Cane Creek. All microhabitats within an approximate 270-m (886 ft) reach were surveyed beginning 220 m (722 ft) downstream of the present U.S. 67 bridge and ended approximately 50 m (164 ft) upstream of the present U.S. 67 bridge. Two MACTEC personnel searched all areas of this stream reach by snorkeling and using viewing buckets while wading shallower areas.

Approximately seven person hours were spent searching this stream reach. However, no unionids were collected during this survey. Many Asian clam (*Corbicula fluminea*) shells were present at this location and live *C fluminea* were common below the surface of the gravel substrates.

3.10.3 Fish

The crystal darter (*Crystallaria asprella*) is state listed endangered with a state rank of S1. This is a former federal C2 species. The crystal darter has been recently collected in the Black River and has historically been collected in the St. Francis River system. This species occurs in streams and ditches with slow current, clear water, and sand or pebble substrates.

The swamp darter (*Etheostoma fusiforme*) is state listed endangered with a state rank of S1. This species occurs only in Butler County. The swamp darter has been documented within the Black River watershed. This species occurs in swamps, sloughs, oxbows, and backwaters with mud and organic debris substrates.

The harlequin darter (*Etheostoma histrio*) is state listed endangered (S2) and has been documented within the project area by MDC personnel. The harlequin darter has been collected within the St. Francis River from Wappapello Dam to the Arkansas border and the Black River. The harlequin darter inhabits permanent streams with bottoms of sand or gravel and organic debris.

The highfin carpsucker (*Catostomidae velifer*) has an S2 state rank. This species was formerly listed as state rare under the former Missouri classification. The highfin carpsucker has been collected from the St. Francis River near the project area. The highfin carpsucker inhabits large reservoirs and streams with fairly clear water and low siltation, however, it is more common in large reservoirs than in streams.

The starhead topminnow (*Fundulus dispar*) has an S2 state rank. The starhead topminnow was formerly listed as a “watch list” species. The starhead topminnnow has been collected from the St. Francis River near the project area. This species typically inhabits sloughs, ditches, backwaters, oxbows, and other lowland wetlands with quiet, clear water and abundant submergent vegetation.

The eastern slim minnow (*Pimephales tenellus parviceps*) has a S2S3 state rank and was formerly listed as state rare under Missouri’s previous classification system. The eastern slim minnow recently has only

been collected from the Black and Castor rivers. This species inhabits clear permanent streams with low siltation and sand or gravel bottoms.

The blue sucker (*Cycleptus elongatus*) has been classified as state rank S3 and was once classified as a federal C2 species. Under the former Missouri classification system this species was listed as a "watch list" species. This species has been collected from the St. Francis and Black rivers near the project corridor. The blue sucker occurs in large streams and rivers with deep, swift channels and sand, gravel, or rock bottoms. The blue sucker can tolerate high turbidity if current prevents silt deposition.

The scaly sand darter (*Etheostoma vivax*) has a S3 state rank and was formerly classified as a "watch list" species under Missouri's former classification system. This species occurs in streams and ditches of southeast Missouri and has been collected from the St. Francis and Black rivers near the project area. The scaly sand darter occurs in streams and ditches with sand bottoms.

The mooneye (*Hiodon tergisus*) has a S3 state rank and was formerly classified as state rare species under Missouri's former classification system. The mooneye has been collected from both the St. Francis River and Black River watersheds. This species typically occurs in reservoirs and clear, quiet pools of streams and ditches.

The Mississippi silvery minnow (*Hybognathus nuchalis*) has a S3S4 state rank. Under the former Missouri classification system this species was listed as a "watch list" species. The Mississippi silvery minnow has been collected from the St. Francis and Black rivers near the project area. This species inhabits pools and backwaters of clear permanent streams with little or no current and mud or sand bottoms.

The pugnose minnow (*Opsopoeodus emiliae*) has a S4 state rank and was listed as a "watch list" species under the former Missouri classification system. This species has been collected from the Little Black, Black, and St. Francis watersheds near the project area. This species is largely restricted to lowlands of southeast Missouri and may be disappearing from the state. The pugnose minnow occurs in ditches, sloughs, swamps, borrow pits and lakes with clear, quiet water with dense aquatic vegetation and a bottom of sand and organic debris.

3.10.4 Additional Species of Concern

Big Creek Crayfish (*Orconectes peruncus*)

The Big Creek crayfish (*Orconectes peruncus*) is an S2 state ranked species that lives in burrows dug in gravelly substrate beneath rocks.in Ozark streams. The Big Creek crayfish has a very localized distribution that is centered in Big Creek and its tributaries on the west side of the St. Francis River basin. Populations also occur in Clark Creek and Twelve Mile Creek in Wayne County.

The Hine's emerald dragonfly (*Somatochlora hineana*) is a federal and state endangered species with an S1 state rank. Although not reported on the Heritage database searches, comments requested that this species be identified for evaluation in the Final EIS. This species is now found in approximately 20 Missouri sites and in Iron, Dent, Wayne, Reynolds, Phelps, Shannon, and Ripley counties. None of these sites are in close proximity to the Preferred Alternative.

The Hine's emerald drangonfly habitat is typically characterized by small, slow-flowing, shallow spring-fed seeps and streams underlain by limestone-dolomite bedrock that are hydrologically connected to densely vegetated calcareous marshes or fens dominated by emergent vegetation, typically including cattails (*Typha* spp.) and sedges (*Carex* spp.) (USFWS, 2001). A fen is a type of wet meadow fed by an alkaline water source such as a calcareous spring or seep. Fen environments are typically classified as emergent wetlands.

The Hine's emerald dragonfly life cycle is comprised of the aquatic egg, aquatic larva, and terrestrial/aerial adult stages. Maturation into the adult stage is marked by foraging flights over herbaceous habitat near clusters of shrubs, forest edges, and frequently over open meadows and successional fields at a height of 1 to 3 m (3.2 to 9.8 ft) (USFWS, 2001). Pre-reproductive adults may fly up to 3 km (1.9 mi) from emergence sites, and reproductive adults may fly 1 to 2 km (0.6 to 1.2 mi) from breeding sites to forage (USFWS, 2001). Potential Hine's emerald dragonfly breeding habitat within the vicinity of the study corridor includes Self, Alexander, and Bounds fens.

3.11 USFS Eastern Regional Sensitive Species

The USFS publishes a list of Eastern Region (Region 9) Regional Forester Sensitive Species consisting of numerous floral and faunal species that are considered sensitive to development activities and that have been documented or are likely to occur within the National Forest boundaries (see Appendix C, USFS letter). Species sensitivity may be based upon, but not limited to, habitat fragmentation, depletion of suitable habitat, distribution and range parameters, and/or rareness of documented occurrences. MTNF and MoDOT biologists evaluated the R9 list to determine those species that may occur and are likely to sustain impact within the U.S. 67 study corridor.

In keeping with the objectives of the Forest Plan, priority must be given to the avoidance or minimization of impacts to species recognized as sensitive by USFS's Eastern Region (see Appendix C). Plant and animal species listed as endangered or rare by the State of Missouri are considered by the MTNF as "Species of Concern." Sections of the Final EIS have addressed potential impacts to federally listed threatened or endangered species.

In addition, biological assessments have been prepared for species listed in Table 3-19 that potentially occur within the U.S. 67 study area and may be impacted by the proposed improvements. Information on 43 animals and 76 plants from the R9 list that are likely to occur on MTNF lands are provided in Table 3-19. It has been determined that 21 animal species and 49 plant species may potentially be within the U.S. 67 build corridor. Determination of potential effect to R9 species was based upon potential occurrence within the vicinity of existing and proposed locations of U.S. 67, likelihood of impact, and species distribution and habitat occurrence information. A professional botanist in the Resource Science Section of MDC provided additional expertise on plant species.

3.12 Cultural Resources

In accordance with NEPA and Section 106 of the National Historic Preservation Act as amended, the study corridor was examined for all known or potential architectural, historical bridge, archaeological, and historical sites. The results of the investigation are described below.

3.12.1 Archaeological Investigation

3.12.1.1 Regional Prehistoric Setting

The archaeological record of Missouri indicates the following sequence of prehistoric cultures that occurred in the region (Chapman, 1975, 1980):

- Paleoindian – Early Hunter (12000-8000 B.C.)
- Dalton – Hunter/Forager (8000-7000 B.C.)
- Early Archaic – Forager (7000-5000 B.C.)
- Middle Archaic – Forager (5000-3000 B.C.)
- Late Archaic – Forager (3000-1000 B.C.)
- Early Woodland – Prairie/Forest Potter (1000-500 B.C.)
- Middle Woodland – Prairie/Forest Potter (500 B.C.-400 A.D.)
- Late Woodland – Prairie/Forest Potter (400 -900 A.D.)
- Early Mississippi – Village Farmer (900-1200 A.D.)
- Middle Mississippi – Village Farmer (1200-1450 A.D.)
- Late Mississippi – Village Farmer (1450-1750 A.D.)

Table 3-19. List of Eastern Region (R9) Sensitive Species Reported from the MTNF, Missouri

Common Name	Scientific Name	Listing Status*		Potential Occurrence (U.S. 67)†	Likelihood of Impact**	Field Survey Required	Land Type Association, Habitat Comments
		Federal	State				
Faunal Species							
Eastern small-footed bat	*Myotis leibii*	C	SU	No	None	No	St. Francois Igneous Glade/Oak Forest Knobs. Known only from one cave in Iron County and on cave in Stone County
Bachman's sparrow	*Aimophila aestivalis*	C	E	Yes	Low	No	St. Francois Igneous Glade/Oak Forest Knobs, St. Francois Oak-Pine Woodland/Forest Hills; Upland savanna, glades, open pine woods, old field; Ozarks
Henslow's sparrow	*Ammodramus henslow*ii	C	S2	No	None	No	Osage Plains and Central Dissected Till Plains Sections Prairie (tall grass), field; west and north MO
Cerulean warbler	*Dendroica cerulea*	C	S2S3?	No	None	No	Middle Gasconade River Oak Woodland/Forest Breaks Mature wooded riparian and wooded bottomlands; Ozarks
American peregrine falcon	*Falco peregrinus anatum*	--	E	No	None	No	LTA unknown; river valleys, mountain ranges, coastlines; upper Mississippi River
Migrant loggerhead shrike	*Lanius ludovicianus migrans*	--	S1S2	No	None	No	Central Dissected Till Plains Section only; open areas with scattered trees, bushes, hedgerows
Swainson's warbler	*Limnothlypis swainsonni*	--	E	Yes	High	No	St. Francois Dolomite Glade/Oak Woodland Basins Black River Oak Pine Woodlands/Forest Hills; canebrake swamps and thickets of moist woods
Hellbender (Eastern)	*Cryptobranchus a. alleganiensis*	C	S2	No	None	No	LTA not applicable; large, clear permanent streams; Ozarks
Ozark hellbender	*Cryptobranchus a. bishopei*	C	S2	No	None	No	LTA not applicable; large, clear permanent streams; Ozarks
Alligator snapping turtle	*Macroclemys temminckii*	C	S2	Yes	None	No	LTA not applicable; deep sloughs, oxbow lakes and deep, muddy pools of large rivers
Crystal darter	*Crystallaria (+ Ammocrypta) asperella*	C	E	Yes	Low	No	LTA not applicable; open stretches of large, clear streams with low or moderate gradients over sand or small gravel bottoms
Western sand darter	*Etheostoma (+Ammocrypta) clarum*	--	S2S3	No	None	No	LTA not applicable; upper Mississippi River and in lowland ditches of southeast MO
Blacknose shiner	*Notropis heterolepis*	--	S2	No	None	No	LTA not applicable; small, moderately clear prairie streams
Ozark shiner	*Notropis ozarcanus*	C	S2	No	None	No	LTA not applicable; large, clear streams having high gradients and permanent strong flow
Sabine shiner	*Notropis sabinae*	--	E	Yes	Low	No	LTA not applicable; known only from clear, deep areas of the Black River in waters with slight to moderate current over sand substrate
Bluestripe darter	*Percina cymatotaenia*	C	S2	No	None	No	LTA not applicable; occurs in Osage and Gasconade River systems of northern Ozarks
Longnose darter	*Percina nasuta*	C	E	Yes	None	No	LTA not applicable; currently believed to be restricted to the upper St. Francis River
Stargazing darter	*Percina uranidea*	C	S2	No	None	No	LTA not applicable; confined to larger lowland ditches and streams
Eastern slim minnow	*Pimephales tenellus parviceps*	--	S2S3	Yes	Low	No	LTA not applicable; occurs in the White, Black, St. Francis, and Castor Rivers in quiet water over a sandy, gravelly, or rocky bottom
Southern cavefish	*Typhlichthys subterraneus*	--	S2S3	No	None	No	LTA not applicable; underground waters of central and southern Ozarks section
Tumbling Creek cavesnail	*Antrobia culveri*	Can.	S1	No	None	No	LTA not applicable; known only from Tumbling Creek cave, Taney County, MO
Spectacle cave	*Cumberlandia monodonta*	C	S3	No	None	No	LTA not applicable; Mississippi, Gasconade, and Meramec Rivers
Western fanshell	*Cyprogenia aberti*	C	S1S2	Yes	High	Yes	LTA not applicable; inhabits riffles of high gradient streams, also shallow water with mixed gravel and mud, locally abundant in Black and St. Francis Rivers
Snuffbox	*Epioblasma triquetra*	C	E	Yes	Low	Yes	LTA not applicable; usually found in medium-sized gravel in clear, swift water, locally abundant in St. Francis River
Southern hickorynut	*Obovaria jacksoniana*	--	S1	Yes	Low	Yes	LTA not applicable; known only from the Whitewater River, Cape Girardeau County, and Cane Creek, Butler County, MO
Sheepnose	*Plethobasus cyphyus*	--	E	No	None	No	LTA not applicable; Occurs only in east-central MO, common in Meramec River basin
Ouachita kidneyshell	*Ptychobranchus occidentalis*	C	S2S3	Yes	Low	Yes	LTA not applicable; widespread in MO south of Meramec River, known from Black, St. Francis, and James Rivers
Rabbitsfoot	*Quadrula c. Cylindrical*	C	S1	Yes	Low	Yes	LTA not applicable; occurs only in Spring River in southwestern MO and Black and St. Francis Rivers in southeastern MO
Purple lilliput	*Toxolasma lividus*	C	S2	No	None	No	LTA not applicable; currently known only from the Little Black River system, Butler and Ripley Counties and Crooked Creek, Bollinger County, MO
Bluff vertigo	*Vertigo meramecensis*	C	SU	No	None	No	LTA not applicable; known only from Crawford County, MO
Micro caddisfly	*Ochrotrichia contorta*	C	SU	No	None	No	LTA not applicable; known only from Greer Spring, Oregon County
Springtail	*Pseudosinella espana*	--	SU	No	None	No	LTA not applicable; known only from three caves in Oregon County
Central Missouri cave amphipod	*Allocrangonyx hubrichti*	C	S1S2	No	None	No	LTA not applicable; known only from caves in Phelps and Washington Counties
Isopod	*Caecidotea dimorpha*	--	S1S3	No	None	No	LTA not applicable; known only from one cave in Barry County
Salem cave crayfish	*Cambarus hubrichti*	--	S3	No	None	No	LTA not applicable; known from several caves in the Salem Plateau of central MO
Bristly cave crayfish	*Cambarus setosus*	--	S3	No	None	No	LTA not applicable; occurs in several caves in southwestern MO
Coldwater crayfish	*Orconectes eupunctus*	--	S3	No	None	No	LTA not applicable; known from streams in Howell and Oregon Counties
Big River crayfish (=belted crayfish)	*Orconectes harrisonii*	--	S3	No	None	No	LTA not applicable; known only from Big River and its tributaries, Washington and Ste. Genevieve Counties
Meek's crayfish	*Orconectes meeki*	--	S1	No	None	NO	LTA not applicable; known only from two sites in Stone County
Big Creek crayfish	*Orconectes peruncus*	--	S2	Yes	High	No	LTA not applicable; collected from Wilmore Creek, Wayne County (1994)
St. Francis River crayfish	*Orcxonectes quadruncus*	--	S2	Yes	High	No	LTA not applicable; occurs only in Missouri, in the St. Francis River and its tributaries
White River midget crayfish/ (=Williams' crayfish)	*Orconectes williamsi*	C	S1?	No	None	No	LTA not applicable; recorded in Roaring River and a few other streams of southern Barry, Stone and Taney Counties
Onondaga Cave amphipod	*Stygobromus onondagaensis*	--	S3	No	None	No	LTA not applicable; known only from subterranean waters in the Meramec River drainage, Franklin and Washington Counties, and the Eleven Point River drainage, Shannon and Oregon Counties

Table 3-19. List of Eastern Region (R9) Sensitive Species Reported from the MTNF, Missouri

		Listing Status*					
Floral Species							
Earleaf foxglove	*Agalinis auriculata*	--	SU	Yes	Low	Yes	Dry upland woods and prairies, open and fallow fields; scattered throughout MO
Purple false-foxglove	*Agalinis skinneriana*	--	S3	Yes	Low	Yes	Dry prairies, dry open woods and thickets; central and southern MO
Wood anemone	*Anemone quinquefolia*	--	S1	Yes	Low	Yes	Dry open woods and thickets; scattered throughout Ozarks in MO
Tradescant aster	*Aster dumosus var strictior*	--	S2	Yes	Low	Yes	Wet meadows and swampy open ground; known only from Butler and Howell Counties, MO
Forked aster	*Aster furcatus*	FC2	S2	Yes	Low	Yes	Moist rocky ledges of bluffs along streams; scattered throughout eastern MO
Large-leafed aster	*Aster macrophyllus*	--	S1	Yes	Low	Yes	Moist rocky ledges of bluffs along streams; scattered throughout eastern MO
American barberry	*Berberis canadensis*	--	S2	Yes	Low	Yes	Rocky, wooded, north-facing bluffs along streams; south-central Ozarks
Ofer hollow reedgrass	*Calamagrostis porteri* spp. *insperata*	--	S3	Yes	Low	Yes	Rocky, wooded ravines, rocky open slopes; central Ozarks
Bush's poppy mallow	*Callirhoe bushii*	--	S2	No	None	No	Restricted to rocky open woods and borders of glades in the White River drainage of southwestern MO
Marsh bellflower	*Campanula aparinoides*	--	S1	No	None	No	Swampy meadows and calcareous fens; known only from Shannon County, MO
Buxbaum's sedge	*Carex buxbaumii*	--	S2	Yes	Low	Yes	Fens, open areas surrounded by bottomland woodlands, widely scattered throughout MO
Cherokee sedge	*Carex cherokeensis*	--	S2	Yes	Low	Yes	Openings of dry upland forests, acid seeps, bottomland woods, roadsides; southern MO
Fibrous-root sedge	*Carex communis*	--	S1	Yes	Low	Yes	Rich, north-facing wooded slopes; White River area of southwestern MO, known in Stoddard County
Epiphytic sedge	*Carex decomposita*	--	S3	No	None	No	Known only from bases of shrubs in sinkhole ponds in southeast Ozarks
Sedge	*Carex fissa var fissa*	--	S1	Yes	High	Yes	Disturbed, moist areas, roadsides; scattered throughout Ozarks and southern MO
Giant sedge	*Carex gigantea*	--	S1S2	No	None	No	Swamps and bottomland forests; lowlands of southeastern MO
Oklahoma sedge	*Carex oklahomensis*	--	S2	No	None	No	Wet prairies; southwest MO
Sharp-scale sedge	*Carex oxylepsis var pubescen*	--	S2	No	None	No	Wetlands and sandy areas within bottomland forests, scattered throughout Mississippi Lowland area
Dioecious sedge	*Carex sterilis*	--	S1	No	None	No	Fens; limited to northern Ozarks
Straw sedge	*Carex straminea*	--	S1	No	None	No	Margins of sinkholes, ditches, roadsides; known only from Shannon County, MO
Tussock sedge	*Carex stricta*	--	S2?	Yes	Low	Yes	Fens and margins of streams and springs on calcareous substrate; eastern Ozarks
Rigid sedge	*Carex tetanica*	--	S1	No	None	No	Fens; known only from St. Francois County, MO
Fox sedge	*Carex triangularis*	--	S1	Yes	Low	Yes	Swamps and openings of bottomland woodlands, wet depressions along roadsides, emergent aquatics throughout Mississippi Lowlands area
Ozark chinquapin	*Castanea pumila v. ozarkens*	--	S2	No	None	No	Dry ridges, acid soils; known only in Howell County and southwest MO
Southern cayaponia	*Cayaponia grandifolia*	--	S1	No	None	No	Rich, low alluvial woodlands, wet depressions, bayous, Lowlands of southeastern MO
Ivy treebine	*Cissus incisa*	--	S2	No	None	No	South or west-facing limestone bluffs overlooking streams; known only in southwest MO
Trelease's larkspur	*Delphinium treleasei*	--	SU	No	None	No	Limestone glades and bald knobs; White River region, southwest MO
Open-ground whitlow-grass	*Draba aprica*	--	SU	Yes	Low	Yes	Low, rocky woods; Madison and Reynolds Counties
Log fern	*Dryopteris celsa*	--	SU	No	None	No	Shaded spring branches, sinkholes; found in Carter, Howell, Oregon Counties, MO
Goldie's woodfern	*Dryopteris goldiana*	--	SU	No	None	No	Shaded spring branches, sinkholes; scattered throughout MO
Wavy-leaf purple coneflower	*Echinacea simulata*	--	SU	Yes	High	Yes	Glades, savannas, roadsides, eastern MO
Small-flower thoroughwort	*Eupatorium semiserratum*	--	S1S2	Yes	High	Yes	Low open fields, open woods, wet meadows; southeastern Missouri, known in Butler County
Pale avens	*Geum virginianum*	--	S1	Yes	High	Yes	Dry mesic upland woods, known in Wayne County, MO
Featherfoil	*Hottonia inflata*	--	S2	Yes	High	Yes	Bald cypress and tupelo swamps, sloughs, sinkhole ponds, mudbanks; southeastern MO
Whorled pennywort	*Hydrocotyle verticillata var. verticillata*	--	S1	No	None	No	Moist banks of spring-fed streams; known only from Ozark County, MO
Small whorled pogonia	*Isotria medeoloides*	T	E	Yes	Low	Yes	Dry upland woods, acid soils; known only in Bollinger County, MO
Butternut	*Juglans cinerea*	--	SU	Yes	High	Yes	Rich woods, base of slopes, riparian areas; central and eastern Missouri
Weak rush	*Juncus debilis*	--	S1	Yes	None	No	Open water along creeks; moist sandy soils; known only from Ripley County, MO
Small-fruit seedbox	*Ludwigia microcarpa*	--	S2	No	None	No	Swampy meadows along spring branches; known only from Oregon County, MO
Baldwin's milkvine	*Matelea baldwyniana*	--	SU	Yes	Low	Yes	Open, rocky woods, edges of glades, riparian areas in southeast MO
Bog buckbean	*Menyanthes trifoliata*	--	S1	No	None	No	Calcareous bogs; known only from Reynolds County, MO
Alabama snow wreath	*Neviusia alabamensis*	--	SH	Yes	Low	Yes	Wooded slopes below bluffs or ridges; known only from Butler County, MO
Panic grass	*Panicum dichotomum v. yadkinense*	--	S1	No	None	No	Upland forests and below bluffs or ridges; known only from Reynolds County, MO
Large-leaved grass-of-parnassus	*Parnassia grandifolia*	--	SU	Yes	Low	Yes	Springs, fens, calcareous seeps; east and south-central Missouri
Carolina phlox	*Phlox carolina v. carolina*	--	S1	No	None	No	Bogs and low wet woods along streams; known only from Carter County, MO
Wild sweet William	*Phlox maculata v. pyramida*	--	S2	Yes	Low	Yes	Swampy calcareous meadows, open wet ground; throughout southeastern Ozarks
Knotweed leaf-flower	*Phlyllanthus polygonoides*	--	S1	No	None	No	Limestone glades; southwestern MO
Yellow-fringe orchid	*Platanthera ciliaris*	--	S1	Yes	Low	Yes	Acid seeps, acid and sandy soils in pine-dominated woods; southeastern Missouri
Small green woodland orchid	*Platanthera clavellata*	--	S2	Yes	Low	Yes	Acid seeps, acid and sandy soils along sinkholes; Crowley's Ridge and Ozarks of southeastern MO
Southern rein orchid	*Platanthera v. flava*	--	S2	Yes	Low	Yes	Mesic bottomland forests and wet prairies; southeastern Missouri
Southern rein orchid	*Platanthera flava var. herbiola*	--	S2	Yes	Low	Yes	Mesic bottomland forests and wet prairies; southeastern Missouri
Halberd-leaf tearthumb	*Polygonum arifolium*	--	S1	Yes	Low	Yes	Wet sandy swales of springs; known from Stoddard and Butler counties, MO
Spotted pondweed	*Potamogeton pulcher*	--	S2S3	Yes	High	Yes	Sinkhole ponds, sluggish streams, emergent on mudflats; throughout southeast Missouri
Nuttall's oak	*Quercus nuttallii (=texana)*	--	S2	Yes	Low	Yes	Low, wet woods; known from Butler and New Madrid Counties, MO

Table 3-19. List of Eastern Region (R9) Sensitive Species Reported from the MTNF, Missouri

		Listing Status*					
Harvey beakrush	*Rhynchospora harveyi*	--	S1	No	None	No	Sandstone and dolomite glades, prairies; limited to southwestern MO
Orange coneflower	*Rudbeckia fulgida v. speciosa*	--	SU	Yes	Low	Yes	Fens, moist thickets, rocky open woods, glades; southern and east-central Missouri
Narrow-leaf pink	*Sabatia brachiata*	--	S1	Yes	Low	Yes	Upland woods; known only from Butler County, Missouri
American cupscale	*Sacciolepis striata*	--	S1	Yes	Low	Yes	Margins of sinkholes, ponds, ditches; scattered through southeastern MO
Canby bulrush	*Scirpus etuberculatus*	--	SU	No	None	No	Sinkhole ponds; known only from Howell and Scott Counties, MO
Weakstalk bulrush	*Scirpus purshianus*	--	SU	No	None	No	Sinkhole ponds, large pools in streams; known only from Bollinger and Oregon Counties, MO
Hall's bulrush	*Scirpus hallii*	--	SU	No	None	No	Sinkhole ponds and sandy depressions; known only from Howell and Scott Co., MO
Bush's skullcap	*Scutellaria bushii*	--	SU	Yes	Low	Yes	Limestone glades, bald knobs; southern Ozarks
Royal catchfly	*Silene regia*	--	SU	Yes	Low	Yes	Rocky open woods, savannas, glade edges; throughout the Ozarks
Gattinger's goldenrod	*Solidago gattengerii*	--	SU	Yes	Low	Yes	Limestone glades, bald knobs; scattered throughout central and southern MO
Ladies' tresses	*Spiranthes ovalis*	--	S2	Yes	Low	Yes	Low, rich woodlands, terraced slopes near streams; scattered in MO, known in Butler and Wayne Counties
Sullivantia	*Sullivantia sullivantii*	--	S2	No	None	No	Moist, shaded limestone bluffs; southern Ozarks of MO
Pale manna grass	*Torreyochloa pallida*	--	S1	Yes	High	Yes	Swamps, margins of springs and sinkhole ponds; eastern Ozarks and Mississippi Lowlands
Ozark spiderwort	*Tradescantia ozarkana*	--	S2	No	None	No	Rich, rocky, wooded slopes and ledges; White River area of MO
Ozark trillium	*Trillium pusillum v. ozarkan*	--	S2	Yes	Low	Yes	Dry woodlands; southern MO
Yellowleaf tinker's-weed	*Triosteum angustifolium var. eamesii*	--	S1	No	None	No	Limestone bluffs; known only from Maries and Benton Counties, MO
Running buffalo clover	*Trifolium stoloniferum*	E	E	Yes	Low	Yes	Moist woodlands, riparian areas around streams; scattered in MO, known in Wayne County
Ozark cornsalad	*Vallerianella ozarkana*	--	S2	No	None	No	Glades and rocky open woods; White River area of MO
Northern arrow-wood	*Vibrunum recognitum*	--	S1	Yes	Low	Yes	Margins of gravel bars in small streams; known in Madison and Oregon Counties, Missouri
Sand grape	*Vitis rupestris*	--	SU	Yes	Low	Yes	Gravel bars, entire Ozark Highlands area
Barren strawberry	*Waldsteinia fragaroides*	--	S2	No	None	No	Steep, wooded cherty and sandstone ledges; relict species known only in south central MO
Netted chainfern	*Woodwardia areolata*	--	S2	Yes	Low	Yes	Mesic woodlands and seeps, acidic soils; southeastern Ozarks

* *C = U.S. Fish and Wildlife Service species of concern; Can. = candidate for listing as threatened or endangered; E = state listed endangered; S1 = critically imperiled; S2 = imperiled; S3 = rare and uncommon; SU = status unknown.*

† *Yes = occurrence records or specific habitat known to exist in the project areas; No = specific habitat (combination of geology, land form, soil type, slope, and a aspect) does not exist within the project areas.*

** *None = will not be affected by the Proposed Action; Low = occurs in the vicinity (county) of the affected areas, could occur in similar habitats near or within impacted areas; High = documented occurrence records or specific habitat available within potential areas of impact.*

It should be noted that the time segments drawn for each period are not necessarily distinct, but reflect an approximate expanse of time during which the described environmental conditions and cultural evidence have been recognized.

The overall prehistory of southeastern Missouri mirrors the general pattern of the Midwest and the Mississippi River valley. This pattern features a trend toward increasing cultural complexity over time, moving from small egalitarian band level cultures to larger, hierarchically organized societies. However, there are some differences reflecting the specific environmental opportunities and limitations of the Ozark Highlands and the central Mississippi River lowlands.

Following Chapman (1975 and 1980), the prehistoric sequence began with the Paleoindian period. The Paleoindian period is typified by the entry of the first humans into the region; they were living in a late Pleistocene glacial environment, hunting large mammals, collecting plants and hunting smaller animals for food (Early Hunter Tradition). Evidence for small game came from the ancient salt licks at Kimmswick, Missouri (to the northeast of the study corridor) where a variety of animal bones were preserved including giant mastodons and small squirrels (Graham et al., 1981). With the Dalton period, global warming shifted environmental conditions to what we are more familiar with today, and the prehistoric population of the region (Hunter/Forager Tradition) adjusted culturally to the different climates and associated flora and fauna. The Archaic period represented a time when hunting and gathering was the predominate means of subsistence (Forager Tradition). The Archaic period and its three subdivisions (Early, Middle, and Late) represent an expanse of time when prehistoric populations became more diversified in their use of regional and local environments. Over time, these hunters and gatherers experimented with various plants, and by the following Woodland period, were living less mobile lifeways and growing some plants for food (Prairie-Forest Potter Tradition). The introduction of cultigens that had been domesticated in Mexico resulted in sedentism and population growth during the Mississippi period (Village Farmer Tradition).

3.12.1.2 Regional Historic Setting

The more recent history of southeastern Missouri has been divided into five periods:

- Colonial Frontier (1700-1803)
- Rural Development (1800-1830)
- Early Agricultural (1830-1860)
- Agricultural/Industrial Development (1860-1920)
- Recent (1920-Present).

Colonial Frontier

The French were the first to penetrate the interior of Missouri in the late seventeenth and early eighteenth centuries (Rafferty, 1980). They came mainly from Canada and the Great Lakes region and established seasonal mining camps in the hills west of the Mississippi River. One of these mining camps, Mine La Motte is located in Madison County north of the study corridor. The French made no permanent settlements within the study corridor.

The earliest land routes were trails inherited from Native Americans. The Greenville-Indian ford Road ran southeast from Greenville, branching out from the Natchitoches Trace. One of the most important trails in the region, the Natchitoches Trace, also known as the Old Military Road, ran from Vincennes, Indiana, to the Post of Natchitoches in Louisiana. The course of the trail in Missouri followed a general path paralleling U.S. 67, although there are several branches of the path within Missouri. within the project area, the Natchitoches Trace paralleled U.S. 67 from Greenville through Fredericktown. The Natchitoches Trace was not generally used by early French and Spanish inhabitants except in the mining districts in Madison County (Price, 1975).

Rural Development

In 1797, the Spanish government provided land grants to entice immigrants. This act essentially altered the pattern of settlement as the new American settlers were agriculturally oriented, and they established

farmsteads in a dispersed, widespread pattern along the rivers and tributary streams. within the vicinity of the study corridor, Spanish land grants were made along the St. Francis River in Madison and Wayne Counties. Small settlements grew up around these tracts, most notably St. Michaels in 1799 (presently Fredericktown) and Old Greenville in 1816, which is also where the Natchitoches Trace crossed the river. Missouri was purchased by the United States in 1803 and became a state in 1821 (Rafferty, 1980).

The new American settlers were primarily of Scots-Irish descent from the Upland South region of the Carolinas, Virginia, Kentucky, and Tennessee. They were mostly farmers, hunters, and fishermen, and they set up their isolated homesteads in the hilly upland country near springs or rivers.

During the period between 1837 and 1839 a final group of transient Native Americans passed through the Ozark area. Cherokee tribal members, on their forced trek from the eastern United States to Oklahoma and Kansas, crossed the Mississippi River north of Cape Girardeau at Green's Ferry. In 1830, President Andrew Jackson had authorized the removal of the Cherokees who lived in North Carolina, Georgia, and Tennessee in order to take advantage of the rich soil and valuable minerals located on the Cherokee land.

The primary route within the project area was known as Benge's Route. A detachment of 1,090 Cherokees lead by John Benge departed Fort Payne, Alabama, in September 1838. within the study corridor, Benge's Route roughly parallels U.S. 67 from just north of Old Greenville south for about three miles, and from there follows the Natchitoches Trace to the Current River (National Park Service, 1992).

Early Agricultural

The primary spur to American settlement of the less desirable hills of the Ozarks before the Civil War was the Graduation Act of 1854. Public land previously on sale for $1.25 per acre was allowed progressively to decline in price after 10 years on the market, ultimately falling to 12.5 cents per acre if the property remained unsold for 30 years. Thus lands not worth the original price became affordable to the lower class Scots-Irish who were willing to settle in rough terrain. This led to a land boom in the Ozarks as Scots-Irish families purchased small tracts of the tillable Ozark highlands and used public lands for grazing (Gerlach, 1986).

Between 1830 and 1850 a large number of Germans moved westward into the Missouri frontier, at first near the Missouri and Mississippi river borders. Slowly, they moved into the Ozark interior usually forming tight communities (Rafferty, 1980).

With the greater influx of immigrants to the area, more roads were built at this time. Several roads crossed or ran parallel to present-day U.S. 67, including the Greenville-Indian Ford Road and the Natchitoches Trace (old Military Road). Taverns and inns were put up along these roads by industrious citizens, and often these stopping points became the foundation of new towns. Prior to 1850, few enduring bridges were constructed in Missouri. Instead, ferry services and fords were commonly used (Fraserdesign, 1996). A ferry service was operated by the Wight family at the St. Francis River near Old Greenville throughout the later half of the nineteenth century.

Agricultural/Early Industrial

This period encompasses the era from the Civil War to the end of World War I. As troops from both Union and Confederate forces were present in the study corridor, some towns were fortified. Old Greenville and Fredericktown saw most of the action; Old Greenville was held by both Union and Confederate troops during the war and was burned at one point. No major battles were seen in the area, although several small skirmishes were fought.

Towards the end of the nineteenth century, farmers began to make the change from subsistence farming to specialized cash-crop farming. This led to a higher economic status for many industrious farmers.

By the mid- to late nineteenth century, railroads had penetrated the Ozark interior and with them came an increase in economic endeavors. Railroads were used, not only for personal transportation, but for

commercial hauling. Found along rail lines would be stores, post offices, rail depots, taverns, and inns. Taskee Station was one of the earliest and largest railway stations in the study corridor.

Late in the nineteenth century, with the development of better transportation, new logging and mining enterprises were booming in the Ozark area. The realization that the abundant timber of the Ozark forests could be very profitable set in motion a timber industry that would continue into the early twentieth century. Large logging companies from the east purchased tracts of timbered land in the Ozarks. Poplar Bluff was a major logging town at this time.

After the timber had been depleted, many jobs were lost and land values were depressed. Taking over the denuded valleys of the Ozarks, farming and the storage and shipping of farm products became the major regional source of income. Corn, cotton, wheat, oats, potatoes, and a variety of fruits have been raised. The highlands were used to profit for livestock, and the area has been known for its hog production, particularly the Hampshire breed. Moonshining also became an income-producing activity (Harris et al., 1977).

When the Swamp Land Act of 1850 was initially passed, individual counties received state swamp lands. In general, these counties were not able to sell the lands to individuals owing to the fact that private owners were not willing to pay taxes on what they thought were useless lands. But, in the latter part of the nineteenth century, people realized the timber within those areas was profitable. The land was bought, and after the timber was cut, owners found themselves with unproductive lands on which they were paying taxes. This brought about the formation of the Little River Drainage District in 1907. The district, which is the largest of its kind in the country, is located in the counties just east of the project area, which bear the brunt of the water flowing out of the hilly Ozark escarpment. The district consists of a series of drainages and the main drainage, the headwater diversion channel, which diverts runoff from as far as Fredericktown to the Mississippi River. (Little River Drainage District, 1989)

In January of 1913 the Inter-River Drainage District was formed and the drainage of the lowlands to the east of Poplar Bluff began on a larger and more successful scale than ever before. Farming boomed in the formerly swampy alluvial lowlands, which experienced population growth compared with the uplands that had previously received more local settlement.

Recent Period

The early twentieth century marked a drastic increase in transportation. In 1907, the Missouri State Highway Department was created. Slowly, a state highway plan began to emerge. U.S. 67 was completed in 1922. At this time many of the standardized concrete culverts, concrete bridges, and concrete and steel bridges were built. Numerous examples of these types of bridges can be found throughout the study corridor. The original U.S. 67 was sinuous and work began in 1941 to straighten it out in some areas. This work was not completed until after World War II.

During the post-World War II economic and transportation boom, many new commercial buildings were built along the new highways. Gas stations, stores, flea markets, motels, and other businesses geared toward highway travelers popped up all along U.S. 67.

By 1930, the population composition of the rural Ozarks was stabilized and little change has occurred since then. The contemporary population of the project corridor is a remarkable reflection of the removal of Native peoples and the early American settlement history of the eastern Missouri Ozark region, with most of the residents being of Scots-Irish and German descent in the upland portions of the study corridor (Gerlach, 1986). At the southern end of the study corridor in the lowland regions, however, there is a heavier population of African-Americans. The lowland areas south of Poplar Bluff and the Ozark Escarpment were predominantly swamps until the early twentieth century. At that time drainage districts were established and numerous ditches were excavated through the study corridor. After the land was cleared and drained, the land was prime for large-scale agricultural crops such as cotton and rice. White landowners adopted a sharecropping system to work the land, and they hired African-Americans from the south.

The 1930s saw the formation of national forests, and in this region, the MTNF was created in 1933. Employment for thousands of men was created as the need to preserve the forests increased. The Works Progress Administration and the CCC were formed by the Roosevelt administration to alleviate some of the nations' rising unemployment. CCC camps were set up within the MTNF, including ones at Poplar Bluff and Greenville. Camps were generally large, consisting of living units and common buildings (medical and cafeteria). The CCC workers completed many projects which can still be seen today including U.S. 67 road work, various forest trails, lookout towers, and installation of telephone lines (Poplar Bluff District Office n.d.; Rafferty, 1980).

The early to mid-twentieth century was perhaps the first time in America when the general public began to have a considerable amount of recreation time. The creation of national forests gave people a place to get away from home, and the spread of the automobile as an affordable commodity allowed them to travel. Many recreational opportunities were developed in the Ozarks, including springs and spas, canoeing and floating on the many rivers, and hunting and fishing. The formation of Wappapello Lake in Wayne County in 1941 drew significant numbers of people into the region and still does today (Rafferty, 1980).

A records search and literature review were conducted for the entire U.S. 67 study corridor to identify all previously recorded archaeological sites. Repositories and records searched include the following: the files of the Archaeological Survey of Missouri (ASM) in Columbia; the files of the Missouri State Historic Preservation Office in Jefferson City; the files of the Fredericktown District Office, MTNF in Fredericktown; the files of the Poplar Bluff District Office, MTNF, in Poplar Bluff; and the files of the Wappapello Lake Office, St. Louis District, USACE, in Wappapello.

The records search and literature review resulted in the documentation of 39 archaeological sites within the study corridor (Table 3-20). On July 9, 1999, a site field inspection was conducted for all previously recorded sites within and immediately adjacent to the study corridor. The purpose of the site field inspection was to assess the current site conditions and verify the original information reported on the ASM site forms. No artifact collections were made. Of the 39 previously recorded sites, only 12 could be relocated during the site field inspection. The remaining 26 sites could not be located due to site inaccessibility, poor surface visibility, and the less accurate labeling and mapping techniques that were used in the 1930s.

Table 3-20 lists and briefly describes each previously recorded site based on information obtained from the ASM site form(s), technical report(s), and site field inspection. Information reported in the table includes the following:

- site number,
- site size,
- landform,
- elevation,
- name of nearest water source,
- distance to water source,
- recorded components (D=Dalton, A=Archaic, MA=Middle Archaic, LA=Late Archaic, W=Woodland, EW=Early Woodland, LW=Late Woodland, M=Mississippi, M-PP=Mississippi-Powers Phase, UP=Unknown Prehistoric, H=Historic),
- recorded site type (B=burials, C=camp, CE=cemetery, D=dump, F=farmstead, LA=limited activity, LD=loading dock, M=mound or mound group, R=road, S=sawmill, T=town, V=village, WE=well),
- date the most current site form was filled out,
- most recent level of work performed,
- NRHP status (based on recommendations recorded on ASM site form or in the applicable technical report: NE=not eligible, PE=potentially eligible, E=eligible, UD=not determined, Listed=listed as an individual site on the NRHP, Listed*=listed as part of a NRHP district),
- whether the site was relocated in July of 1999 (No*=could not access site, No**=area relocated, but no trace of site),

- current site condition (B=burned field, D=destroyed, HV=high visibility, LV=low visibility, ND=no obvious disturbances, PD=partially destroyed), and
- recommendation concerning future work, and mitigation potential (High=if directly impacted, the potential for full mitigation would be high, Medium=if directly impacted, the potential for full mitigation would be medium, Low=if directly impacted, the potential for full mitigation would be low).

Due to public distribution of this document, the specific locations of these sites has been withheld.

The 39 previously recorded archaeological sites within or immediately adjacent to the study corridor consist of 24 prehistoric sites, 8 historic sites, and 7 multicomponent prehistoric/historic sites (Table 3-20). Seventeen sites (23BU201, 23WE123, 23WE124, 23WE153, 23WE261, 23WE262, 23WE263, 23WE290, 23WE299, 23WE313, 23WE420, 23WE474, 23WE475, 23WE514, 23WE515, 23WE575, and 23WE576) have not been evaluated as to their significance or NRHP eligibility. Half of one of these sites (23BU201) has been assessed as ineligible for listing to the NRHP, while the other half has not been evaluated. A Phase I revisit is recommended for these sites to determine their potential significance and eligibility for listing to the NRHP. Nine sites (23BU281, 23BU293, 23BU297, 23BU299, 23MO40, 23MO116, 23WE293, 23WE546, and 23WE694) are reported to be ineligible for listing to the NRHP and no further work is recommended. Seven sites (23BU123, 23BU179, 23MO134, 23MO137, 23MO153, 23WE494, and 23WE635) are reported to be significant and are evaluated as potentially eligible for listing to the NRHP. If impacted by the proposed highway construction, a Phase II testing of significance is recommended. One site (23WE138) has been reported as being eligible for listing to the NRHP. If it cannot be avoided by highway construction, a Phase III mitigation is recommended.

Five sites are listed on the NRHP. Three of the NRHP sites are listed as part of the Little Black River Archaeological District (23BU59, 23BU60, and 23BU127). No excavations have been performed at these sites; thus, a Phase I revisit is recommended. Two of the NRHP sites are listed individuallyXOld Greenville (23WE637) and the Wilbourn-Steinberg Site (23BU77/23BU96). It is recommended that these two sites be avoided during all phases of the proposed U.S. 67 highway construction. If avoidance and protection are not feasible, it is recommended that Phase III mitigations be conducted.

3.12.2 Architectural and Bridge/Culvert Investigation

An architectural and bridge/culvert survey of the project corridor was performed to identify architectural resources which possess architectural significance and are recommended eligible for inclusion in the NRHP). This process consisted of a records search and literature review, a field survey, and a NRHP criteria analysis of each identified site and conformed to AMoDOT Protocol for Cultural Resources Investigations Associated with Environmental Assessment or Environmental Impact Statement Corridor Studies≅ (1997).

The records search and literature review identified all previous architectural and bridge/culvert studies that included portions of or all of the project corridor, identified all architectural and bridge/culvert resources that are listed in the NRHP or that have been determined NRHP eligible, and gathered available historical information on architectural and bridge/culvert properties. As part of the records search and literature review, the NRHP, the State of Missouri Historic Preservation Office files, the Missouri Historic Bridge Inventory Draft Report (Fraserdesign, 1996), and the MoDOT 1995 Bridge/Culvert Service Ratings were reviewed for any previously documented bridges/culverts that lie within the project corridor. None of the bridges or culverts within the project corridor are listed on the NRHP. However, several of the project corridor bridges and culverts were included in the Missouri Historic Bridge Inventory Draft Report (Fraserdesign 1996) and the MoDOT 1995 Bridge/Culvert Service Ratings.

Table 3-20. Previously Recorded Archaeological Sites within the U.S. 67 Study Corridor

Site Number	Site Size	Landform	Elevation (ft)	Nearest Water	Distance to Water	Component	Site Type	Site Form Date	Work Performed	NRHP Status	Relocated	Current Site Condition	Recommended Work
23BU59	Unknown	Lowland Sandridge	310-315	Hart Ditch	0.25 mi	W/M	LA	1969	Phase I	Listed*	No*	Unknown	Phase I Revisit
23BU60	Unknown	Lowland Sandridge	305-310	Harviell Ditch	0.25 mi	W	LA	1969	Phase I	Listed*	No*	Unknown	Phase I Revisit
23BU77/96	193 ac	Lowland Sandridge	295-310	Neelyville Ditch	300 ft	M-PP	V	1972	Partial Phase II	Listed	Yes	B	Avoidance or Phase III
23BU123	25 ac	Slope/Hilltop	330-360	Cane Creek	½ mi	A/W/M/H	LA/F	1978	Partial Phase II	PE	No**	D	Partial Phase II
23BU127	Unknown	Lowland Sandridge	295-300	Neelyville Ditch	Adjacent	H	R	1978	Phase I	Listed*	No**	LV	Phase I Revisit
23BU179	660 x 340 ft	Hilltop	340	Cane Creek	165 ft	A	LA	1977	Partial Phase II	PE	Yes	LV	Partial Phase II
23BU201	4.1 ac	Slope	350-360	Cane Creek	1,700 ft	UP/H	LA/F	1978	Partial Phase II	NE/UD	No**	LV	Phase I Revisit
23BU281	7.95 x 6.05 m	Slope	470	Intermittent	210 m	H	F	1985	Phase I	NE	No*	Unknown	None
23BU293	8 x 12 m	Hilltop	580	Intermittent	1,500 ft	H	LD	1985	Phase I	NE	No**	D	None
23BU297	10 x 45 m	David Summit	570	Well	Adjacent	H	F	1988	Phase I	NE	Yes	ND/HV	None
23BU299	15 x 20 m	Divide Summit	550	Well	Unknown	H	F	1988	Phase I	NE	Yes	ND/HV	None
23MO40	250 x 100 ft	High Terrace	800	Twelve Mile Creek	50-100 ft	UP	LA	1975	Phase I	NE	Yes	PD/LV	None
23MO134	300 x 150 m	Slope	840	Spring	Adjacent	UP/H	LA/F	1996	Phase I	PE	No*	Unknown	Phase II
23MO116	110 x 60 m	Eroded Terrace	800	Intermittent	20 m	UP	LA	1989	Phase I	NE	Yes	PD/LV	None
23MO137	30 x 30 m	Slope	860	Twelve Mile Creek	0.25 mi	H	CE	1997	Phase I	PE	No*	Unknown	Phase II
23MO138	500 x 250 m	Stream Terrace	800	Old Mines Hollow	Adjacent	LA/EW/LW	C	1997	Phase II	E	Yes	PD/LV	Avoidance or Phase III
23MO153	45 x 5 m	Stream Terrace	800	Twelve Mile Creek	23 m	UP	LA	1998	Phase I	PE	Yes	PD/LV	Phase II
23WE123	Unknown	Floodplain	380	Otter Creek	25 yards	UP	M	1938	Phase I	UD	No**	LV	Phase I Revisit
23WE124	Unknown	Knoll	380	Otter Creek	Adjacent	UP	C	1938	Phase I	UD	No**	LV	Phase I Revisit
23WE153	Unknown	Stream Terrace	440	Smoot Hollow	30 yds	UP	M	1938	Phase 1	UD	No**	PD	Phase I Revisit
23WE261	Unknown	Low Land	380 ft	St. Francis River	300 yds	UP	M	1938	Phase I	UD	No**	LV	Phase I Revisit
23WE262	100 x 40 m	Slope	380	St. Francis River	80 m	A	V/B	1990	Phase I	UD	Yes	PD	Phase I Revisit
23WE263	Unknown	High Bottom Farm	380	St. Francis River	½ mi	A	V	1930s	Phase I	UD	Yes	PD	Phase I Revisit
23WE290	Unknown	Knoll	380	Holliday Creek	Adjacent	UP	C	1930s	Phase I	UD	No**	LV	Phase I Revisit
23WE293	260 x 60 m	Floodplain	360	St. Francis River	30 yds	D/M/H	LA/D	1985	Phase II	NE	No**	LV	None
23WE299	Unknown	Stream Terrace	380	Reeces Creek	25 yds	UP	C	1930s	Phase I	UD	No**	LV	Phase I Revisit
23WE313	Unknown	Stream terrace	400-440	Reeces Creek	25 yes	UP	C	1930s	Phase I	UD	No**	PD	Phase I Revisit
23WE420	Unknown	Hillside	380-400	St. Francis River	Adjacent	UP	C	1938	Phase I	UD	No*	Unknown	Phase I Revisit
23WE474	Unknown	Knoll	510	Cedar Creek	50 yd	UP	C	1938	Phase I	UD	No*	Unknown	Phase I Revisit
23WE475	Unknown	Stream Terrace	480	Cedar Creek	150-200 yds	UP	C	1930s	Phase I	UD	Yes	ND/LV	Phase I Revisit
23WE494	7 x 10 m	Hilltop	465	St. Francis River	200 m	UP	M	1992	Phase I	PE	No*	Unknown	Phase II
23WE514	Unknown	Knoll	420	Bennett Creek	Adjacent	UP	C	1938	Phase I	UD	No*	Unknown	Phase I Revisit
23WE515	Unknown	Knoll	420-440	Bennett Creek	Adjacent	UP	C	1938	Phase I	UD	No*	Unknown	Phase I Revisit
23WE546	230 x 80 m	Floodplain	360	St. Francis River	Adjacent	MA/LW/H	LA/S	1985	Phase II	NE	No*	Unknown	None
23WE575	30 x 60 m	Low Finger	395	St. Francis River	1/3 mi	UP	LA	1978	Phase I	UD	Yes	PD/LV	Phase I Revisit
23WE576	25 x 25 m	Knoll	380	St. Francis River	1/3 mi	H	WE	1978	Phase I	UD	No**	LV	Phase I Revisit
23WE635	120 x 270 m	Floodplain	360	St. Francis River	25 m	LW/H	LA/S	1985	Phase I	PE	No*	Unknown	Phase II
23WE637	Large	Floodplain	360-480	St. Francis River	Adjacent	UP/H	LA/T	1985	Phase II	Listed	Yes	PD	Avoidance or Phase III
23WE694	5 x 5 m	Slope	430	St. Francis River	150 m	H	F	1992	Phase I	NE	No*	Unknown	None

Source: American Resources Group, 2000.

Likewise, for architectural properties, a review of the NRHP and the State of Missouri Historic Preservation Office files were completed to identify any previous architectural studies within the project corridor. At the time of this study, there are no NRHP listed architectural or bridge/culvert properties within the project corridor. Only one architectural survey has been done within a portion of the project corridor. In 1993 an architectural/historical survey report was completed in Butler County by Dr. Bonnie Stepenoff for the Ozark Foothills Regional Planning Commission (Stepenoff, 1993). Dr. Stepenoff documented all architectural properties over 50 years old that possessed architectural or historical significance in Butler County (excluding Poplar Bluff). Dr. Stepenoff=s survey included 385 county properties, eight of which lie within the project corridor (properties 131, 135, 136, 141, 146, 148, 149, and 151). According to the State of Missouri Historic Preservation Office, no architectural studies have been completed within the project corridor in either Wayne or Madison counties (Mr. Jeff Partridge, personal communication 1999 and 2001). Numerous cultural resource management reports were also reviewed; however, these reports were primarily for archaeological surveys and did not document any architectural properties within the project corridor. Information from two of these reports was utilized in the historic architectural and bridge/culvert overview (Klinger and Kandare, 1987; McNerney et al., 1978).

In addition, historic research was completed at the Fredericktown District Office-MTNF; Poplar Bluff District Office-MTNF; Wappapello Lake Office-St. Louis District, USACE; Missouri State Historical Society; Poplar Bluff Public Library; Butler County Historical Society; Wayne County Historical Society; Ozark Regional Library in Fredericktown; Madison County Historical Society; and the Wayne County Courthouse. In addition to the above, the following offices were contacted by telephone to check on the availability of historical atlases and plat books: Missouri Historical Society, Madison County Courthouse, Madison County Title Company, Greenville Abstract and Title Company, Butler County Courthouse, and Poplar Bluff Abstract and Title Insurance Office. Resources reviewed included published local histories as well as files of unpublished documents, clippings, family histories, photographs, atlases, and plat books. For all three counties, there are no atlases or plat books showing property owners, property boundaries, or house locations for the nineteenth or early twentieth centuries. Based on consultation with local historians and state librarians, no atlases appear to have been made for these areas. The earliest maps that are available are 1930s or 1940s 15-foot topographic quadrangles. These maps show general locations for some structures, but do not show all house structures, list property owner names, show property boundaries, or show barn locations. Thus these maps were only used as a reference source for dating schools and churches, which were regularly documented on the maps. The earliest available farm plat books for these counties were published in the 1960s. Due to their late date, these farm plat books were not utilized for this study.

Other references which were reviewed included published local histories as well as files of unpublished documents, clippings, photographs, etc. Potentially knowledgeable sources of local history including area historians, property owners, and local residents were consulted for any information they might provide concerning the history of individual properties.

An architectural survey of the project corridor was performed to identify buildings which possess historic architectural significance and be recommended eligible for listing in the NRHP. The architectural survey was conducted within a 152.4 m (500 ft) wide corridor [76.2 m (250 ft) on each side of the present U.S. 67] extending from Cherokee Pass in Madison County to Neelyville in Butler County. Initial field survey work was completed during the summer of 1998. Additional areas being considered by the highway alignment were surveyed during the summer of 2000 and early 2001. The field survey focused on those structures that were 50 years old or older. At the beginning of the field survey, each site along the corridor was visually observed to identify those structures which generally met the minimum age criteria. Physical descriptive information of each such structure was collected on site. If a site included multiple structures, information was collected for all of the structures at that site, regardless of age.

Each location was assigned a numerical identification number. Where multiple properties were found at a survey location, each was assigned an alphabetical designation following the survey identification number. The principal property (e.g., main dwelling) at each location was assigned the letter Aa≅. Secondary properties at each location were designated in alphabetical sequence following the principal building. Bridge site numbers are preceded by AB.≅ Culvert site numbers are preceded by a AC.≅ Survey numbers were keyed to the inventory forms, the report of findings, photographs and maps.

To initiate the coordination process with the Historic Preservation Program, MDNR, the one-page Missouri Historic Preservation Program Architectural/Historic Inventory Form was used for recording architectural properties and the one-page Missouri Office of Historic Preservation Bridge Inventory Survey Form was used for recording bridge and culvert resources. Individual sketch site maps were prepared for each site containing multiple architectural resources. All recorded properties were keyed with their inventory number to project aerial maps. Photographs were taken of each structure which was recorded including structures less than 50 years of age at sites with multiple buildings and having only one building 50 years old or older. Where necessary, multiple views of structures were photographed in order to reveal architectural or structural features. A separate architectural report includes survey forms, photographs and maps (White & Borgognoni Architects, 2003).

In order to make a determination of a site=s eligibility for inclusion in the NRHP, the following criteria was used to evaluate each site:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association, and:
>
> a). that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b). that are associated with the lives of persons significant in our past; or
>
> c). that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lake individual distinction; or
>
> d). that have yielded, or may be likely to yield, information important in prehistory or history.

Each property was evaluated for its significance within local, state, or national historic contexts. Each property was also evaluated for its integrity. The aspects of integrity that were considered are location, design, setting, materials, workmanship, feeling, and association. These qualities, in various combinations, formed the basis of evaluating each property's ability to convey its significance.

The architectural survey identified a total of 148 survey locations containing 372 properties (328 architectural resources, 21 bridges, and 23 culverts), of which at least one property at each location meets the minimum age (50 years) criterion for potential NRHP eligibility (Appendix E). The individual buildings include residences, barns, outbuildings, churches, and commercial buildings. Based on the information gathered from the survey and the records search and literature review, the buildings were found to have been constructed between the late-nineteenth century and the late-twentieth century. The majority of the buildings were constructed in the first half of the twentieth century. No architectural or bridge resources within the study corridor are currently listed on the NRHP, although the St. Francis River Bridge (B84) has been previously recommended as potentially NRHP eligible (Fraserdesign, 1996).

The State Historic Preservation Office (SHPO) has determined that the following architectural resources within the study area are eligible for listing in the NRHP:

- Building 22a – Preston Chipman property;
- Building 38a – LuAnne Moyers property;
- Building 39a – Twelvemile Missionary Baptist Church;

- Building 62a – Mt. Pisgah General Baptist Church;
- Building 78a – Howard and Wanda Gregory property;
- Buildings 317a and 317b – Thomas Kennedy property; and
- St. Francis River Bridge (B84).

The SHPO has determined that all other historic properties identified by this architectural survey, though they are at least 50 years of age, are not eligible for listing in the NRHP. They are of standard construction and architectural styling and are not associated with any significant historical event or person.

Building 22a

The Preston Chipman property includes four buildings. Only building 22a at this location is more than 50 years old. This one-story commercial building is built of randomly coursed granite masonry with grape-vine mortar joints. The roof is a single-slope structure, draining from the front to the rear of the building. The straight parapet at the west (front) facade steps down on the north and south facades as the roof elevation reduces.

The west facade consists of five fenestration bays, including three large display windows and two access doorways. One large display window, similar to those in the front facade, is located on the north and south facades continuing the window pattern of the front facade. A single, clerestory window is located in the center third of the north and south facades. A pair of double-hung, wood windows with 6-over-6 light sashes is located in the east third of the south facade. The building has a wood-framed addition to the rear. The walls of the addition have horizontal, fiberboard siding. The roof is a single-slope structure with asphalt shingles. Building Aa≅ is in poor condition.

Building 22a appears to date to approximately 1947. It was at this time that work was being completed on present-day U.S. 67. Originally built in 1922, the road was initially very curvy. Portions of the highway began to be straightened in 1941, but the work was not completed until after World War II. The building, now used for storage purposes, appears to have been originally used as a garage/machine shop. Further information was not available on the business or its initial owner (Madison County Historical Society 1988; Mr. John Skaggs, personal communication 2000).

Building 22a is a good example of traditional architecture built in the Missouri Ozarks during the first half of the twentieth century using granite-masonry with grape-vine mortar construction for exterior wall cladding. This building is one of three buildingsXincluding Barks Trucking (Site 6) and Twelvemile Baptist Church (Site 39)Xin the study corridor built of this type of stone masonry. Thus, this building is eligible for the NRHP under Criterion C. Structure 22a may also be eligible for the NRHP based on Criterion A. This building is representative of the post-World War II economic and transportation boom. Improvements to U.S. 67 were completed after World War II, and at that time many new commercial enterprises were started along the new road. The majority of these enterprises were geared toward serving the Atraveling≅ public, as the Missouri highways took on a new recreational purpose. U.S. 67 is symbolic of the new recreational purpose of the highway system as it cut through the scenic Ozarks and intersected the new Wappapello Lake. In a letter dated February 7, 2003 (MDNR, Appendix C), the SHPO has concurred that Building 22a is eligible for listing in the NRHP.

The other buildings at this location are of recent origin and are not potentially significant. They do not contribute to the historic architectural integrity of structure 22a. They do not meet the criteria of eligibility for inclusion in the NRHP.

Building 38a

The LuAnne Moyers property includes a house and three outbuildings. The house, building 38a, is two stories in height with an irregular plan shape. The estimated date of construction is 1907. It is also known

as the Whitener residence. The walls are constructed of rock-faced, concrete masonry. The intersecting hipped roofs have seamed-metal panel roofing. The wood windows have double-hung sashes with 2-over-2 light patterns. Chimneys are internal to the footprint of the house. They are constructed of brick and have profiled tops of off-set, brick coursing. The house is in poor condition and was overgrown with vegetation at the time of this survey. The current owner plans to demolish the house.

This house was built by Benjamin David Whitener in 1907. It was constructed of concrete blocks made with gravel from Twelvemile Creek. A block machine was established on the site, and the blocks were manufactured there. Mr. Whitener also built and operated a gravel plant on the creek. The plant prepared the sand and gravel used to build the nearby Mississippi River Fuel Transmission Corporation (a pipeline booster station) in 1929. The house is also reported to have been the first house in Madison County with electricity and telephone (Madison County Historical Society 1988; Ms. LuAnne Moyers, personal communication, 1998).

Building 38a is significant due to its unique construction. It was constructed of concrete blocks made on the site with local materials. It is the only concrete-block residence within the study corridor. Thus, it is recommended as eligible for the NRHP under Criterion C. In a letter dated February 7, 2003, the SHPO has concurred that building 38a is eligible for listing in the NRHP (Appendix C). The other buildings at this location are not significant. They do not appear to contribute to the significance of building 38a and are not considered eligible for the NRHP.

Building 39a

The Twelvemile Missionary Baptist Church (building 39a) is a ca. 1947 church building with an architecturally distinctive granite exterior. Property 39a is one of only three buildings with such an exterior treatment within the study corridor. It is recommended as NRHP eligible under Criterion C. In a letter dated February 7, 2003 (Appendix C), the SHPO concurred that building 39a is eligible for listing in the NRHP.

Building 62a

The Mt. Pisgah General Baptist Church (building 62a) is a ca. 1857 pioneer log church that has been in constant use and moved to this location in 1889. Although Property 62a lacks integrity of location (as it was moved in 1889), the Mt. Pisgah General Baptist Church is recommended as NRHP eligible under Criterion C due to the rare log construction of the building. In a letter dated February 7, 2003 (Appendix C), the SHPO concurred that building 62a is eligible for listing in the NRHP.

Building 78a

Building 78a is a two-story, transverse-crib barn of wood-frame construction. It was built in the early 1900's, probably just before or during 1922 when U.S. 67 was built. The barn was built by the current owner's grandfather, Raymond Kloninger. It was used for grain hay and livestock. The barn has never been altered. The construction of U.S. 67 bisected the original homestead. Another barn at this location was torn down to accommodate construction of present U.S. 67. A two-story, wood-frame farm house which is located on the west side of U.S. 67 was part of the early farmstead. In a letter dated February 7, 2003 (Appendix C), the SHPO determined that building 78a is eligible for listing in the NRHP.

Buildings 317a and 317b

Building 317a is a one-story house of horizontal-log construction. A single-story accessory building, property number 317b, is also horizontal-log construction. Both buildings date from circa 1930.

Buildings 317a and b are recommended as NRHP eligible under Criterion C for their architectural characteristics. In a letter February 7, 2003 (Appendix C), the SHPO determined that buildings 317a and b are eligible for listing in the NRHP.

Bridge B84 (St. Francis River Bridge)

One bridge, the St. Francis River bridge (B84) has been previously recommended as eligible for inclusion in the NRHP. A riveted Warren through truss with polygonal top chords, the St. Francis River bridge is skewed and rests on a concrete substructure. There are nine steel stringer approach spans on the north end, and two more on the south end. Design work for the crossing was prepared by the Missouri State Highway Department in the fall of 1940. On November 29th, the George W. Condon Company received a $158,598.07 contract for the bridge's erection. It was completed early in 1941.

The St. Francis River bridge typifies long-span truss design and detailing by the state highway department. Throughout the 1920s and 1930s the Missouri State Highway Department relied almost exclusively on rigid-connected Pratt and Parker configurations for its medium-span through trusses. The agency adopted Warren configurations for its pony trusses and for its cantilevered through trusses over the Missouri and Mississippi Rivers, but for some reason did not employ Warren webs for its simply supported through trusses. The St. Francis River bridge marks a departure from this trend, and a reconciliation of sorts between pony and through truss design by the highway department. World War II arrested most steel bridge construction in the early 1940s, and as trusses were used less frequently for all but the longest-span crossings after the war, the Warren through truss never received widespread use in the state.

The St. Francis River bridge is considered eligible for the NRHP because it exemplifies engineering and technology techniques and methods that are becoming increasingly rare in Missouri, and it is representative of significant bridge design changes within the Missouri State Highway Department in the 1940s. Although the St. Francis River bridge itself is technologically unadventurous, it represents a prototype in Missouri State Highway Department bridge design (McWilliams, 1992). The St. Francis River bridge may be eligible for the NRHP under Criteria A and C. In a letter dated February 7, 2003 (Appendix C), the SHPO concurred that the St. Francis River bridge is eligible for listing in the NRHP.

3.12.3 Prehistoric Prediction Model

The study corridor is encompassed within two physiographic regions—the Ozark Highlands and the Western Lowlands of the Central Mississippi River valley. Previous archaeological surveys conducted in both regions have provided information on the distribution and density of cultural resources across the landscape. This data was used to construct predictive models that suggest the number and location of unrecorded sites that may be identified during an archaeological survey. Because the conditions observed in any one survey tract may not be representative of the entire region in which they occur, site prediction models must be used with caution.

In the Ozark Highlands, the study corridor crosses highly dissected topography consisting of narrow ridge crests with steep flanks, narrow ridge spurs, and deep, narrow valleys. The results of previous work within the MTNF suggest the uplands in this region are unlikely locations for prehistoric sites, and that when sites do occur they will be concentrated in major stream valleys. Rock shelters and caves, however, could contain prehistoric sites on these flank positions. The highest potential for prehistoric sites within the study corridor is in the vicinity of the Twelvemile Creek, St. Francis River, Hubble Creek, Smoot Hollow, Otter Creek, Black River, and Cane Creek valleys. There is also a high potential for prehistoric sites near the natural springs located in the Ozark Highlands. Ridge crests adjacent to the springs, creeks, rivers, and well-drained bottomland terraces contain the highest potential for prehistoric sites.

A site distribution/frequency model has been proposed for the Ozark Highlands that ranks the distance to water as a major factor in determining the extent and intensity of the prehistoric use of the landscape. Yelton and Parsons (1992) studied the site-location data recorded for a sample of 116 sites identified during eight previous USFS surveys; they found a strong correlation between site location and distance to permanent water. Of these sites, 60 (52 percent) of the sites were located within 500 m (1,640.5 ft) of a permanent water source and 101 (87 percent) were within 2 km (1.2 mi). Yelton and Parsons (1992) also

found an association between site size and distance to permanent water—all of the largest sites in their sample were located near a permanent water source, while all those located farthest from a permanent water source were small.

While conducting numerous large-scale USFS surveys, the Center for Archaeological Research of Southwest Missouri State University, Springfield, has compiled a large body of data concerning the distribution of prehistoric sites within the MTNF. The Center for Archaeological Research site-density data reflect a striking pattern of differential prehistoric utilization of different portions of the Ozark Highlands. Substantially lower site densities have consistently been reported for the Poplar Bluff District than for other districts (Ray, 1991; Ray and McGrath, 1988). The U.S. 67 study corridor crosses the Poplar Bluff District and is thought to be representative of the area as a whole. A fairly large number of prehistoric sites have been recorded within the interior of the Poplar Bluff District, but most are concentrated in major stream valleys. The site distribution pattern that has emerged for the Poplar Bluff District has been interpreted as reflecting a "dispersed and selective" upland settlement strategy and a preference for valley settings (Ray and McGrath, 1988). Currently available Center for Archaeological Research data suggests a prehistoric site density of approximately one site per 597 ha (1,476 ac.) surveyed in the Poplar Bluff District.

Site density and distribution patterns for the Western Lowlands of the Central Mississippi River valley differ dramatically from those of the Ozark Highlands. The U.S. 67 study corridor crosses the Ozark Escarpment and extends into the Western Lowlands, a subdivision of the Lower Mississippi Valley Alluvial Basin. Topography in this portion of the corridor is characterized by a series of southwest by northeast trending sand ridges that are separated by low swampy areas and periodically inundated during the year. A variety of alluvial and colluvial landforms are also located along the bluff base of the Ozark Escarpment and include fans, terraces, and toe slopes. The results of previous work along the St. Francis River and Little Black River basins suggest that prehistoric sites are likely to occur on the alluvial fans and terraces near the bluff base of the Ozark Escarpment, as well as along the sandy ridges and natural levees (Dekin et al., 1978; Price and Price, 1978). These areas are generally higher and drier portions of the lowlands and are suitable for both habitation and agriculture. Results of a survey along the Little Black River watershed, located just west of the U.S. 67 study corridor, suggests a prehistoric site density of approximately one site per 21.2 ha (53 ac.) surveyed.

Site density and frequency within the study corridor are not only expected to vary with respect to environmental/geographic variables, but are also temporally relative to the prehistoric cultures that utilized the area within the study corridor. Table 3-21 is derived from various sources including regional surveys in southeastern Missouri.

Table 3-21. Expected Temporal Site Frequency within the U.S. 67 Study Corridor

Cultural Period	Predicted Location Base Camp/Village	Predicted Location Limited Activity Site	Estimated Site Frequency
Mississippi	Near tracts of sandy, fertile loam near stream mouths and floodplain ridges.	Limited activity sites may occur in any area.	Low frequency, restricted distribution.
Woodland	Terraces near stream mouths.	May occur throughout the study corridor with frequency increasing in the major stream valleys.	High frequency, wide distribution.
Archaic	Terraces near stream mouths.	May occur throughout the study corridor with the highest frequency along the Ozark Escarpment and along major stream valleys.	High frequency, wide distribution.
Paleoindian	Near major streams and along the Ozark Escarpment.	Could occur throughout the study corridor.	Low frequency, distribution unknown.

Data obtained through previous surveys suggest that prehistoric site density and site size within the study corridor will be greatest along the Ozark Escarpment, the lower and middle sections of major stream valleys, and the high sandy ridges and natural levees of the Western Lowlands. Site density may be as high as one site per 11.0 ha (33 ac) along stream valleys and is expected to decrease dramatically in highly dissected areas away from perennial water sources. Sites in the Ozark Highlands are likely to be encountered on the surface in agricultural fields or in shovel testing of wooded and pastured areas. Buried sites are likely to occur on terraces along major streams, terraces, and alluvial fans at the base of the Ozark Escarpment and on the floodplain ridges. Archaeological investigations in this bottomland setting should be closely coordinated with geomorphological investigations that identify buried Holocene soils. Any buried soil horizons identified should be examined and assessed for their potential for containing cultural material.

3.12.4 Historic Site Prediction

Data derived from extensive surveys in the MTNF have allowed for the development of historic rural settlement models for the region. The first permanent settlements consisted of small farmsteads engaged in corn and hog production. These farmsteads operated primarily on a subsistence level. The stream and river valleys provided arable land, a source of water, and served as communication and trade links. Prime areas for settlement were at locales where trails or traces crossed stream valleys. In the latter part of the nineteenth century, little land was available in the valleys and the uplands were sparsely settled. Previous research in the MTNF has indicated that farmsteads tend to be located on well-drained landforms near a permanent water source in large stream valleys. Small communities tend to be concentrated in the valleys in the upland regions, and the local population supported rural industrial sites and associated features such as sawmills, gristmills, and railroads. Small mine pits, tram road beds, and features associated with the mining and logging industries may also be found in the region.

Historic site density data has been compiled for the Poplar Bluff District based on the previous field surveys. A site density of one historic site per 18.5 ha (45.5 ac) was obtained. This site density is reflective of the large number of sites recorded around the community of Poplar Bluff. Another survey conducted in the interior areas of the Poplar Bluff District obtained a historic site density of one site per 107 ha (264 ac). Given the similarity in landforms, it is thought that the latter site density is more reflective of the U.S. 67 study corridor.

Table 3-22 briefly lists and describes the 86 known or potential historical sites located within or adjacent to the study corridor that were identified during the records search and literature review. The site types include early roads or traces, early churches, cemeteries, mills (grist, lumber), early schools, stores, Spanish land grants, post offices, iron mines, railroads, drainage ditches, a CCC camp, a ferry site, and innumerable residences. In addition, nine towns are located within or partially within the study corridor. One of these, Old Greenville (23WE637), has been listed on the NRHP. Taskee Station because of its significance as one of the earliest and largest railway stations in the study corridor, could potentially be found eligible for the NRHP.

The wide variety of historic sites that have been documented within the study corridor represent a number of different historical themes. These themes include Aboriginal Americans (Natchitoches Trace, Cherokee Trail of Tears—Benge's Route); Agriculture (farmsteads, gristmills); Economics (banks, drainage ditches, sawmills); Education (early log schools); Exploration and Settlement (Greenville-Indian Ford Road, Wight Ferry, Spanish Land Grants); Military Affairs (Civil War Gravesite, Wight Family Cemetery); Political Affairs (Old Greenville), Recreation (Wappapello Lake); Science (Greenville CCC Camp); Society (early churches, post offices, stores, towns, cemeteries); Technology (iron mines, railroads); and Urban Design (Old Greenville, Taskee Station, Coldwater). Most of the major periods of Missouri history are also represented by the above sites and the general county histories. These periods include the Colonial Frontier, 1700-1803 (Natchitoches Trace, Osage tribes); Pioneer, 1803-1830 (Old

Greenville, Spanish Land Grants); Early Agricultural, 1830-1864 (Cherokee Trail of Tears, dispersed farmsteads, gristmills, towns, Civil War skirmishes and troop movements); Agricultural/Industrial Development, 1865-1920 (railroads, lumber industry, drainage ditches); and Present, 1920+ (drainage ditches, sharecropper struggles, Greenville CCC Camp, Wappapello Lake).

Table 3-22. Known and Potential Historic Sites within the U.S. 67 Study Corridor

Historic Site	Site Description
Madison County	
Natchitoches Trace	Also known as the old Military Road, the suspected route of this trace closely follows the original U.S. 67 and portions of the present day U.S. 67. Small preserved sections of the roadbed may be found within the study corridor.
Original Ebenezer Baptist Church	The original log structure of this church was built in the 1850s. It was built within a mile of the present structure.
1930s Houseplaces	The Fredericktown MTNF District office has on file a survey conducted in 1935 of homes within the St. Francois Mountain Purchase Unit.
Revelle-Ebenezer Cemetery	Ca. 1873+ Cemetery.
Stave Mill	A stave mill was once located on the grounds of the present day Longhorn Motel and Restaurant.
Mine La Motte Mill	There are two suspected locations of the nineteenth-century Mine La Motte Mill.
Ebenezer School	There are two suspected locations of the early to mid-twentieth-century rural school.
Original Antioch Church	This church dated to the early and mid-twentieth century.
Antioch Cemetery	Ca. 1898+ cemetery.
Barber-Whitener Cemetery	Ca. 1869+ cemetery.
Twelvemile and Zion Communities	Sites between the two towns may include brick schoolhouse, post offices, stores, gristmills, sawmills, and ox corrals.
Zion School	Suspected location of a ca. 1900-1934 frame school.
Original Twelvemile Baptist Church	Original log schoolhouse/church (ca. 1805s) was possibly located 200 yards west of present church.
Graham Family Burials	Ca. 1850s-1890s cemetery located behind Twelvemile Baptist Church.
Stevens and Cloninger Farm Cemetery	Ca. 1860s-1900s cemetery.
Log Schoolhouse	Suspected location of a ca. 1890 log schoolhouse.
Hoffman Cemetery	
Cloninger Family/Sanders Cemetery	Ca. 1856-1919 cemetery
Stevens Residence	Possible site of a ca. 1874 Stevens residence.
Twelvemile Store	Suspected site of ca. 1949 store.
Settle Cemetery	Ca. 1857+ cemetery.
Fairmont/Twelvemile School	Late nineteenth to mid-twentieth century school site.
Chubb Store	Suspected site of ca. 1949 store.
Berry Family/Old Mt. Pisgah Cemetery	Ca. 1886+ cemetery.
Store and Gristmill	Suspected site of ca. 1900 Graham store and gristmill.
Greenwood Cemetery	Ca. 1857-1929 cemetery.
Wayne County	
Cherokee Trail of Tears-Benge's Route	Suspected route of John Benge's detachment of 1,090 Cherokees in 1838-1839. The route joins present day U.S. 67 in the vicinity of Greenville and then branches off south of Greenville.
Greenville-Indian Ford Road	Nineteenth-century road connecting Greenville to the Indian Ford on the St. Francis River. The road closely follows the original U.S. 67 and portions of present day U.S. 67 until a few miles north of the Butler County line.
Linville-Barrett Cemetery	
Coldwater Community	This town dates from the 1840s and was positioned along the Natchitoches Trace. There are several springs. Sites may include mills, post offices, wagon shops, stores, and blacksmith shops.
Sutton Cemetery	
Lewis Cemetery	
Spanish Land Grant No. 3168	This land grant was settled around 1804.
Lodi Community	This late nineteenth century town may contain a quarry, school, and store sites. The Antioch and Lewis cemeteries are also in the vicinity.
Twidwell Cemetery	
Mt. Pisgah Cemetery	Ca. 1889+ cemetery.
Bounds School	Suspected site of ca. 1930s school.
Bounds Community	This town was settled as early as 1830. Sites may include a store and post office.
Montgomery Cemetery	
Spanish Land Grant No. 1834	This land grant was settled prior to 1805 by Ephraim Stout.
Silva Community	This town was settled around 1856 by Thomas and Polly Ward.
Spanish Land Grant No. 813	This land grant was claimed by Tillman Smith during the early 1800s.
Bennett Cemetery	
Silva Post Office	Suspected site of ca. 1930s Silva post office.

Table 3-22. Known and Potential Historic Sites within the U.S. 67 Study Corridor

Historic Site	Site Description
Greenville Community	The location of the second Greenville was settled in 1941.
Greenville Cemetery	Current town cemetery.
Stephens Cemetery	
Hickman Cemetery	
Spanish Land Grant No. 727	Isaac E. Kelly claimed to have resided here prior to December 1803. Other early settlers include the Bettis family in 1807.
Wappapello Lake	Ca. 1941+
Wight Family Ferry	Suspected site of Wight family ferry operation, which ran between 1830 and 1876. The family also operated a mill nearby.
Wight Cemetery	Cemetery may contain an unmarked Confederate grave.
Civil War Gravesite	Location of the Civil War Gravesite marker. The marker reads "Grave of a Civil War Soldier Known Only to God." Bones were found during the construction of present day U.S. 67.
Marcus Sutton Mine	Late nineteenth to early twentieth century iron mine.
House, Spring, and Cemetery	Suspected location of nineteenth century house, spring, and two gravesites.
Clubb Mine	Late nineteenth century iron mine.
Pleasant Valley Cemetery	
Pleasant Valley School	Suspected site of ca. 1930s school.
King Mine	Late nineteenth to early twentieth century iron mine
Juda Mine	Late nineteenth to early twentieth century iron mine
Greenville CCC Camp	This camp was established in October or November 1934. It was closed in October 1935 and the buildings were later removed.
Janis Mine	Early twentieth century iron mine.
Smoot Cemetery	
USFS Mine	Late nineteenth to early twentieth century iron mine
Taskee Station Community	This town was laid out in 1888 as a station on the Cape Girardeau Southwestern Railroad. The town was abandoned in 1941.
W.H. Hughes Mine No. 2	Early twentieth century iron mine.
T.J. Moss Mine	Late nineteenth century iron mine.
Unnamed Mine	Mid-twentieth century iron mine.
Unnamed Cemetery	
Patt Cullnam Mine	Early twentieth century iron mine.
U.S. Scott Bank Mine	Late nineteenth to early twentieth century iron mine.
Butler County	
Keele Cemetery	Ca. 1890s-1940 cemetery.
Sexton Bank Mine	Early twentieth century iron mine
Hendrickson Community	The town was laid out in 1873 along the Iron Mountain Railroad. Sites may include stores, bank, hotel, depot, saloon, schools, and mills.
Iron Mountain Railroad	This railroad was laid out in 1871.
Oak Grove School	Suspected site of ca. 1930 school.
Unnamed Cemetery	
Dunning Cemetery	Ca. 1865+ cemetery.
St. Louis and San Francisco Railroad	This railroad was laid out ca. 1907 in the vicinity of Harviell.
Oakdale School	Ca. 1944 rural school.
Brannum School	Suspected site of early nineteenth century log schoolhouse built by early settlers.
Harviell Ditch	Early twentieth century drainage ditch.
Hart Ditch	Early twentieth century drainage ditch.
Neelyville Ditch	Early twentieth century drainage ditch.
Mt. Moriah AME Church and School	Early twentieth century African-American church and school site on western edge of Neelyville.
Neelyville-Doniphan Branch Railroad	This branch off of the Iron Mountain Railroad was laid out in 1886.
Sims Cemetery	Ca. 1869+ cemetery.
Byrnes Ditch	Early twentieth century drainage ditch.

Source: ARG, 2001.

3.13 Hazardous Materials

An assessment was conducted within the U.S. 67 study area to identify regulated and uncontrolled hazardous waste sites within the proposed right of way of each study alternate. Hazardous waste sites are regulated by the Resource Conservation and Recovery Act (RCRA) and/or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. Additionally, non-hazardous special waste sites which are not regulated by RCRA, CERCLA, or SARA but are regulated by the State of

Missouri under the Missouri Solid Waste Management Regulations, 10 CSR were included within the scope of the assessments. The initial step in the assessment process involved a search of federal and state databases by a commercial vendor. The databases searched included:

- National Priorities List (NPL);
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS);
- Resource Conservation and Recovery Information System (RCRIS)-Treatment, Storage, and Disposal (TSD) Facilities;
- RCRIS-Large Quantity Generators (LQG) and Small Quantity Generators (SQG);
- Emergency Response Notification System (ERNS);
- Facility Index System (FINDS);
- Polychlorinated Biphenyl (PCB) Activity Database (PAD);
- RCRA Administrative Action Tracking System (RAATS);
- Toxic Release Inventory System (TRIS);
- Hazardous Materials Incident Report System (HMIRS);
- MDNR-USTs;
- MDNR-Leaking Underground Storage Tanks (LUSTs);
- MDNR State Hazardous Waste Sites (SHWS);
- MDNR-Solid Waste Facilities/Landfill Sites (SWF/LS); and
- MDNR-Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites.

The following sources for examining historical and current land use were also investigated:

- USDA-NRCS aerial photographs of Butler, Wayne, and Madison counties;
- Ortho corrected aerial photographs of the study area (1995); and
- USGS topographic maps.

These information sources were reviewed to identify facilities which could present an environmental liability to the selected right of way. After reviewing the information within the databases, a field reconnaissance of the study area was conducted to identify any additional facilities of concern.

A summary of the facilities of the project area that represent a potential hazardous materials or special waste concern is provided in the following sections (Figure 3-9, Table 3-23). A more detailed discussion of each of these facilities is provided in Section 4.17. There are no TSD facilities within the project area.

3.13.1 USTs/ASTs/Transportation Related Facilities

Within the study corridor, a total of 24 facilities which have now or have had in the past petroleum fuel storage tanks (either USTs or ASTs) or perform automotive/engine repairs. These sites are listed in Table 3-23 and are shown on Figure 3-9. Of these 24 facilities, three have active USTs/aboveground storage tanks (ASTs) and the other sites either have had the tanks removed, closed in place, or the disposition of the tanks is not known. The three sites with active tanks are:

- York Village Conoco;
- Cherokee Pass Coastal Mart; and
- Fowlers Handi-Mart, Neelyville.

Table 3-23. Hazardous/Special Waste Sites

Facility Name	Map ID #	Parcel ID #	Segment	UST/AST Sites	RCRA/ CERCLA Sites	Other
Vel's Antiques	8	109-25-05-15-19	V	X	--	--
Handi-Mart	9	109-25-05-16-07	V	X		
Neelyville Water Plant/Bus Barn	13		V	X	X	
Pennington's Self-Storage	20	109-17-08-28-02	T	X		
Francis Satellite/Salvage Yard	23					X
Price Property	24	109-17-02-10-18	S	X		
Former Service Station	25	109-17-02-10-14	S	X		
KC & Sons Krafts	30	109-17-02-03-55	Q	X		
York Village Conoco	49	108-20-09-31-04	O	X		
Solid Rock Baptist Church	51	108-20-3.2-07-04	M, N			X
Eagles Hall #4187	54	108-14-8.1-27-20.01	L	X		
Berry Wood Products, Inc.	58	79-10-03-08-17	A, B, C		X	
Costephens-Barbers	59	108-08-06-23-07	L	X		
Sawmill	63	108-08-06-14-25	I	X		X
Libla Industries	65	108-08-06-14-07	J			X
Libla Industries	66		J			X
City of Greenville	68	08-14-01-04-17-01	L			X
The Glass Shop	74A	79-14-08-33-09	H	X		
Junk Alley Antiques	74B	79-14-08-33-06	H	X		
Highway 67 Collectibles	75	79-14-08-33-07	H	X		
Gregory's	78	79-14-05-15-01	D	X		
Belken Auto Repair	82	79-10-09-29-23.01	D	X		X
Auto Repair Shop	87	79-10-03-03.06	C			X
Residence-Former Gas Station	88	79-10-03-05-74	C	X		
Robinson's Recycling	89	79-10-03-05-75.01	A, B, C		X	
Scrap Yard-Former Gas Station	91	79-10-03-05-79	B	X	X	
Coastal Mart	95	79-10-03-05-84	B	X		
Frontier Flea Market	96	79-10-03-06-26	A, B	X		
Cherokee Pass Ice	97	79-10-03-06-27	B	X		
W.E. Sears Youth Center	112	109-04-08-34-01.02	P	X		
McClane Livestock Transport	113	109-07-02-03-01	P	X		
Former Gas Station	114	109-07-02-03-02	P	X		

3.13.1.1 Active Sites

York Village Conoco, located adjacent to the York Village Restaurant on the west side of U.S. 67 at the intersection of Routes 67 and 172 [map identification (ID) 49], currently has one AST and two USTs. The owner of the facility stated that the USTs were upgraded in 1998-1999 and that he is awaiting a closure letter from the MDNR. The owner also stated that, to the best of his knowledge, the onsite AST has not had any reportable releases. The Yorktown Village gas station has been onsite since the 1950s.

The Cherokee Pass Coastal Mart is located on the west side of U.S. 67 approximately 305 m (1,000 ft) south of the intersection of U.S. 67 and State Route A. The mart has been at that location since approximately 1966 (map ID 95). According to one of the owners, the facility has only used ASTs, and no reportable releases have occurred at the facility.

Fowlers Handi-Mart, located on the west side of U.S. 67 approximately 305 m (1,000 ft) north of Butler CR270 (map ID 9), quit pumping gas in December 1998 and is in the process of relocating to a new location north of Route 142. The current facility still has one AST and two USTs in-place, but these are expected to be removed in accordance with MDNR regulations during 2000. The new location lies outside of the proposed rights of way in the Neelyville area.

3.13.1.2 Inactive Sites

The inactive sites were identified either through the database report, during the field reconnaissance, or through contacts with local residents. These sites stored petroleum products at some time in the past and due to the age of the sites, most were not closed in accordance with current MDNR regulations. These sites are described below.

Vel's Antiques, located in Neelyville on the east side of U.S. 67 approximately 260 m (850 ft) north of Butler CR270 (map ID 8). According to a tenant in the building, this site was formerly a new car dealership. No information was found to determine if this site had been the location of USTs or ASTs in the past. No evidence of USTs was noted at the time of the site visit.

The Neelyville water plant, located approximately 375 m (1,230 ft) east of U.S. 67 and approximately 75 m (246 ft) north of Route 142 (map ID 13) stores chlorine for the treatment of the Neelyville water supply. Additionally, a 300-gallon AST is located onsite for the storage of diesel fuel for the well pump. According to the Neelyville mayor, no reportable leaks or spills are known to have occurred from the AST.

The old Neelyville bus barn, located approximately 380 m (1,247 ft) east of U.S. 67 and approximately 25 m (82 ft) north of Route 142 (map ID 13), is not known to have had fuel storage on-site. However, a concrete structure which looks like an AST saddle is present on the west side of the bus barn.

A facility located on the west side of U.S. 67 approximately 305 m (1,001 ft) south of Butler CR340 (map ID 20), currently occupied by Penningtons Self-Storage and a rental house, is the site of a former business identified by the residential tenant as a Wards Store. The current owner, stated that to the best of his knowledge, Wards Store sold gasoline but the tanks and supply lines were removed prior to his purchase of the property. No confirmation of the tank removal was available.

The Price property, located at the northeast corner of CR360 and U.S. 67 (map ID 24) is the former location of a gas station. The facility has not been used as a gas station since at least the early 1960s. No information was available concerning the type (AST versus UST) or disposition of the tanks at the site.

A former service station, located on the on the east side of U.S. 67 approximately 835 m (2,740 ft) north of CR360 (map ID 25), is the location of a former gas station. According to one of the owners, the ASTs and piping were removed from the site and the site ceased operation as a gas station about 1972.

KC & Sons Krafts, located on the east side of U.S. 67, approximately 50 m (164 ft) west of CR343, is the site of a former gas station. The site reportedly used ASTs which were removed by the current owner. The disposition of the supply lines is not known.

The Pleasant Valley Eagles Hall, located on the east side of U.S. 67, approximately 810 m (2,650 ft) north of CR403 (map ID 54), is the site of a former gasoline station. According to the members of the club, the USTs formerly located onsite were removed in accordance with MDNR regulations, and the MDNR granted closure to the site.

Costephens-Barbers Cash Store, located on the east side of U.S. 67 at the intersection of CR220, Old U.S. 67, and U.S. 67 (map ID 59), was a gasoline station until the early 1990s. At that time, the owners reportedly removed the USTs in accordance with MDNR regulations and were granted closure of the site by MDNR.

A small sawmill, located on the west side of U.S. 67 at the south intersection of U.S. 67 and Route 34-east (map ID 63), is the site of a small sawmill which also has several field-mounted ASTs onsite.

The Glass Shop, located on the west side of U.S. 67 immediately north of CR454 (map ID 74A), is a former gas station. No information was available regarding the types of tanks (i.e., ASTs/USTs) present when the gas station was open. No evidence of tanks was noted during the site visit.

Junk Alley Antiques, located on the west side of U.S. 67 immediately south of CR454 (map ID 74B), is a former gas station. No information was available regarding the types of tanks (i.e., ASTs/USTs) present when the gas station was open. No evidence of tanks was noted during the site visit.

Highway 67 Collectibles, located on the west side of U.S. 67 immediately north of CR454 (map ID 75), is a former gas station with a second former gas station located immediately north. No information was available regarding the types of tanks (i.e., ASTs/USTs) were present when the gas station was open. No evidence of tanks was noted during the site visit.

Gregory's, located on the east side of U.S. 67 approximately 150 m (492 ft) north of CR411 (map ID 78) is a former gas station. According to the owner, no gasoline has been sold at the facility since the 1970s and the USTs were removed at that time.

Belken Auto Repair/Salvage yard, is located on the east side of U.S. 67 approximately 1,940 m (6,365 ft) north of the south intersection of CR417 and U.S. 67 (map ID 82). The site is currently utilized as a small salvage yard and auto repair facility. No commercial sales of petroleum products are known to have occurred at the facility.

An auto repair shop, located on the east side of U.S. 67 approximately 890 m (2,920 ft) south of Route C (map ID 87), is currently occupied by a small frame building which houses an automotive repair shop.

A residence, located at 6952 U.S. 67, approximately 475 m (1,558 ft) south of Route C (map ID 88), is the location of a former gas station. The concrete base for the pump islands is still present. It is not known if ASTs or USTs were utilized at the site. Based on information obtained from local residents, the site has not been an active gas station for at least 35 years.

A small scrap yard, located at 6878 U.S. 67, approximately 150 m (492 ft) south of Route C (map ID 91), is currently a small scrap yard with a single family residence on the property. The site was utilized as a gasoline station at some point in the past but the disposition of the storage tanks is not known.

The Frontier Flea Market, located on the west side of U.S. 67 approximately 80 m (262 ft) north of Route A (map ID 96), is the site of a former gas station. Based on information received from the owner, two USTs are still present at the site.

Cherokee Pass Ice, located on the east side of U.S. 67 approximately 215 m (705 ft) north of Route A (map ID 97), is the site of a former gas station. The presence or absence of tanks could not be confirmed.

The W.E. Sears Youth Center, located on the west side of U.S. 67 approximately 360 m (1,181 ft) north of CR522 (map ID 112), has one unused UST on the site. According to the Youth Center Director, the UST has not been used for the past 20+ years. He did not know the size of the UST but he believed that the UST was utilized for gasoline for the site when the CCC used the site.

McClane Livestock Transport, located on the east side of U.S. 67 approximately 590 m (1,936 ft) south of CR522 (map ID 113), is a trucking firm which performs some light vehicle maintenance onsite. No ASTs or USTs are present at the site.

A vacant facility, located on the east side of U.S. 67 approximately 870 m (2,854 ft) south of CR522 (map ID 114), appeared to be the site of a former gas station. The building and apparent pump islands currently on the property are the primary evidence of past use of the facility as a gas station. No evidence of ASTs or USTs was noted.

3.13.2 RCRA/CERCLA Sites

Within the study corridor, one CERCLA site was identified through the database search. This site is the Berry Wood Products, Inc., located on the east side of U.S. 67 approximately 650 m (2,133 ft) north of CR401, near Cherokee Pass (map ID 58). Berry Wood Products, Inc. has been at this location since the 1940s and has used pentachlorophenol to pressure treat lumber. Over the years, the pentachlorophenol storage tanks have leaked and the treatment vessels were not secondarily contained, allowing the pentachlorophenol to enter the site soils. The Berry Wood Products facility, which is under a RCRA permit is also a Superfund site and a cleanup is currently being conducted under Superfund's Cooperative Agreement Program.

Several other facilities within the study corridor use or acquire materials or chemicals which, if handled incorrectly, could lead to the inclusion of these facilities under the RCRA regulations. These facilities include:

- Francis Satellite/Salvage Yard;
- Libla Industries;
- City of Greenville Maintenance Yard; and
- Robinson's Recycling.

The facility identified as Francis Satellite/Salvage Yard is located at the northwest corner of CR360 and U.S. 67 (map ID 23). The site measures approximately 150 m by 425 m (496 ft by 1,394 ft) with approximately 300 salvage vehicles located on the site.

Libla Industries, located at the northwest corner of CR309, Route 34, and U.S. 67 (map ID 65 and 66), is the site of a former pallet manufacturing plant. Near the southeast corner of the facility are three burned buildings. These buildings were burned by the local fire protection district during practice fire drills. It is not known if any type of accelerant was used. The burning of processed lumber, plastic, and other building materials may result in the formation of waste materials which are regulated under RCRA. The northwest corner of the site is currently covered with a sawdust pile from the cutting of lumber to make the pallets.

The City of Greenville maintenance yard located at the south end of Sycamore Street (map ID 68), is also the location of the city wastewater treatment facility. In addition, minor repairs of city equipment and vehicles takes place at the facility.

Robinson's Recycling, located on the west side of U.S. 67 approximately 675 m (2,215 ft) south of Route C, is a small recycling yard with various vehicles, appliances, equipment, and scrap metal on the site (map ID 89).

3.13.3 Other Sites of Concern

within the study corridor, three sites were identified which contain sawdust piles greater than 0.1 ha (0.25-ac) in size. Two of these sites, Libla Industries (map ID 65) a small sawmill (map ID 63) were discussed in previous sections. The third site, the Solid Rock Baptist Church (map ID 51), is located on the west side of U.S. 67 approximately 1,200 m (3,937 ft) north of CR546. A large sawdust pile [>0.1 ha (0.25 ac)] is located at the southeast corner of the property. Sawdust piles are regulated under different MDNR programs, depending on the site circumstances. MDNR has issued a Sawdust Guidance Document which details requirements for managing sawdust. If the sawdust is managed on the site where generated, the sawdust is exempt from solid waste management regulations. If the sawdust is removed from the generation site, it becomes a solid waste and subject to the requirements of the Missouri Solid Waste Management Law, Sections 260.200-260.345 RSMO and the Missouri Solid Waste Regulations, 10 CSR 80 Chapters 1-10.

3.13.4 Structures

It is anticipated that during the acquisition of the right of way of the Preferred Alternative, a number of structures will be acquired which will be demolished prior to construction of U.S. 67. Upon acquisition of the structures by the MoDOT, the demolition of the structures will need to be demolished in compliance with the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) Subpart M, National Emission Standard for Asbestos 40 CFR 61, in particular 40 CFR 61.145 standard for demolition and renovation. The Occupational Safety and Health Administration (OSHA) has additional regulations involving worker protection measures pertaining to asbestos removal (29 CFR 1910.1001 and 29 CFR 1926.58). In addition to worker protection standards during asbestos removal, OSHA has also promulgated a construction industry standard for lead exposure (29 CFR 1926.62). Any structures to be demolished may contain lead, particularly in paint and plumbing fixtures.

3.13.5 Potentially Unknown Sites

Any unknown sites that are encountered during project construction will be handled in accordance with federal and state laws and regulations.

If regulated solid or hazardous wastes are found unexpectedly during construction activities, the MoDOT construction inspector will direct the contractor to cease work at the suspect site. The construction inspector will contact the appropriate environmental specialist to discuss options for remediation. The environmental specialist, the construction office, and the contractor will develop a plan for sampling, remediation if necessary, and continuing project construction. Independent consulting, analytical, and remediation services will be contracted if necessary. MoDOT has the capability to collect samples and analyze for volatile organics and heavy metals. If necessary, the MDNR will be contacted for coordination and approval of required activities. In excavations where hazardous atmospheres could reasonably be expected to exist, such as in areas where hazardous substances are stored nearby, the contractor is responsible for appropriate worker safety precautions, as required by OSHA.

4.0 Environmental Consequences

4.1 Socioeconomic Consequences

The primary socioeconomic impacts potentially associated with the Preferred and No Action Alternatives are residential and business displacements; changes in employment; changes in tax revenue to service providers and local governments; and potential impacts to special group concentrations. This section presents an analysis of potential impacts relating to the Preferred Alternative and the No Action Alternative. Detailed census information on the counties and communities in the study area is provided in Section 3.1.

Engagement and interaction with the potentially affected public has occurred throughout the location study process. A thorough public involvement program was implemented to engage residents and business owners located in the project corridor to solicit their input and inform them of the proposed improvements. Three sets of open house public informational meetings were held in Madison, Wayne, and Butler counties. In addition, small group meetings were held with business owners and residents in Cherokee Pass, Greenville, Poplar Bluff North business district, Route 160 area, and Neelyville. The main issue for residents included the potential for impact to their homes and property. Primary concerns of business owners included potential for impact to buildings and property, access issues, and proximity of the improved facility relative to existing business locations.

A detailed description of information presented at these meetings and public comment is included in Section 9.1, Public Coordination.

4.1.1 Residential Displacements/Property Acquisition

The proposed improvement to U.S. 67 would require the relocation and/or widening of the existing highway. As noted in Section 2.2, the anticipated roadway type will consist of a four-lane freeway with two traffic lanes in each direction and full paved shoulders separated by a depressed grass median. Access will be limited to interchanges only. Frontage roads will be developed to provide access to properties along the corridor. This type of road requires more right of way than currently exists on U.S. 67, and, therefore, additional right of way would be purchased from property owners to provide the needed area. Consequently, property acquisition would necessitate the relocation of some households and businesses in the project area.

Property acquisitions include purchases of entire parcels as well as partial property purchases (Figure 4-1). Parcel sizes along the Preferred Alternative vary in size from small residential lots to large agricultural tracts. In some cases, existing structures are setback from the existing right of way by a significant distance and will not necessitate building acquisition for the proposed right of way. In many of these situations, only a portion of land, or partial acquisition, would be required. The remaining useable land is retained by the property owner.

In some cases, after required right of way is purchased from a parcel, the remaining property is not feasible for development due to access problems or deficient size. An uneconomic remnant is a parcel of the real property in which the owner is left with an interest after the partial acquisition of the owner=s property, and which the acquiring agency has determined to have little or no value or utility to the property owner.

If acquisition of only a portion of property leaves the owner with a remnant, MoDOT will determine whether the remnant maintains utility or value to the present owner. If MoDOT determines that the portion of property is an uneconomic remnant, they will offer to acquire the uneconomic remnant along with the portion of property needed for the project. The owner may decline MoDOT’s offer to purchase the uneconomic remnant.

No alternative could be constructed in the project area meeting the Purpose and Need that avoids all residential and business properties. Acquisition and relocation for the project will be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and amendments (Act). The Act, as well as Missouri State law, requires that just compensation be paid to the owner of private property taken for public use. The appraisal of fair market value is the basis of determining just compensation to be offered to the owner for property to be acquired. An appraisal is defined in the Act as a written statement independently and impartially prepared by a qualified appraiser setting forth an opinion of defined value of an adequately described property as of a specific date, and supported by the presentation and analysis of relevant market information.

During the relocation phase, MoDOT is responsible for assuring that a displaced person will not be required to move unless the agency has made comparable, decent, safe, and sanitary housing available and that the displaced will not be required to move without at least a 90-day notice in writing. The Uniform Act requires that comparable, decent, safe, and sanitary replacement housing within a person's financial means be made available before that person may be displaced. Should this project include persons who cannot readily be moved using the regular relocation program benefits and/or procedures, i.e., when there is a unique housing need or when the cost of available comparable housing would result in payments in excess of statutory payment limits ($22,500 or $5,250), MoDOT's relocation policy commits to utilizing housing of last resort. Housing of last resort involves the use of payments in excess of statutory maximums or the use of other unusual methods of providing comparable housing.

A general information notice in the form of a brochure entitled "Relocation Assistance and Payments Program" will be provided to persons who may be displaced. This relocation brochure provides general information about MoDOT's relocation program.

The number of residences and individuals that would be displaced, the number of properties to be acquired, and the cost of acquisition for the Preferred Alternative are presented in Table 4-1. Property acquisition would include the purchase of vacant land, farmland, residential land, homes, businesses, and land associated with public uses. Table 4-2 identifies the types of land uses that will potentially be impacted by each alternate. Table 4-3 shows detailed right-of-way costs including relocation costs. In addition to land acquisition, the project would potentially require temporary or permanent easements for construction or utility location.

The following tables reflect the impact totals for the Preferred Alternative using Alternate P, Option 1, for the interchange at Township Line Road north of Poplar Bluff in Butler County (Figure 2-13c). (Refer to Section 2.4.9 for a description of the two interchange options, Options 1 and 2, at this location.) Impact totals for the Preferred Alternative using Alternate P, Option 2 (Figure 2-13c), are footnoted in Tables 4-1 and 4-2.

All parcels, whether or not they are impacted by right of way acquisition, will continue to have access to U.S. 67 via frontage roads or county roads. No parcel will be landlocked as a result of right of way purchase and road construction.

Table 4-1 shows residential displacements for the Preferred Alternative with the estimated combined total value of acreage and improvements. The displacements and estimated costs presented in Table 4-1 are based upon right of way for the Preferred Alternative. In addition to building and land acquisition, relocation costs would also be associated with moving each household displaced. The Preferred Alternative would displace 148 single-family residences, including mobile homes, and one multi-family (4-unit) building using the Alternate P, Option 1 interchange in Butler County. (Inclusion of the Option 2 interchange design would result in the displacement of an additional seven single-family residences.)

Table 4-1. Potential Residential Displacements Associated with the Preferred Alternative Using Alternate P, Option 1*

Number of Single-Family Residences	115
Number of Mobile Homes	33
Number of Multi-Family Residences (4-unit building)	1
Estimated Number of Individuals†	380
Estimated Acquisition Cost of Dwelling Units**	$5,622,110
Estimated Residential Land Cost	$375,950
Total Estimated Land and Building Cost	$5,998,060

* *Displacement impact totals for the Preferred Alternative with the Alternate P, Option 2, interchange design include six additional single-family residences, one additional mobile home, and 18 additional people. The estimated dwelling unit cost and residential land acquisition cost would be $5,972,940 and $379,950, respectively, using the Alternate P, Option 2, interchange.*

† *Estimated based on 2000 Census reported average household size of 2.5 persons.*

** *Building and land costs were estimated based on interviews with local area appraisers and real estate agents and the MoDOT District 10 Right of Way Department. A windshield survey was conducted to estimate the cost of potentially impacted structures. Cost estimates for relocation are not included in this table. See Table 4-3 for detailed right of way estimates.*

Source: Zambrana Engineering, Inc., 2001.

Table 4-2. Potential Existing Land Use Impacts Associated with the Preferred Alternative Using Alternate P, Option 1*

	Hectares Impacted	Acres Impacted
Agricultural/Undeveloped	584	1,442
Single-Family Residential	64	158
Multi-Family Residential	0.4	1
Commercial	28	70
Industrial	4	10
Public/Semi-Public	1	3
Church	0.6	2
Mark Twain National Forest	155	382
Wappapello Wildlife Area	115	285
Coldwater Conservation Area	6	15
Utility	7	17
Right of Way†	15	37
Total Existing Land Use Impact Area	983	2,429
Total Parcel Acquisitions	28	70
Parcel Acquisitions	948	2,347

* *Existing land use impact totals for the Preferred Alternative using Alternate P, Option 2, include an additional 3.2 ha (8 ac) of land. The predominant difference in existing land use impacts between Options 1 and 2 includes the acquisition of additional residential land uses and less commercial land uses with Option 2.*

† *Existing right of way includes roads other than U.S. 67 and railroad right of way that may lie within the Preferred Alternative.*

Source: Zambrana Engineering, Inc., 2001.

Table 4-3. Right of Way Cost Estimate, Preferred Alternative*

Building Acquisition Cost	$9,330,293
Relocation Cost†	$2,868,000
Demolition Cost	$1,639,500
Land Acquisition Cost	$2,497,800
Total Building and Land	$16,335,593
Contingency**	$6,534,237
Subtotal Right of Way Estimate	$22,869,830
Incidentals‡	$2,286,983
Total Estimated Right of Way Cost	$25,156,813

* *Right of Way estimates represent the cost of building and land acquisition within the Preferred Alternative using the Alternate P, Option 1, interchange design. Total right of way cost using the Alternate P, Option 2, interchange would be $24,998,624*

† *Relocation Costs were based on the assumption that the owner-occupant has occupied a displacement dwelling for at least 180 days and receives the statutory payment limit of $22,500 to cover costs associated with moving and purchase of a replacement dwelling.*

** *Contingency is 40 percent of land and building costs and represents costs associated with anticipated condemnation actions.*

‡ *Incidentals are 10 percent of the overall estimate and represent MoDOT time and materials involved in property acquisition.*

Source: Zambrana Engineering, Inc., 2001.

Table 4-1 also provides an estimate of the number of individuals impacted by residential displacement. These impacts were estimated using the 2000 average household size in Madison, Wayne, and Butler counties of 2.5 persons per household. Based on this average, the number of individuals impacted is estimated at 380 using the Alternate P, Option 1 interchange. (Inclusion of the Alternate P, Option 2 interchange would result in impacts to an additional 18 individuals.)

The residential displacements resulting from the Preferred Alternative occur throughout the corridor, primarily along the existing highway. The city of Neelyville is the only incorporated area where residents would be affected. The remaining displacements occur in unincorporated areas of Madison, Wayne, and Butler counties. According to the 2000 Census, in all of the townships that encompass the U.S. 67 corridor, the rate of renter-occupied dwellings varied from 10 percent in Black River Township, Butler County, to 38 percent in Poplar Bluff Township, Butler County. Discussions with local real estate agencies indicate that the majority of dwellings in the rural areas of each county are owner-occupied rather than renter-occupied.

According to local real estate listings, a number of single-family homes are listed for sale throughout Madison, Wayne, and Butler counties. Based on the property value estimation for the Preferred Alternative, home values for residences within the proposed right of way were estimated to be between $5,000 and $120,000. A review of real estate listings in Madison, Wayne, and Butler counties indicates that in the later part of 2000 there were over 80 comparable single-family dwellings for sale within this price range. The supply of replacement housing is expected to be adequate for displaced residents due to the phased development of the corridor, as discussed in Section 2.2. The corridor would be developed over an extended period of time, and replacement housing needs would be met throughout this time period. Accommodations for all potentially displaced residences would not be needed at one time given the extensive length of the project. In addition, for some of the displaced residents, adequate land to rebuild or move structures would remain after the required right of way acquisition. In these cases, displaced residents may choose to stay on their remaining properties to rebuild or relocate a site-built home or mobile home.

The Program Manager for the Missouri Community Development Block Grant Program was contacted regarding housing projects that may be occurring in the area. Information from this office indicates that residential displacements which would occur due to the proposed project are not related to nor do they

affect Department of Housing and Urban Development activities in the area. Activities under the Community Development Block Grant Small Cities Program are also not affected.

The No Action Alternative will not require the displacement or relocation of residential uses.

4.1.2 Business Displacements

As with residences, any business displacements must conform to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Any qualified displaced business, farm operation or nonprofit organization is entitled to payment of their actual moving and related expenses, as MoDOT determines to be reasonable and necessary. In addition, a business, farm, or nonprofit organization may be eligible to receive a payment, not to exceed $10,000 for expenses incurred in reestablishing their business, farm operation or nonprofit organization at a replacement site.

A displaced business may be eligible to choose to receive a fixed payment in lieu of the payments for actual moving and related expenses, and actual reasonable reestablishment expenses. The payment amount for this entitlement alternative is based on the average net earnings of the business. This fixed payment amount cannot be less than $1,000 or more than $20,000.

The 1977 FHWA/National Highway Institute publication, "Social and Economic Considerations in Highway Planning and Design" contains the following discussion regarding business displacements:

> "The type of business which may be displaced is important since some can overcome the change with greater ease than others. Studies have shown that, in general, traffic dependent businesses such as gas stations, restaurants, and motels may be greatly affected by forced relocation or access loss. Some service businesses, such as insurance firms, may be only minimally affected, while others, such as banks, may face liquidation due to the project. A greater percentage of service establishments, i.e., barbers, laundries, taverns, eating places, went out of business than did retail units."

The Preferred Alternative would result in the displacement of 45 commercial buildings, affecting 35 different commercial properties, using the Alternate P, Option 1 interchange. (Use of the Alternate P, Option 2 interchange would result in the displacement of three fewer businesses.) These commercial properties include highway dependent businesses, retail and service businesses, and a number of older, vacant commercial buildings. Table 4-4 shows business displacements associated with the Preferred Alternative and the estimated combined total value of land and buildings. As with residential displacements, the cost of relocating each business would also be incurred by MoDOT. The MoDOT Right of Way Division will carry out the acquisition and relocation of commercial and industrial properties in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Business owners will be paid fair market value for the real property to be acquired and for relocation costs. Acquisition of commercial properties will not involve relocation of businesses if no operating business is located on the property.

For business owners that choose to be relocated, adequate vacant land area exists throughout the corridor as indicated on the Existing Land Use map shown on Figure 3-1. Businesses may choose to locate outside the study area, elsewhere along the corridor, or not to reopen. No part of the corridor is regulated by land use controls, which creates a potential for commercial development on all privately owned land throughout the corridor. Reestablishment of commercial uses would most likely occur on vacant land along the highway. Few tracts in Madison, Wayne, and Butler counties are currently listed for sale as commercial properties, with the exception of land within and around Poplar Bluff, particularly in proximity to the new U.S. 67 bypass. The lack of commercially listed sites is reasonable considering the historic low occurrence of development along the existing corridor. It is probable that the abundant vacant

land within the corridor study area will provide numerous sites for reestablishment of displaced commercial uses at the time that demand warrants it.

Table 4-4. Potentially Displaced Businesses Associated with the Preferred Alternative

Business Name	County	Vacant/Occupied	Business Type
Custom Draperies & Blinds	Madison	Occupied	Service
Flea Market Building	Madison	Seasonal	Retail
Junkyard	Madison	Occupied	Industrial/Retail
Geronimo Flea Market/Campground	Madison	Seasonal	Campsites/Retail
Commercial Building	Madison	Vacant	Unknown
Junk Alley Antiques/The Glass Shop	Madison	Vacant	Retail
County Line Cafe	Wayne	Occupied	Retail
Country Life Motel	Wayne	Vacant	Lodging
Wayne County Livestock Association	Wayne	Vacant	Agricultural
Libla Industries	Wayne	Vacant	Industrial
Commercial Building	Wayne	Vacant	Unknown
Costephens Barber Cash Store	Wayne	Occupied	Retail
Pleasant Valley Auto Sales	Wayne	Occupied	Retail
Pleasant Valley Auto Repair Shop	Wayne	Occupied	Service
Wayne County Eagle Lodge	Wayne	Occupied	Service Organization
Commercial Building	Wayne	Vacant	Unknown
Highway 67 Auction Barn	Wayne	Vacant	Livestock Auctions
D&D Body Shop	Wayne	Occupied	Service
York Village Flea Market	Wayne	Seasonal	Retail
Conoco Gas Station	Wayne	Occupied	Retail
Wolf's Greenhouse*	Butler	Occupied	Retail
Two Horse Auto Sales	Butler	Occupied	Auto Sales
Red Rooster Antiques	Butler	Occupied	Retail
Home USA*	Butler	Occupied	Retail
USDA Building	Butler	Occupied	Government
First Stop Mobile Homes*	Butler	Occupied	Retail
McClain Trucking	Butler	Occupied	Trucking/Shipping
Commercial Building	Butler	Vacant	Unknown
Motel Building	Butler	Vacant	Lodging
Home Business	Butler	Occupied	Service
J&L Tack	Butler	Occupied	Service
Commercial Building	Butler	Vacant	Unknown
Junkyard	Butler	Occupied	Service/Retail
Mid-Way Storage	Butler	Occupied	Storage
Gas Station	Butler	Occupied	Retail
Estimated Cost of Building Acquisition		$3,151,570	
Estimated Cost of Land Acquisition		$445,550	
Total Building and Land Acquisition†		$3,597,120	

* *These businesses would not be displaced under the Alternate P, Option 2 interchange.*

† *Estimate includes acquisition of land use categorized as public/semi-public. Cost estimates for relocation are not included in this table. See Table 4-3 for detailed right of way estimates.*

Source: Zambrana Engineering, Inc., 2001.

The No Action Alternative will not result in the displacement of businesses located along existing U.S. 67.

4.1.3 Employment and Cost

Employment impacts are measured in the form of jobs lost and jobs generated by the Preferred Alternative. The No Action Alternative would result in no impacts to employment or payroll within the study area.

Based on the type and number of businesses displaced, and utilizing information obtained from the Missouri Division of Employment Security, the approximate number of jobs lost by the Preferred Alternative can be estimated. Job losses are primarily associated with the displacement of small retail businesses located adjacent to existing U.S. 67. It is estimated that the total job losses associated with the Preferred Alternative would be 55 to 65 jobs. Many of these job losses would be offset by business relocation elsewhere along the Preferred Alternative.

Employment would occur during the construction of the new highway. Employment generated by the construction of the Preferred Alternative is based on construction cost estimates. Based on an estimated construction cost of $428 million and a construction period of 10 years, it is estimated that the Preferred Alternative would generate 337 jobs annually (for the duration of the construction). This estimate is based on labor costs being equal to 40 percent of the construction costs, and estimated labor costs of $50,000 per employee per year. While construction employment would be a direct impact from construction of the proposed facility, construction employment and payroll would also generate induced impacts as a result of payroll dollars being spent.

Utilizing accepted practices contained in the 1992 U.S. Department of Commerce manual titled “Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System” (RIMS II), it is possible to estimate these induced impacts. Construction of the Preferred Alternative would result in a statewide change in output of $991,353,000 and an annual statewide increase in employment of 816 during construction of the facility. These impacts would be experienced throughout the economy, but would be greatest in sectors related to highway construction such as gravel industries, concrete manufacturing, engineering and design, and heavy equipment manufacturing.

4.1.4 Tax Revenue

The acquisition of land and improvements for right of way will result in the direct loss of property that is subject to property taxes by local taxing districts. In addition, the displacement of businesses will result in the loss of sales tax revenue for Madison, Wayne, and Butler counties. The No Action Alternative will not require acquisition of right of way and will, therefore, have no impact on taxing districts.

The reduction of assessed valuation by the Preferred Alternative is shown in Table 4-5. The Preferred Alternative would require the use of 278 ha (689 ac) of the MTNF, USACE property, and MDC property for highway purposes. Although properties are already tax exempt, those under U.S. government ownership will remain so because use by MoDOT will be through easement. MoDOT will likely purchase MDC property needed for right of way, therefore tax revenues will not be affected as a result of any MDC property purchased by MoDOT.

Tax impacts from the Preferred Alternative would be minimal, particularly in the larger taxing districts such as the Fredericktown R-1 School District in Madison County, the Three Rivers Community College District in Wayne County, and the Poplar Bluff R-2 School and Poplar Bluff Fire Districts in Butler County. Impacts to these taxing districts would be 1 percent or less than the total assessed valuation for each taxing district. The taxing district which would experience the greatest impact is the Marquand-Zion R-6 School District in Madison County. This district would lose approximately 5 percent of assessed valuation.

Table 4-5. Potential Loss of Assessed Value by Taxing District Associated with the Preferred Alternative

Taxing District	1999 Assessed Value	Assessed Value of Preferred Alternative	Percent Reduction in Assessed Value
Marquand-Zion R-6 School District	$4,791,240	$252,567	5.3%
Fredericktown R-1 School District	$37,399,390	$173,300	0.46%
Greenville R-2 School District	$16,896,460	$558,400	3.3%
East Wayne Ambulance District	$27,684,791	$558,400	2.0%
TRCC Jr. College District	$54,475,275	$558,400	1.0%
Poplar Bluff R-1 School District	$86,582,287	$428,700	0.5%
Neelyville R-4 School District	$13,775,749	$481,128	3.5%
Poplar Bluff Fire District	$100,459,128	$535,600	0.5%
Neelyville/Naylor Ambulance District	$10,586,227	$399,300	3.8%

Source: Madison County Assessors Office, Wayne County Assessors Office, Butler County Assessors Office, and Zambrana Engineering.

4.1.5 Special Group Concentrations

Consideration of special groups including the elderly, the disabled, minority groups (racial, religious, or ethnic), or special interest groups (political) is given through the evaluation of impacts from the proposed alternatives. Federal legislation including the Americans with Disabilities Act, Title VI of the Civil Rights Act of 1964, provides specific requirements and considerations to address the needs and situations of special groups.

As indicated in Section 3.1, Socioeconomics, the primary demographic characterization within the region is a populace that is predominantly white, with a below state average income. The study area reflects these regional characteristics and does not contain a concentration of groups that could be considered disadvantaged or having special needs, therefore, the Preferred Alternative would not result in disproportionate impacts to low income groups, the elderly, or the disabled.

The No Action Alternative would not result in impacts to special groups.

4.1.6 Environmental Justice

The proposed project will not have disproportionate adverse impacts on minority and/or low-income populations as defined by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations). Signed on February 11, 1994, the Executive Order requires federal agencies to identify and address disproportionately high and adverse effects of federally funded projects on minority and low-income populations. Guidelines for addressing this Executive Order on federal transportation projects were published by the U.S. Department of Transportation in 1995 and revised on February 13, 1997 (Final Department of Transportation Order on Environmental Justice). Initiatives to comply with the principles of environmental justice include the following steps:

- Identify any minority or low income populations in the project area;
- Evaluate impacts to the overall community and to any minority and/or low income population;
- Determine mitigation measures being considered to deal with disproportionate impacts; and
- Involve the affected population groups in the decision-making process.

The 1990 population of the townships that encompass the study area corridor were analyzed to determine potential impacts to low-income persons. According to the data, the percentage of persons below poverty level in these townships is generally consistent with the 21.9, 29, and 25 percent of persons below poverty level in Madison, Wayne, and Butler counties, respectively. In addition, the study area corridor does not contain a high percentage of minorities or other special groups, therefore, no disproportionate impacts would occur to minority populations or low-income populations as a result of the project.

A comprehensive public involvement program was implemented to allow for citizen participation throughout the location study. Public information meetings were held to gather feedback from the community. Notification of the public meetings was made through news releases, advertisements in the local newspapers, and flyers placed in post office boxes in the project area. Other communication tools were used such as newsletters, meetings with elected officials, neighborhood groups, news articles, and citizens' advisory group meetings. Details of this public interaction are included in Section 9.0, Public Involvement. Throughout this extensive public involvement process no indication of minority populations were observed by project team members.

4.2 Land Use

Evaluation of land use as it relates to a transportation project refers to the determination of impacts to land use planning and regional development. Land use analysis involves the identification of potential impacts to local and regional economic planning, existing transportation systems, public services, and environmental issues.

4.2.1 Existing Land Use

As described in Section 3.2, land uses in the project corridor are predominantly vacant or undeveloped and agricultural. The Madison County and Wayne County sections of the study area corridor include portions of public land in the MTNF, WWMA, and the Coldwater Conservation Area. These areas are primarily undeveloped with the exception of the "Old Greenville" historic area. Development in the study area corridor has been largely influenced by the location of the U.S. 67 corridor. Residential, commercial, and industrial land uses are located adjacent to the highway and at nodes in Cherokee Pass, Silva, Greenville, Poplar Bluff, and Neelyville.

Impacts to existing land uses are through the direct acquisition of right of way for highway construction. Land use impacts, therefore, reflect the acquisition and conversion of land uses outside of the existing highway right of way. Land acquisition by land use classification is presented in Table 4-2. The No Action Alternative would not require the acquisition of land, therefore creating no direct impact to existing land use.

Land use impacts are classified as agricultural, residential, commercial, industrial, and public/semi-public. In terms of land use classification, agricultural land includes farmland or vacant areas that have been cleared for agricultural purposes and have no other uses on the property. As shown in Section 3.2, the majority of the land in the study area is agricultural or vacant. Consequently, the most significant land use impact, in terms of total area taken, is agricultural land. Development of the Preferred Alternative would require the acquisition of 584 ha (1,442 ac) of agricultural land along the U.S. 67 corridor. This represents 8.1 percent of the total amount of undeveloped land identified in the socioeconomic study area shown in Section 3.3 (Agriculture).

Residential impacts in the study area include single-family land uses, which consist of small houses and mobile homes, and one multi-family use with approximately four units, in Butler County south of Poplar Bluff. Among the commercial impacts are service and retail businesses along the existing highway including flea markets and gas stations. Industrial land use impacts would result from property acquired at Berry Wood Products, Inc. in Cherokee Pass and the Libla Industries building in Wayne County. The public/semi-public land use affected includes a portion of MoDOT property in Silva.

As shown in Table 4-2, the Preferred Alternative would require the acquisition of 157 ha (389 ac) of the MTNF, 115 ha (285 ac) of the WWMA (USACE), and 6 ha (15 ac) of the Coldwater Conservation Area (MDC). The impacts to these public lands largely occur along the existing U.S. 67 right of way in undeveloped and wooded areas (Figures 4-2 through 4-5).

4.2.2 Consistency of the Alternates with Local Comprehensive Land Use Plans

Comprehensive land use plans are adopted by communities in an effort to direct growth and ensure its diversity, efficiency, and balance of land uses. There are no adopted land use plans affecting any area within the Preferred Alternative, with the exception of the 1986 Mark Twain Land and Resource Management Plan. The acquisition of areas of the MTNF required for additional U.S. 67 right of way is consistent with the use of this property adjacent to the existing corridor.

4.2.3 Future Land Use

Construction of a new highway in the study area is not expected to cause significant amounts of growth. Throughout the length of the Preferred Alternative, existing development is scattered and infrequent. Areas along the alignment which are close to the City of Poplar Bluff could provide increased opportunities for development, particularly near interchanges. The availability of services and infrastructure in these areas will increase the potential for future commercial, industrial, and higher density uses compared to the existing character of development in these areas. Although development of the proposed U.S. 67 improvements would enhance access to developable properties, there are no known developments that would be prohibited from proceeding unless the project is approved. Development for displaced businesses and homes is likely to develop in areas where similar land uses are present, such as in Cherokee Pass, Greenville, or Neelyville. As the new facility would provide limited access, replacement development may occur closer to interchanges.

Limitations on available ground throughout the study area due to USFS and USACE ownership will affect the location of replacement and new development. Lack of typical municipal utilities throughout most of the study area, such as sewer and water service, may also affect future development locations.

Increased traffic volumes and improvements at key intersections, such as at Route N, Route 34, and Route 160, will create opportunities for development of highway businesses (e.g., gas stations and convenience stores). Topographic constraints and lack of adequate utilities at the intersections will limit the amount of development that can occur at these locations; however, given the current level of development in the study area, the extent of new development is expected to be minimal.

Investigations conducted throughout the project area indicate that there are no known or planned joint development activities that may be affected by, or which may affect, the proposed project.

4.3 Community Facilities and Services

4.3.1 Parks, Recreation Areas, National Historic Sites, and Other Public Lands

Section 4(f) of the Department of Transportation Act (49 USC 303) protects publicly-owned parks, recreation areas, wildlife and waterfowl refuges, and significant historic and archeological resources. The use of such areas for the proposed project is prohibited unless there are no feasible and prudent alternatives and all possible planning to minimize harm has occurred. Section 4(f) resources that may be affected by the Preferred Alternative are Old Greenville, Greenville Recreation Area, St. Francis River bridge, North Greenville Recreation Area/Greenville ballpark, and the Ozark Trail.

The LWCF of 1965 (16 USC 460L-4) established funds for the acquisition and development of local park and outdoor recreation projects. Section 6(f) of the LWCF Act protects properties that have been developed or enhanced with this fund. Section 6(f) resources affected by the Preferred Alternative include the Greenville ballpark and those MTNF areas purchased with Land and Conservation funds.

Pittman-Robertson Act funding (known more formally as the Federal Aid in Wildlife Restoration Act, as amended) provides grants to states for the purpose of restoring and managing wildlife. An excise tax on the sale of firearms and ammunition funds the program. The USFWS administers the grant program, in

cooperation with state conservation departments such as the MDC. Pittman-Robertson funds were used to purchase a portion of the Coldwater Conservation Area that is located within the study area. Some of this property acquired with Pittman-Robertson funds will be affected by the Preferred Alternative.

The following discusses those public lands, Section 4(f) resources, Section 6(f) resources, and properties acquired with Pittman-Robertson funds potentially affected by the Preferred Alternative. Greenville City Park and access to the Greenville City Park will not be affected by the Preferred Alternative. Lake View golf course is privately owned and does not qualify as a Section 4(f) resource.

Parks

No direct impacts to Lodi Roadside Park are anticipated, as the Preferred Alternative is located east of this park. Access to the park will change with the Preferred Alternative. Currently, access is directly from U.S. 67 to Lodi. With the Preferred Alternative, access would be provided at interchanges to the north at Route EE and south at Route K and via service roads. Lodi does not qualify as a Section 4(f) resource for the proposed project.

The Preferred Alternative will require 4.43 ha (10.93 ac) or 91 percent of the total Greenville ballpark that is located within North Greenville Recreation Area. This 4.43 ha (10.93 ac) portion consists of a wooded area, the outfield of the ballpark, and a portion of the parking lot. The remaining 0.43 ha (1.07 ac) of the ballpark will no longer be large enough to function as a ballpark. Funds from the LWCF Act were used to develop this park; therefore, the Greenville ballpark is both a Section 4(f) and 6(f) resource affected by the Preferred Alternative. Section 6(f) conversion is proposed for the ballpark and replacement land will be necessary. See the Final Section 4(f) Evaluation (Section 5.0) for a detailed discussion on the Greenville ballpark and mitigation measures.

Recreation Areas

The Preferred Alternative will require 20.10 ha (49.7 ac) for new right of way from North Greenville Recreation Area which is 33 percent of the total North Greenville Recreation Area. This includes the 4.43 ha (10.93 ac) Greenville ballpark. This area is classified as recreational in the Wappapello Lake Master Plan (USACE, 2000) and in a letter dated December 7, 2000 (Appendix C), the USACE considers this area to be significant. North Greenville Recreation Area is a Section 4(f) resource affected by the Preferred Alternative.

The Preferred Alternative will laterally divide North Greenville Recreation Area into three parcels. Two parcels will remain east of the Preferred Alternative. One parcel is located northeast of the proposed intersection with Greenville and consists of 1.05 ha (2.59 ac). The other parcel is located southeast of the proposed intersection and consists of 4.44 ha (10.97 ac). The parcel located west of the Preferred Alternative consists of 42.44 ha (104.87 ac). Other than the Greenville ballpark, no other developed recreational facilities will be impacted by the Preferred Alternative at this area. Access to North Greenville Recreation Area will be modified with the Preferred Alternative. Currently, direct access is provided to North Greenville Recreation area by a private drive off of U.S. 67. With the Preferred Alternative, access will be provided by a service road connection at the proposed interchange at CR221 in Greenville. For detailed information on North Greenville Recreation Area and mitigation measures, see the Final Section 4(f) Evaluation (Section 5.0).

The Preferred Alternative will require 0.79 ha (1.95 ac) of new right of way from Greenville Recreation Area which is 0.01 percent of the total Greenville Recreation Area. Greenville Recreation Area is a popular, significant, recreational area and is a Section 4(f) resource for the proposed project. Greenville Recreation Area is located on both sides of U.S. 67 and the property required for right of way is immediately adjacent to both sides of U.S. 67. Approximately 0.60 ha (1.48) of Greenville Recreation Area northwest of existing U.S. 67, which is wooded and undeveloped, will be affected. Approximately 0.19 ha (0.47 ac) from the section southeast of U.S. 67 will be required for right of way. This area includes wooded areas, mowed areas, and a small portion of the parking lot. The vault comfort station by

the boat ramp would be affected by the right of way for the Preferred Alternative; however this comfort station is proposed to be relocated to the Route 34 bridge. All remaining facilities such as the campground, picnic areas, and boat ramp, will be unaffected by the Preferred Alternative. For detailed information on Greenville Recreation Area and mitigation measures, see the Final Section 4(f) Evaluation (Section 5.0).

National Historic Site

The Preferred Alternative will require 0.81 ac (2.0 ac) of new right of way from Old Greenville National Historic Site. Old Greenville is listed on the NRHP and is a Section 4(f) resource affected by the Preferred Alternative [see the Final Section 4(f) Evaluation, Section 5.0]. The property required for right of way is immediately adjacent to U.S. 67 and is wooded or mowed and undeveloped. No developed facilities are impacted by the Preferred Alternative. A preliminary archaeological investigation identified a concrete foundation, two concrete features, two concrete and stone walls, and a relic domestic wall that will be impacted by the Preferred Alternative.

A drive on the west side currently provides access to Old Greenville of U.S. 67. The Preferred Alternative will modify access to Old Greenville by providing a service road west of the southbound lanes to a proposed interchange at Route D.

Other Public Lands

Mark Twain National Forest (MTNF)

The Preferred Alternative will require 24.8 ha (61 ac) from the Fredericktown District and 129.9 ha (321 ac) from the Poplar Bluff District for a total 155 ha (382 ac) of property managed by the MTNF. This property functions primarily for timber production and does not qualify as a Section 4(f) resource for the proposed property. Access to the MTNF will be altered. Access to the Fredericktown District will be via the interchanges at Route C or JJ and via service roads. Access to Poplar Bluff District will be via interchanges at Routes D, A, CR404/543, Routes 49/172, CR401/501, Route JJ, Route 60, and CR421, and service roads. The only developed MTNF recreational facility in the study corridor, Hendrickson Recreation Area which consists of a boat ramp and associated parking lot and restrooms along the Black River, will not be impacted by the Preferred Alternative. This facility is located outside of the right of way for the Preferred Alternative. Access to the boat ramp will be provided at the interchange at CR401 and 501.

Approximately 13.4 ha (33 ac) of the Fredericktown District and 10.9 ha (27 ac) of the Poplar Bluff District purchased with monies from the LWCF will be affected by the Preferred Alternative. These properties are currently undeveloped and designated by the MTNF as multiple-use areas. Section 6(f) conversion is proposed for areas acquired with Land and Water Conservation funds and replacement land will be necessary.

The Victory Section of the Ozark Trail starts at Route 172 and continues southwest to Highway V north of Ellisnore primarily on property managed by MTNF (Figure 3-1, page 4). The Ozark Trail is discontinuous at the Black River in Butler County. The existing U.S. 67 bridge is not pedestrian, bicycle, or equestrian friendly.

There has never been a designated Ozark Trail connection over the Black River at U.S. 67, therefore, there are no impacts to the Victory Section of the Ozark Trail by the Preferred Alternative. However, the National Forest is currently proposing a Black River crossing to connect the Ozark Trail (Hendrickson Recreation Area EA, 1996). A connection to the Ozark Trail over the Black River is currently being considered by MDNR and MTNF. This proposed connection incorporates the old U.S. 67 steel truss bridge over the Black River and is in an early development stage ("The Ozark Trail Victory Section," Ozark Trail Association, October 25, 2003). The proposed connection would require the trail to go underneath the U.S. 67 Black River bridge.

As part of the Preferred Alternative, a two-lane companion bridge is proposed to be located to the west of the existing U.S. 67 Black River bridge. Access will be required under both bridges to allow for the trail connection. MoDOT will likely be requested to grant access rights under the bridges to make this connection.

Other USACE Property

St. Francis East, St. Francis West, Laconia, and Pleasant Valley are all "Multiple Resource-Vegetative Management" areas (USACE, 2000). A total of 89.0 ha (220 ac) of these vegetative management areas will be required for the proposed project. Most of this potentially impacted property is wooded. The interchange at Route 34 will provide access to St. Francis East and St. Francis West. The interchange at Corps Road 21 at Greenville will provide access to Laconia. The interchange at Route A will provide access to Pleasant Valley. The only developed recreational facility that will be affected in these areas is the Ozark Trail crossing at Pleasant Valley. The crossing is considered a Section 4(f) resource for the proposed project because the trail is located on public land on both sides of the existing U.S. 67.

The Preferred Alternative will alter the manner in which Ozark Trail users cross U.S. 67. Trail users currently walk across the existing two-lane U.S. 67. At the area where the Ozark Trail crosses U.S. 67, the Preferred Alternative is proposed as a four-lane freeway with a grass median and walking across the freeway would not be feasible. With the Preferred Alternative, the continuity of the Ozark Trail will be maintained by extending the trail underneath the proposed bridges at Pleasant Valley Creek that is immediately adjacent to the Ozark Trail. For detailed information on the Ozark Trail and mitigation measures, see the Final Section 4(f) Evaluation (see Section 5.0).

Trail use may be temporarily disrupted at times during construction. Trail traffic could be halted during different times of the day, when necessary, for safety reasons. Mitigating measures will include detouring trail users by providing a temporary alternate route in close proximity to the existing trail around the construction area (if practicable), timing trail closures to occur during periods of off-peak use, and using public outreach to provide advance notification of extended trail closure dates and time (if those become necessary), as well as appropriate informational signing on the trail itself and at nearby trailheads. Aside from the possibility of brief disruptions of trail use during construction, public access and use of the trail will not be disrupted to any large extent or duration.

The Preferred Alternative will require approximately 13.4 ha (33 ac) of Otter Creek Multiple Resource Management Area, classified as "Multiple Resource Management-Recreation Low Density" (USACE, 2000). The part of Otter Creek MRMA required for the proposed project is primarily wooded and adjacent to existing U.S. 67. Otter Creek is managed for an unstructured natural setting for low visitor densities. Other than the boat ramps that are not affected by the Preferred Alternative, there are no developed recreational facilities. Otter Creek does not qualify as a Section 4(f) resource for the proposed project.

Missouri Department of Conservation Property

Approximately 6 ha (15 ac) of Coldwater Conservation Area will be required for the Preferred Alternative. This includes property that was acquired with Pittman-Robertson funds. The affected property is immediately adjacent to existing U.S. 67 and is primarily wooded. An interchange at Route EE and a service road will provide access to Coldwater Conservation Area. There are no developed recreational facilities at Coldwater Conservation Area; Coldwater Conservation Area, therefore, does not qualify as a Section 4(f) resource for the proposed project.

No impacts to the Corkwood Conservation Area or changes to access are anticipated with the Preferred Alternative. Corkwood Conservation Area is accessible from Route 142, which forms the northern boundary to this area. An interchange is proposed at Routes 142 and 67. Corkwood Conservation Area does not qualify as a Section 4(f) resource.

Mitigation Measures for Public Lands

Measures to minimize or mitigate harm to Old Greenville National Historic Site/Greenville Recreation Area, North Greenville Recreation Area/Greenville ballpark, and the Ozark Trail are discussed in the Final Section 4(f) Evaluation (Section 5.0).

FHWA proposes that monetary compensation be provided to the USACE, MTNF, and MDC for all property acquired from these agencies for the Preferred Alternative. Property acquisition will be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and amendments. The fair market value of the property will determine the amount of the monetary compensation (Section 4.1.1 Residential Displacements/Property Acquisition).

The USACE, MTNF, and MDC could evaluate new property for objectives similar to the objectives of the properties acquired for the Preferred Alternative. The USACE has requested land, from previously identified in holdings, to replace USACE property required for the Preferred Alternative. Monetary compensation provided to the USACE for property acquired for the Preferred Alternative could be used to purchase some of these in holdings. These in holdings could be evaluated by the USACE to identify those properties that would best suit the objectives of the Wappapello Lake USACE.

4.3.2 Churches and Cemeteries

There are several cemeteries and churches throughout the study area corridor, however, no church or cemetery will be directly impacted by the Preferred Alternative. Partial acquisition for additional right of way would be required at the Solid Rock Baptist Church property in Wayne County. This acquisition would include less than 0.4 ha (1 ac) of land along the existing highway frontage. The church building would not be impacted.

No impacts to churches or cemeteries are expected as a result of the No Action Alternative.

4.3.3 Schools

There are no school facilities along the Preferred Alternative, and, therefore, no direct impacts to schools or school property would occur. Due to the limited access nature of the Preferred Alternative, school bus routes may change to take advantage of the frontage road and interchange locations

No impacts to schools are expected as a result of the No Action Alternative.

4.3.4 Hospitals and Nursing Homes

The majority of medical facilities are located within Greenville and Poplar Bluff, however, none of these facilities are located within the right of way of the Preferred Alternative, and, therefore, would not be impacted.

No impacts to hospitals or nursing homes are expected as a result of the No Action Alternative.

4.3.5 Libraries and Museums

There are no libraries or museums located within the Preferred Alternative, and, therefore, no direct impacts to these facilities are anticipated.

No impacts to libraries or museums are expected as a result of the No Action Alternative.

4.3.6 Emergency Services

Emergency services in the study area are provided by several entities including fire districts, ambulance districts, county sheriffs' offices, and the Greenville Police Department. No direct impacts to any emergency service facility will occur as a result of the proposed alternates.

The No Action Alternative may result in indirect impacts from unsafe driving conditions and narrow shoulder width for vehicles pulling over on the side of the road.

4.3.7 Utilities

No significant impacts to utilities would occur as the result of the Preferred Alternative or the No Action Alternative. Some relocation of phone lines, cable lines, fiber-optic lines, transmission lines or transmission line towers may occur; however, the extent of these impacts are anticipated to be minimal.

4.4 Community Cohesion

As stated in Section 3.1, with the exception of the incorporated areas and Cherokee Pass and Silva, there are no geographically and socially defined neighborhood or community areas within the study corridor. The Preferred Alternative would not disrupt current land use patterns or community components, cause a substantial change in the community, or result in its segmentation. With the exception of isolated residential displacements, no primary impact to the cohesive values communities within the study area are anticipated, nor will separation or isolation of population groups or land uses occur from any of the proposed routes.

The No Action Alternative would not impact community cohesion within the project corridor.

4.5 Agriculture

Coordination occurred with the NRCS throughout the course of the environmental documentation and project planning process. Pursuant to the Farmland Protection Policy Act (FPPA), coordination has occurred regarding the Farmland Conversion Impact Rating, Form AD-106 (Appendix C) which specifically evaluates the conversion of prime and unique farmland, and state-wide and locally important farmland to nonagricultural uses.

The utilization of existing farmland for a transportation facility affects agricultural land by converting agricultural land to non-agricultural purposes, loss of prime farmland, and reduction in agricultural production and consequential income loss. Agricultural areas of potential impact were determined by incorporating aerial mapping into a GIS database. The right of way for the Preferred Alternative has the potential to convert a total of 160.1 ha (395.6 ac) of agricultural land, including cropland and pasture (Table 4-6).

Table 4-6. Agricultural Land Requirements Associated with the Preferred Alternative Right of Way

	Total Agricultural Land Required for Right of Way			Total Agricultural Land in County		Percent of Farmland Per County Converted
County	ha	ac		ha	ac	
Madison	38.9	96.1		44,552.7	110,092	0.09
Wayne	40.1	99.1		39,523.2	97,664	0.10
Butler	81.1	200.4		103,222	255,067	0.08
Total	160.1	395.6		187,297.8	462,823	--
Source: U.S. Census of Agriculture, 1997.						

Coordination with NRCS through the completion of the Farmland Conversion Rating form (Form AD-106, Appendix C) finalized the farmland conversion information, and determined the occurrence of

statewide and locally important farmland within the right of way of the Preferred Alternative. Potential impacts to prime farmland totals 229.8 ha (567.8 ac) (Table 4-7).

Table 4-7. Impacts to Prime Farmland Associated with the Preferred Alternative Right of Way

County	ha	ac
Madison	3.8	9.3
Wayne	8.1	20.1
Butler	217.9	538.4
Total	229.8	567.8
Source: NRCS, 2000.		

Additional impacts to agricultural lands may also result from the acquisitions of borrow material. Typically, agricultural land is utilized for borrow. While the location of borrow areas has not been determined, the utilization of prime farmland as borrow areas will be avoided or minimized.

The following management and design practices have been incorporated into the project to minimize disruptions to agricultural lands, as well as limit adverse effects to designated soils.

- Maximum utilization of existing right of way to every extent practicable.
- Paralleling property lines to the greatest extent possible.
- Proper control of sedimentation and erosion during construction to minimize loss of top soil into streams and roadside ditches, according to MoDOT's Temporary Erosion and Sedimentation Control program.

4.6 Traffic, Transportation, and Safety

This section provides discussion on the traffic characteristics in the study area relative to the potential effects of the construction and operation of the Preferred Alternative on the regional transportation network. These characteristics are based on capacity issues, road closures and local traffic impacts, safety, vehicle operating costs, and travel time costs.

4.6.1 Analyses for Future Conditions

4.6.1.1 Preferred Alternative

Under future conditions, capacities for highway segments were analyzed using the procedures as discussed in Section 3.4.1 of this document. These analyses were conducted for the highway segments identified in Section 3.4.1 (see Table 3-9).

Projected ADT volumes were obtained from the Planning Division of MoDOT and were derived from a straight-line extrapolation of existing traffic volumes using a growth percentage per year. A growth of approximately 2 percent per year was established by MoDOT, which considered a review of historical trends.

An interim condition may exist before the ultimate freeway facility is constructed. This condition would allow for an expressway to exist for some time before an upgrade to a freeway is made. Given this condition, many of the outer roads and interchanges would not be required as part of an expressway. However, in some cases interchanges may be justified based on traffic demands, safety or both. The justification for interchanges for these cases and an approximate time when the interchange is warranted are listed on Table 4-8. These interchanges are also shown in Figure 4-6.

Table 4-8. Interchange Justification, U.S. 67, Madison, Wayne, and Butler Counties

Location (County)	Existing (2002) ADT			Design (2025) ADT		Interchange Justified?	If "yes", Reason for Justification	Year When Interchange is Justified	Status, If Justified
	U.S. 67	Cross Street		U.S. 67	Cross Street				
Route E (Madison)[1]	5,990	1,690		10,480	2,725	Existing			
Route A (Madison)[2]	5,990	1,330		10,480	2,595	Yes	Traffic Warrant 2/ Accidents	2005 (traffic); Now (safety)	Under Study
Route C (Madison)[2]	5,990	900		10,480	1,600	No			
Route JJ (Madison)	4,140	300		8,900	690	No[3]			
Route N (Madison)	4,260	220		7,450	200	No[3]			
Route EE (Wayne)	4,200	90		7,350	70	No[3]			
Route K (Wayne)	4,200	110		7,350	80	No[3]			
Route 34-West (Wayne)	5,570	3,780		10,060	6,620	Yes	Traffic Warrants 1&2/Accidents	Now	Under Study
Route 34-East (Wayne)	5,570	1,320		10,060	3,595	Yes	Traffic Warrants 1&2/Accidents	Now	Under Study
Route E (Wayne)	5,400	530		9,450	1,075	No[4]			
Route D (Wayne)	5,400	1,470		9,450	3,460	Yes	Traffic Warrants 1&2	2015	Under Study
Route FF (Wayne)	5,180	130		9,070	325	No			
Route A (Wayne)	5,180	1,160		9,070	2,680	Yes	Traffic Warrant 2	2015	Under Study
Route F (Wayne)	4,410	150		7,720	310	No			
Route 49 (Wayne)	4,410	780		7,720	1,960	Yes	Traffic Warrant 2	2017	Under Study
Route 172 (Wayne)	4,410	400		7,720	790	No[5]			
Route O (Butler)	6,010	240		10,520	480	No[6]			
Route JJ (Butler)	6,010	410		10,520	850	No			
Route 60-West (Butler)	7,400	5,700		12,950	10,100	Existing			Existing
Route 60-East (Butler)	12,900	5,500		22,900	9,800	Existing			Existing
Route m (Butler)	19,130	1,190		34,120	2,045	Existing			
Route 160 (Butler)	6,550	5,490		12,560	11,355	Yes	Traffic Warrants 1&2/Accidents	Now	Under Study
Route 158 (Butler)	6,550	690		12,560	1,210	No[7]			
Route V (Butler)	6,550	450		12,560	830	No[7]			
Route MM (Butler)	4,450	170		7,790	315	No			
Route 142-East (Butler)	3,510	2,290		6,140	2,640	Yes	Traffic Warrant 2/ Accidents	2011 (traffic); Now (safety)	Under Study
Route 142-West (Butler)	3,510	1,090		6,140	2,170	Yes	Traffic Warrant 2/ Accidents	2011 (traffic); Now (safety)	Under Study

1 Route E in Madison County is part of MoDOT project J0P0562.
2 An interchange is proposed at Route C in Cherokee Pass, which serves both Route C and Route A.
3 An interchange is planned at this location for other than traffic reasons. (Spacing between interchanges for a proposed freeway.)
4 Route E in Greenville is served by a proposed interchange at Corps Road 21 in Greenville.
5 Route 172 is served by a proposed interchange at Route 49.
6 Route O is served by a proposed interchange at Hendrickson, which is warranted based on interchange spacing requirements.
7 Route 158 and Route V in Butler County are served by a proposed interchange at Route 160.

Source: MACTEC, 2004.

The traffic justifications are based on Warrants 1 and 2 of the Manual of Uniform Traffic Control Devices (MUTCD). Warrant 1 (Minimum Vehicular Volume) is intended for application where the volume of the intersecting traffic is the principal reason for consideration of traffic signal installation. Warrant 2 (Interruption of Continuous Traffic) applies to operating conditions where the traffic volume on the major street is so heavy that traffic on the minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. Since it is assumed that traffic signal installation is not appropriate for the ultimate facility, the installation of an interchange is the recommended course of action to satisfy the warrant. No turning movement traffic volumes were available for any of the intersections in question; therefore, no capacity studies were conducted.

Given all of the segments of U.S. 67 identified in Table 3-9, the segment having the highest traffic volume in the design year 2025 is the segment between the Route 60 East and West junctions north of Poplar Bluff where the traffic volume is 22,900 vpd. This section is currently a four-lane expressway. Given a daily volume of 22,900 and a four-lane expressway, the LOS would operate at a LOS B. If other portions of existing two-lane highway are upgraded to an interim expressway, all LOS would operate at, or better than, a LOS B by inspection, because daily traffic volumes in all other areas are lower than 22,900. An interim expressway would operate at good levels of service up to and into the design year, 2025; therefore, a freeway would operate even more favorably than an expressway by inspection. Upgrade from an expressway to a freeway will occur initially where interchanges are warranted based on traffic and where safety is of concern. The mainline sections recommended for upgrade are shown in Figure 4-6. Theoretically, mainline sections of U.S. 67, where safety is not of concern, would function at very good levels of service as an expressway in the design year. With the exception of one area, all high accident areas in the study corridor are at-grade intersections. These at-grade intersections are proposed to be upgraded to interchanges based on traffic demands. The area having high accident statistics which is not upgraded by an interchange is a section of U.S. 67 south of Cherokee Pass and north of Route JJ. This section is shown on Figure 4-6 and is recommended to be the first to be upgraded to freeway based on safety issues.

Although the pavement section from the North Terminus to Route C is not warranted for improvement until 2008, the interchange at Route C in Cherokee Pass currently is warranted. This interchange is on new location which will be built to a freeway standard. This includes the section between the North Terminus and Route C.

Since the ultimate facility is to be a freeway, no at-grade intersection analyses were conducted along U.S. 67 for the ultimate condition. For those at-grade intersections occurring at interchange ramp terminals and cross roads, no level of service was conducted. These areas are considered to be acceptable by inspection.

A summary of the various improvements required to the local road system resulting from the construction and operation of the Preferred Alternative is provided on Table 4-9.

Table 4-9. Future Roadway Improvements Required for the Existing Roadway System Resulting from U.S. 67 Improvements

Segment	Road	Limits/Location	Improvements
Madison County			
A	Route C	Proposed U.S. 67 to existing U.S. 67	Construct light-duty pavement at interchange
A/D	East Outer Road	Berry Wood Products, Inc. to south of Cold Spring	Construct light-duty pavement for Outer Road connection
D	East Outer Road	Charles Parker property to Roy Watts property	Construct light-duty pavement for Outer Road connection
D	West Outer Road	Near Douglas Welch property	Construct light-duty pavement near proposed overpass
D	Existing U.S. 67		Construct overpass to provide local access connection
D	East Outer Road	Borgmann property to Route JJ	Construct light-duty pavement for Outer Road connection
D	Route JJ	Proposed U.S. 67 to Existing U.S. 67	Construct light-duty pavement at interchange
D	East Outer Road	Route JJ to near Sanders Cemetery	Construct light-duty pavement for Outer Road connection
D	Existing U.S. 67	Near Roger Moyers property	Close existing U.S. 67 and construct cul-de-sac

Table 4-9. Future Roadway Improvements Required for the Existing Roadway System Resulting from U.S. 67 Improvements

Segment	Road	Limits/Location	Improvements
D	East Outer Road	Near Rauls property	Construct light-duty pavement near proposed overpass
D	Existing U.S. 67	Near Settle Cemetery	Construct light-duty pavement for local road connection
D/F	East Outer Road	Delmont Stockman property to CR312	Construct light-duty pavement for Outer Road connection
D/F	West Outer Road	William Self property to Route N	Construct light-duty pavement for Outer Road connection
F	Route N	West of existing U.S. 67 to CR325	Construct light-duty pavement at interchange
F	East Outer Road	CR325 to existing U.S. 67	Construct light-duty pavement for outer road connection
Madison/Wayne Counties			
F/H	West Outer Road	Route N to Route EE	Construct light-duty pavement for Outer Road connection
Wayne County			
H	Route EE	Existing U.S. 67 to proposed U.S. 67	Construct light-duty pavement at interchange
H	West Outer Road	Route EE to CR302	Construct light-duty pavement for Outer Road connection
H	West Outer Road	Kathryn Paullus property to CR303	Construct light-duty pavement for Outer Road connection
H	East Outer Road	Reifsteck property to CR211	Construct light-duty pavement for Outer Road connection
H	Existing U.S. 67	Near Coldwater State Forest	Construct overpass for local road access
H	Existing U.S. 67	Near CR303	Close existing U.S. 67 and construct cul-de-sac
H	East Outer Road	CR211 to Bennett Creek	Construct light-duty pavement for outer road connection
H	Existing U.S. 67	At Lodi	Construction light-duty pavement for local road connection (three locations)
H	CR213	Existing U.S. 67 to CR213	Construct light-duty pavement for local road connection
H	Route K	At proposed interchange	Construct light-duty pavement at interchange
H	West Outer Road	Route K to CR307	Construct light-duty pavement for Outer Road connection
H	East Outer Road	CR213 to Ploesser property	Construct light-duty pavement for Outer Road connection
J	West Outer Road	CR307 to Route 34	Construct light-duty pavement for Outer Road connection
J	Existing U.S. 67	Route 34 to existing U.S. 67	Construct light-duty pavement for local road connection
J	Route 34	Approximately 0.8 km east of existing U.S. 67 to existing U.S. 67	Construct light-duty pavement for relocated Route 34
J	CR219	Route 34 to CR219	Construct light-duty pavement for local road connection
J	Existing U.S. 67	At Almond Leach property	Construct light-duty pavement for local access
L	West Outer Road	CR306 to Bounds Creek access	Construct light-duty pavement for Outer Road connection
L	Existing U.S. 67	Near Frazier Creek	Construct overpass for local access connection
L	East Outer Road	CR219 to CR220	Construct light-duty pavement for Outer Road connection
L	East Outer Road	Approximately 2.2 km north of Corps Road 21 to Corps Road 21	Construct light-duty pavement for Outer Road connection
L	West Outer Road	St. Francis River access to Corps Road 21	Construct light-duty pavement for Outer Road connection
L	Corps Road 21	Proposed U.S. 67 to existing U.S. 67	Construct light-duty pavement at interchange
L	Route D	Existing U.S. 67 to proposed U.S. 67	Construct light-duty pavement at interchange
L	West Outer Road	Route D to Historic Greenville	Construct light-duty pavement for Outer Road connection
L	Route A	Existing Route A to existing U.S. 67	Construct light-duty pavement at interchange
L	West Outer Road	Route A to existing U.S. 67	Construct light-duty pavement for Outer Road connection
L	Route F	Existing Route F to existing U.S. 67	Construct overpass for local road access
L	East Outer Road	Route F to MTNF property	Construct light-duty pavement for Outer Road connection
L	West Outer Road	At existing U.S. 67 and MTNF property	Construct light-duty pavement for Outer Road connection
L	East Outer Road	MTNF property to CR545 interchange	Construct light-duty pavement for Outer Road connection
L/N	East Outer Road	CR545 interchange to existing CR545	Construct light-duty pavement for Outer Road connection
N	West Outer Road	CR545 interchange to existing U.S. 67 near CR406	Construct light-duty pavement for Outer Road connection
O	Existing U.S. 67	Near Wolf Run Creek	Close existing U.S. 67 and construct two cul-de-sacs
O	East Outer Road	Existing U.S. 67 near Lonnie Wood property to Route 172	Construct light-duty pavement for Outer Road connection
O	West Outer Road	CR403 to Route 49	Construct light-duty pavement for Outer Road connection
O	Route 49/172	Existing Route 49 to Existing Route 172	Construct light-duty pavement at interchange
Wayne/Butler Counties			
O	East Outer Road	Route 172 to Route O	Construct light-duty pavement for Outer Road connection
O	West Outer Road	Route 49 to Magill Hollow	Construct light-duty pavement for Outer Road connection
Butler County			
O	CR401	At existing U.S. 67	Construct light-duty pavement at interchange
O	Route JJ	At existing U.S. 67	Construct light-duty pavement at interchange
O	West Outer Road	Route JJ to Nicolini property	Construct light-duty pavement for Outer Road connection
O/P	East Outer Road	CR521 to J.P. McLane property	Construct light-duty pavement for Outer Road connection
P	West Outer Road	Magills Grocery to Harold Morrison property	Construct light-duty pavement for Outer Road connection
P	Existing U.S. 67	Approximately 1.1 km north of CR522	Construct overpass for local traffic access
P	West Outer Road	Joseph Mick property to Route 60	Construct light-duty pavement for Outer Road connection
P	East Outer Road	Bruce McIver property to near Missouri Highway Patrol Headquarters	Construct light-duty pavement for Outer Road connection

Table 4-9. Future Roadway Improvements Required for the Existing Roadway System Resulting from U.S. 67 Improvements

Segment	Road	Limits/Location	Improvements
P	West Outer Road	Route 60 to Eagle Investment Corp. Property	Construct light-duty pavement for Outer Road connection
P	CR421	At existing U.S. 67	Construct light-duty pavement at interchange
P	West Outer Road	CR421 to 0.75 km south	Construct light-duty pavement for Outer Road connection
P	East Outer Road	Camelot Mobile Home Court to CR527	Construct light-duty pavement for Outer Road connection
P	West Outer Road	Irma Jean Hillis property to CR441	Construct light-duty pavement for Outer Road connection
P	East Outer Road	CR527 to Church of the Nazarene of Poplar Bluff	Construct light-duty pavement for Outer Road connection
P	West Outer Road	CR441 to ADM, Inc. property	Construct light-duty pavement for Outer Road connection
P	West Outer Road	Lundry property to Baptist Church near CR437	Construct light-duty pavement for Outer Road connection
P	Existing U.S. 67	CR523 to near CR437	Construct overpass for local road access
Q	East Outer Road	Lora Pennell property to R.T. Parker property	Construct light-duty pavement for Outer Road connection
Q	West Outer Road	R.T. Parker property to existing U.S. 67	Construct light-duty pavement for Outer Road connection
Q	West Outer Road	Darwin Davis property to CR478	Construct light-duty pavement for Outer Road connection
Q	East Outer Road	R.T. Parker property to CR323	Construct light-duty pavement for Outer Road connection
Q/R	East Outer Road	Jay Brickell property to Route 158	Construct light-duty pavement for Outer Road connection
Q	West Outer Road	At CR482	Construct light-duty pavement for Outer Road connection
R	East Outer Road	Route 158 to existing U.S. 67	Construct light-duty pavement for Outer Road connection
R	Route 158	At proposed U.S. 67	Construct light-duty pavement at interchange
R	West Outer Road	Existing U.S. 67 to CR360	Construct light-duty pavement for Outer Road connection
T	West Outer Road	Oscar Riley property to Route MM	Construct light-duty pavement for Outer Road connection
T	East Outer Road	At CR350	Construct light-duty pavement for Outer Road connection
T	Route MM	At existing U.S. 67	Construct overpass for local road access
U	Route 142	Existing U.S. 67 to proposed U.S. 67	Construct light-duty pavement at interchange
U	CR270	At proposed U.S. 67	Construct overpass for local road access

Source: MACTEC, 2004.

4.6.1.2 No Action Alternative

Highway segments were analyzed using the procedures discussed and presented in Section 3.4.1. Table 4-10 lists the levels of service for each roadway segment under design year conditions assuming that no action is taken to improve U.S. 67.

Table 4-10. Roadway Segment Capacity Analysis (Design Year Conditions 2025) for the No Action Alternative

Segment of U.S. 67	ADT	LOS	Remarks
North Terminus to Route C	10,480	D	Two-lane with 2.4 m (8 ft) gravel shoulders. Runs through Cherokee Pass; numerous points of access, and rolling terrain.
Route C to Route EE	7,450	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain.
Route EE to Route 34	7,350	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain.
Route 34 to Route A	9,450	C	Two-lane with 2.4 m (8 ft) gravel shoulder and rolling terrain.
Route A to Route 49	7,720	C	Two-lane with 1.8 m (6 ft) gravel shoulder and rolling terrain.
Route 49 to Begin Divided Pavement	12,950	D	Two-lane with gravel shoulders for 4.8 km (3 mi). Two-lane with paved 2.4-m (8-ft) shoulders for 4.8 km (3 mi) and rolling terrain.
Begin Divided Pavement to Route 60-West	12,950	A	Four-lane divided with 3 m (10 ft) surfaced shoulders and rolling terrain.
Route 60-West to Route 60-East	22,900	B	Four-lane divided with 3 m (10 ft) surfaced shoulders and rolling terrain.
Route m to Route 160	14,870	D	Two-lane with 2.4 m (8 ft) shoulders and rolling terrain.
Route 160 to Route 142	7,790	C	Two-lane with 2.4 m (8 ft) gravel shoulders and level terrain.
Route 142 to South Terminus	6,140	C	Two-lane with 2.4 m (8 ft) gravel shoulders and level terrain.

Source: MACTEC, 2004.

Under design year conditions, several segments of the existing two lanes of U.S. 67 would operate at LOS D, which indicates the facility is near capacity. Of these, the two-lane segment with the highest traffic volume, is the area between Route m and Route 160 south of Poplar Bluff in Butler County. Other

areas having a design year LOS D are from the northern project terminus to Route C in Madison County, and from Route 49 in Wayne County to the beginning of divided pavement in Butler County. From Route C in Madison County to Route 34 in Wayne County and south of Route 160 in Butler County, U.S. 67 is at LOS C. The major contributors to the poor levels of service are the absence of adequate shoulders (or no shoulders), the poor highway geometry which results in a reduction of available passing zones, and the presence of semi-trailer trucks in the traffic stream (approximately 10 percent of the total daily volume). Improving the roadway to a four-lane highway would be a mitigating factor in improving the level of service. The existing four-lane divided highway in northern Butler County is at LOS A or B in the design year.

4.6.2 Travel Patterns and Accessibility

The construction and operation of the Preferred Alternative would create the following conditions:

- the creation of a freeway from just south of Fredericktown in Madison County to just south of Neelyville in Butler County;
- the use of 78 percent of the existing facility;
- a relocation to the west of Cherokee Pass;
- a relocation to the west of Greenville;
- the incorporation of the Poplar Bluff bypass; and
- a relocation to the west of Neelyville;

The impacts to each local road crossed by the Preferred Alternative are provided on Table 4-11.

Generally, the predominant impact to the local road system resulting from the construction of the Preferred Alternative is the change in access to prohibit direct access to the proposed facility. Since this facility is proposed as a freeway, no driveway access to the proposed facility is allowed. In many cases, outer roads need to be constructed to provide access to adjacent parcels. In some cases, the existing U.S. 67 pavement becomes an outer road adjacent to the proposed facility. Access to the proposed facility is then limited to interchanges only, and all access to adjacent properties and outer roads will be tied into these interchanges. The proposed interchanges are listed in Table 4-11. In areas where proposed U.S. 67 bypasses existing U.S. 67, the traffic volumes on existing U.S. 67 would be reduced to predominantly local traffic. The level of congestion on these portions of existing U.S. 67 would depend solely on the demand on that facility as a local road.

Additional impacts resulting from the change in access of U.S. 67 to a fully controlled-access facility are:

- Possible longer travel distances to get on the primary highway;
- Possible longer travel times for emergency vehicles; and
- Loss of direct access to the primary highway for some traffic-dependent businesses.

Those individual traffic-dependent businesses with a change in direct access to the primary highway may experience some level of decrease in volume of sales. However, this decrease is dependent on several factors:

- The visibility of the business from the primary highway;
- The presence of signage on the primary highway alerting motorists of the business;
- The severity of the adverse travel from the primary highway to the business; and
- The presence of other competing businesses in the area.

Table 4-11. Local Road Impacts Associated with the Preferred Alternative (Direct Impacts Only)

County	Local Road	Impact
Madison	CR402	Close at U.S. 67
Madison	Route C	Provide interchange
Madison	Existing U.S. 67 south of Cherokee Pass	Re-route to east outer road
Madison	CR401	Existing U.S. 67 becomes Outer road
Madison	CR417 (North)	Existing U.S. 67 becomes Outer road
Madison	CR417 (South)	Existing U.S. 67 becomes Outer road
Madison	Route JJ	Provide interchange
Madison	Existing U.S. 67 south of Route JJ	Close
Madison	CR303	Existing U.S. 67 becomes Outer road
Madison	Existing U.S. 67 north of CR303	Re-route to East Outer road
Madison	CR412	Re-route traffic to West Outer road
Madison	CR411	Re-route traffic to West Outer road
Madison	CR325 (North)	Re-route traffic to East Outer road
Madison	Route N	Provide interchange
Madison	CR325 (South)	Re-route traffic to East Outer road
Madison	Existing U.S. 67 south of Route N	Re-route traffic to East Outer road
Madison	CR321	Existing U.S. 67 becomes Outer road
Madison	CR450	Re-route traffic to West Outer road
Madison	CR454	Re-route traffic to West Outer road
Madison	CR452	Re-route traffic to West Outer road
Wayne	Route EE	Provide interchange
Wayne	CR301	Re-route traffic to West Outer road
Wayne	CR302	Re-route traffic to West Outer road
Wayne	CR209 (North)	Existing U.S. 67 becomes Outer road
Wayne	CR209 (South)	Existing U.S. 67 becomes Outer road
Wayne	CR303 (North)	Re-route traffic to West Outer road and overpass
Wayne	CR212	Re-route Traffic to East Outer road
Wayne	Existing U.S. 67 just north of CR212	Re-route Traffic to East Outer road
Wayne	Existing U.S. 67 just north of CR303	Close
Wayne	CR303 (South)	Existing U.S. 67 becomes Outer road
Wayne	CR211	Re-route Traffic to East Outer road
Wayne	CR214	Re-route Traffic to East Outer road and underpass at Lodi
Wayne	Lodi	Re-route traffic to underpass and East Outer road
Wayne	CR213 (North)	Re-route traffic to underpass and existing U.S. 67
Wayne	Existing U.S. 67 south of Lodi	Re-route traffic to CR213
Wayne	Route K	Provide interchange
Wayne	CR213 (South)	Becomes East Outer road; close access to U.S. 67
Wayne	CR307 (North)	Re-route traffic to West Outer road
Wayne	CR307 (South)	Re-route traffic to West Outer road
Wayne	Route 34 - West Junction	Provide interchange
Wayne	Route 34 - East Junction	Re-route traffic to Route 34 West Junction and provide interchange
Wayne	CR219 (North)	Re-route traffic to relocated Route 34
Wayne	CR306	Re-route traffic to West Outer road and overpass
Wayne	CR219 (South)	Re-route traffic to East Outer road
Wayne	CR220	Re-route traffic to East Outer road
Wayne	CR221	Provide interchange
Wayne	Existing U.S. 67 in Greenville	Becomes local road
Wayne	Route D	Provide interchange to/from the south
Wayne	Historic Greenville	Re-route traffic to West Outer road
Wayne	Route FF	Re-route traffic to underpass and existing U.S. 67
Wayne	Existing U.S. 67 bridge over Wappapello Lake	Remove and replace bridge
Wayne	Route A	Provide interchange
Wayne	CR403 (Far North)	Existing U.S. 67 becomes Outer road
Wayne	Route F	Provide overpass to West Outer road
Wayne	CR541 (North)	Close at U.S. 67
Wayne	CR541 (South)	Close at U.S. 67

Table 4-11. Local Road Impacts Associated with the Preferred Alternative (Direct Impacts Only)

County	Local Road	Impact
Wayne	CR404/CR545	Provide interchange
Wayne	CR546	Re-route traffic to CR545
Wayne	CR406	Existing U.S. 67 becomes Outer road
Wayne	Existing U.S. 67 at Wolf Run Creek	Close
Wayne	CR547	Existing U.S. 67 becomes Outer road
Wayne	CR548	Re-route traffic to East Outer road
Wayne	CR403 (North)	Existing U.S. 67 becomes Outer road
Wayne	CR403 (South)	Re-route traffic to West Outer road
Wayne	Route 172	Re-route traffic to Route 49 and provide interchange
Wayne	Route 49	Provide interchange
Butler	Route O	Re-route traffic to East Outer road
Butler	CR401	Re-route traffic to West Outer road and provide interchange to/from the south
Butler	Route JJ	Provide interchange
Butler	CR521	Re-route traffic to east outer road
Butler	CR402	Use existing outer road access
Butler	CR520	Re-route traffic to east outer road
Butler	CR522	Close access to U.S. 67 and re-route traffic to east
Butler	U.S. Route 60	Use existing interchange
Butler	CR452	Close access to U.S. 67
Butler	CR421	Provide interchange
Butler	CR429	Close access to U.S. 67
Butler	CR527/CR441	Provide interchange
Butler	CR523	Provide overpass for local traffic
Butler	CR437	Re-route traffic to shifted West Outer road and overpass
Butler	CR478	Close access to U.S. 67; re-route traffic to west outer road
Butler	CR323	Close access to U.S. 67
Butler	CR488	Existing U.S. 67 becomes Outer road
Butler	CR482/CR343	Provide overpass for local traffic
Butler	Route 158/U.S. 160	Provide interchange
Butler	CR480	Existing U.S. 67 becomes Service Road
Butler	Route V	Existing U.S. 67 becomes Service Road
Butler	CR360	Re-route traffic to East and West Outer roads
Butler	CR338 (West)	Close access to U.S. 67
Butler	CR338 (East)	Existing U.S. 67 becomes Outer road
Butler	CR340 (West)	Close access to U.S. 67
Butler	CR340 (East)	Existing U.S. 67 becomes Outer road
Butler	CR352 (West)	Close access to U.S. 67
Butler	CR352 (East)	Existing U.S. 67 becomes Outer road
Butler	Route MM/CR350	Provide overpass for local traffic
Butler	Route 142	Provide interchange
Butler	CR270	Provide overpass for local traffic

It is difficult to estimate the effects of the Preferred Alternative on these businesses at this time. For example, despite the loss of direct access to proposed U.S. 67, a business may not see a net change in sales volume if there is good visibility and if the adverse travel to the business is not lengthy.

4.6.3 Safety

The most recent statewide accident rates for Missouri have been used to evaluate the impact of U.S. 67 on traffic safety in the study area. The Preferred Alternative reduces the number of access points and provides two additional lanes. Under design year conditions, it can be assumed that the accident rate on U.S. 67 would be equal to the current state-wide average for a four-lane divided freeway or 127.32 accidents per HMVMT. Given the projected traffic data at the various segments identified in Table 4-10 and the travel distance of each segment, a forecast of the number of accidents can be

calculated. The accident forecasts for the Preferred Alternative are presented in Table 4-12. The accident forecasts for the No Action alternative are presented in Table 4-13.

Under the No Action alternative, accident rates can be assumed to worsen as traffic is expected to roughly double by 2025. Table 4-13 presents the forecasted accidents expected to occur if no action is taken to improve the existing facility. If no action is taken, accidents can expect to increase 71 percent over the amount expected if a four-lane freeway is constructed for the length of the facility. Additionally, the forecasted number of accidents expected to occur in the study corridor over a 5-year period, starting in 2025, is 2,866. Over the same time period and study area, the forecasted number of accidents expected to occur for the Preferred Alternative is 1,675. It should be noted that the amount of accidents occurring in the study area from January 1, 1998 to December 31, 2002 was 871.

Table 4-12. Accident Forecasts for the Preferred Alternative (2025)

Segment	Begin Log Mile	End Log Mile	Mileage	ADT	Accident Rate*	Projected Accidents†
Madison County						
North Terminus – Cherokee Pass	116.90	118.22	1.32	10,480	127.32	32
Cherokee Pass	118.22	119.06	0.84	10,480	127.32	20
Cherokee Pass – Route JJ	119.06	124.20	5.14	8,900	127.32	106
Route JJ	124.20	124.70	0.50	8,900	127.32	10
Route JJ – Route N	124.70	129.68	4.98	8,900	127.32	103
Route N	129.68	130.18	0.50	7,450	127.32	9
County Total			13.28			280
Wayne County						
Route N (Madison County) – Route EE	130.18	133.50	3.32	7,450	127.32	57
Route EE	133.50	134.00	0.50	7,450	127.32	9
Route EE – Route K	134.00	140.41	6.41	7,350	127.32	109
Route K	140.41	140.91	0.50	7,350	127.32	8
Route K – Route 34 Junctions	140.91	142.84	1.93	7,350	127.32	33
Route 34 Junctions	142.84	143.65	0.81	10,060	127.32	19
Route 34 Junctions – Greenville	143.65	147.35	3.70	9,450	127.32	81
Greenville	147.35	148.58	1.23	9,450	127.32	27
Greenville – Route D	148.58	149.49	0.91	9,450	127.32	20
Route D (including Route FF)	149.49	150.72	1.23	9,450	127.32	27
Route D – Route A	150.72	152.01	1.29	9,450	127.32	28
Route A	152.01	152.51	0.50	9,070	127.32	10
Route A – Routes 49/172	152.51	161.88	9.37	7,720	127.32	168
Routes 49/172	161.88	162.38	0.50	7,720	127.32	9
Routes 49/172 – County Line	162.38	163.25	0.87	10,520	127.32	21
County Totals			33.07			626
Butler County						
County Line – Route JJ	163.25	165.42	2.17	10,520	127.32	53
Route JJ	165.42	165.92	0.50	10,520	127.32	12
Route JJ – Begin Divided Pavement	165.92	167.30	1.38	12,950	127.32	41
Begin Divided Pavement – Route 60 West Junction	167.30	170.16	2.86	12,950	127.32	86
Route 60 West Junction – Route 60 East Junction	170.16	174.79	4.63	22,900	127.32	246
South End of Poplar Bluff Bypass – Route 160/158	183.86	187.52	3.66	14,870	127.32	126
Routes 160/158	187.52	188.17	0.65	12,560	127.32	19
Routes 160/158 – Route MM	188.17	192.53	4.36	7,790	127.32	79
Route MM	192.53	193.03	0.50	7,790	127.32	9
Route MM – Route 142	193.03	194.57	1.54	7,790	127.32	28
Route 142	194.57	195.07	0.50	6,140	127.32	7
Route 142 – State Line	195.07	199.49	4.42	6,140	127.32	63
County Totals			27.17			769

* *Statewide average accident rate for 4-lane freeway is 127.32 per HMVMT.*
† *Over a 5-year period. This assumes the current freeway accident rate will hold constant until 2025.*

Table 4-13. Accident Forecasts for the No Action Alternative (2025)

Segment	Begin Log Mile	End Log Mile	Mileage	ADT	Accident Rate*	Projected Accidents†
Madison County						
North Terminus – Cherokee Pass	116.90	118.22	1.32	10,480	226.07	57
Cherokee Pass	118.22	119.06	0.84	10,480	226.07	36
Cherokee Pass – Route JJ	119.06	124.20	5.14	8,900	226.07	189
Route JJ	124.20	124.70	0.50	8,900	226.07	18
Route JJ – Route N	124.70	129.68	4.98	8,900	226.07	183
Route N	129.68	130.18	0.50	7,450	226.07	15
County Total			13.28			498
Wayne County						
Route N (Madison County) – Route EE	130.18	133.50	3.32	7,450	226.07	102
Route EE	133.50	134.00	0.50	7,450	226.07	15
Route EE – Route K	134.00	140.41	6.41	7,350	226.07	194
Route K	140.41	140.91	0.50	7,350	226.07	15
Route K – Route 34 Junctions	140.91	142.84	1.93	7,350	226.07	58
Route 34 Junctions	142.84	143.65	0.81	10,060	226.07	34
Route 34 Junctions – Greenville	143.65	147.35	3.70	9,450	226.07	144
Greenville	147.35	148.58	1.23	9,450	226.07	48
Greenville – Route D	148.58	149.49	0.91	9,450	226.07	35
Route D (including Route FF)	149.49	150.72	1.23	9,450	226.07	48
Route D – Route A	150.72	152.01	1.29	9,450	226.07	50
Route A	152.01	152.51	0.50	9,070	226.07	19
Route A – Routes 49/172	152.51	161.88	9.37	7,720	226.07	298
Routes 49/172	161.88	162.38	0.50	7,720	226.07	16
Routes 49/172 – County Line	162.38	163.25	0.87	10,520	226.07	38
County Totals			33.07			1,114
Butler County						
County Line – Route JJ	163.25	165.42	2.17	10,520	226.07	94
Route JJ	165.42	165.92	0.50	10,520	226.07	22
Route JJ – Begin Divided Pavement	165.92	167.30	1.38	12,950	226.07	74
Begin Divided Pavement – Route 60 West Junction	167.30	170.16	2.86	12,950	182.30	123
Route 60 West Junction – Route 60 East Junction	170.16	174.79	4.63	22,900	182.30	353
South End of Poplar Bluff Bypass – Route 160/158	183.86	187.52	3.66	14,870	226.07	224
Routes 160/158	187.52	188.17	0.65	12,560	226.07	34
Routes 160/158 – Route MM	188.17	192.53	4.36	7,790	226.07	140
Route MM	192.53	193.03	0.50	7,790	226.07	16
Route MM – Route 142	193.03	194.57	1.54	7,790	226.07	49
Route 142	194.57	195.07	0.50	6,140	226.07	13
Route 142 – State Line	195.07	199.49	4.42	6,140	226.07	112
County Totals			27.17			1,254

* *Statewide average accident rate for 4-lane expressway is 182.30 per HMVMT. Statewide average accident rate for two-lane highway is 226.07 per HMVMT.*

† *Over a 5-year period. This assumes the current freeway accident rate will hold constant until 2025.*

4.6.4 Bicycle, Pedestrian, and Equestrian Use

As discussed in Section 3.4.6, the predominant bicycle use and pedestrian traffic in the study area is limited to Cherokee Pass, Greenville, Poplar Bluff, and Neelyville. Hiking trails occur within the project corridor, including the Ozark Trail and those within MTNF and MDC properties. Due to the nature of the study area and the type of highway studied (rural and used predominantly for through-trip purpose), there is little bicycle or pedestrian traffic in the U.S. 67 project corridor. There are no known existing or planned bicycle facilities within the project corridor.

The Preferred Alternative is proposed as a freeway, which prohibits bicyclists from utilizing the pavement and shoulders of the facility. Pedestrian use of the proposed facility should be limited to emergency situations only.

As presented in Section 4.3.1, due to the orientations of the Ozark Trail and the existing U.S. 67 corridor, it is not possible to avoid the crossing of the Ozark Trail. However, the continuity of the trail will not be compromised by the construction of the Preferred Alternative. The crossing just north of Route A in Wayne County is proposed to be accomplished by extending the trail under the proposed highway at the Pleasant Valley Creek bridges to allow for the safe passage of hikers and other trail users (i.e., horseback riders).

4.7 Air Quality

The project area is located within an attainment area and, therefore, the State Implementation Plan (SIP) does not require any transportation control measures. Consequently, the conformity procedures of 23 CFR 770 do not apply to this project. Current air quality in the area is regarded to be high. Potential air quality impacts that may be associated with the project area are short-term effects that are limited to the construction phase as discussed in Section 4.22.6. Relative to the No Action Alternative, the Preferred Alternative represents free-flow operating conditions. The No Action Alternative experiences poor levels of service in the design year 2025, which in turn would represent something less than free-flow conditions. These conditions could lead to congested conditions which could potentially result in poorer air quality.

Based on a cooperative agreement between FHWA, MoDOT, and MDNR (FHWA, 1988), an air quality analysis should be performed if the ADT exceeds 54,000 in the year of construction and 72,700 vehicles in the twentieth year following project construction (i.e., design year). Present traffic volumes for U.S. 67 study area range from 4,110 to 12,900 ADT (see Figure 3-2) and forecasted traffic volumes range from 7,700 to 22,900 ADT for the design year 2025; therefore, the project is exempt from additional air quality analysis.

4.8 Aesthetics

The Preferred Alternative will potentially impact visual resources by the wider roadway width, the need for service roads, and the severity of grades necessitating cut and fill slopes that increase the visual scale of the roadway. The Preferred Alternative, however, generally remains within, and adjacent to, the existing U.S. 67 corridor with six exceptions: a relocation at Cherokee Pass, the JJ and U.S. 67 intersection, the Route EE and U.S. 67 intersection, a relocation at Greenville, the Routes 160 and 67 intersection and curve, and a relocation at Neelyville.

Throughout the rest of the corridor there will be local impacts as the widening will involve clearing and grading of forested and pasture areas. However the views from the road into forested and pasture areas will essentially be unchanged. The perspective of view from the road will not be modified to any great extent as the Preferred Alternative will follow the existing U.S. 67 corridor for most of the length of the project. The view of the landscape is therefore expected to remain similar to the existing condition. The perspective of the road will change somewhat as the proposed improvements to U.S. 67 will increase the facility from two lanes to four lanes. The view of the road will also be somewhat modified in those areas where frontage roads and interchanges are proposed.

The landscape through which the proposed improvements to U.S. 67 will be located is considered representative, or typical, of what occurs across the region, and is therefore not considered to be aesthetically or visually unique. Additionally, the proposed improvements associated with the Preferred Alternative will largely occur within an existing transportation corridor. Consequently, impacts to the landscape are not expected to adversely alter the visual and aesthetic character of the project corridor.

Best management practices including reseeding, natural vegetation, and erosion prevention will aid in reducing visual impacts along the route while meeting the project objectives.

4.9 Mines and Geologic Hazards

4.9.1 Mines

The only mines known to exist within the study area were open pit surface mines. No underground mines are known to exist within or near any of the alternates (Figure 4-9). The only consequences expected from the small surface mines, if encountered, are compactibility of the soils. Typical engineering tests performed prior to, and during, construction of the roadway are expected to be sufficient to determine the suitability of the soils for the construction of the roadway.

4.9.2 Earthquake Potential

The proposed improvements to U.S. 67 are within the New Madrid Seismic Zone (Figure 4-7) (Thenhaus, 1990). This area is within Zones VIII and IX of the modified Mercalli Intensity scale for an earthquake of magnitude 8.6 (Thenhaus, 1990). The potential impacts from an earthquake include liquefaction of unconsolidated materials, collapse of structures, and landslides. A geotechnical study to determine soil and bedrock physical properties will be conducted during the design phase. This information, along with design standards to reduce earthquake impact potential, will be used in the final design of the highway.

4.9.3 Karst

Although sinkholes and caves were not reported for or observed within the Preferred Alternative, much of the corridor is considered in karst terrain due to the presence of springs, fens, and gaining and losing streams (see Section 3.7.4). There is the potential for roadway contaminants (salt, oil, sediment, etc.) to enter the groundwater system via losing streams and/or fractures/solution voids and impact groundwater quality. Karst systems provide little opportunity for adsorption, degradation, and/or other natural processes to cleanse the water of contaminants before the water reaches the aquifer. The increased impervious surface area of the Preferred Alternative will increase runoff and potentially accelerate erosion which may impact surface water and/or groundwater (see Section 4.12 for further discussion).

Karst terrain also presents special construction issues because the bedrock may not provide a stable foundation and is susceptible to collapse due to solution of the bedrock. Therefore, extra subsurface investigations (i.e., drilling, geophysical surveys, etc.) may be needed in karst areas prior to road construction. If solution voids are encountered, they will be sealed and filled to prevent subsequent roadway collapse.

4.10 Jurisdictional Stream Impacts

Complete avoidance of surface water systems is not possible within the project corridor given existing drainage characteristics. However, impact avoidance and minimization was a component of the alternate development and selection process (Section 2.0).

Surface water systems within the study area include ephemeral, intermittent, perennial streams, and man-made ditches. The jurisdictional water resources were delineated in accordance with USACE methodology and presented in the Wetland and Stream Delineation Technical Memorandum for the U.S. 67 EIS (Wetland TM) (MACTEC, 2003). The following presents a summary of the direct jurisdictional stream impacts (i.e., filling, culverts, etc.) as presented in the Wetland TM (MACTEC, 2003) followed by a discussion of potential indirect impacts to water quality and aquatic life. The direct impacts to jurisdictional ponds/lakes is included in the wetland impacts (Section 4.11).

4.10.1 Direct Stream Impacts

The Preferred Alternative will result in 51 jurisdictional stream crossings (bridged, culverted, or filled) (Figure 4-8). Of these, 32 are perennial streams and 19 are intermittent streams. The stream crossings are divided into transverse (approximately 90 degree) crossings and relocations.

There are seven jurisdictional stream channels that will require relocation due to the Preferred Alternative. The total length of relocated stream channel is approximately 3,541 m (11,619 ft). Of these impacts, approximately 2,168 m (7,113 ft) are perennial and 816 m (2,676 ft) are intermittent.

The total length of jurisdictional stream impacts (including transverse crossings and relocations) per county is as follows:

- Madison County = 1,309 m (4,293 ft);
- Wayne County = 3,905 m (12,812 ft); and
- Butler County = 916 m (3,004 ft).

Therefore, the total project stream impacts are 6,130 m (20,109 ft) or 6.13 km (3.8 mi).

Madison County

There are 11 jurisdictional stream crossings in Madison County (Figure 4-8 and Table 4-14). Four of these are perennial and seven are intermittent (Table 4-14). Most of these are tributaries of Twelvemile Creek. The Preferred Alternative crosses Twelvemile Creek at three locations. A Twelvemile Creek side channel [516 m (1,693 ft)] will be filled for the Preferred Alternative. Approximately 344 m (1,129 ft) of this side channel are intermittent and 172 m (564 ft) are perennial. The total Madison County stream impacts are 1,309 m (4,293 ft).

Wayne County

There are 30 jurisdictional stream crossings in Wayne County, comprised of 18 perennial and 12 intermittent streams (Figure 4-8 and Table 4-14). There are also five jurisdictional stream relocations:

- Tributary to Hubble Creek (WASC0110) – Perennial [approximately 152 m (500 ft)];
- Silva Stream (WASCO165) – Perennial [approximately 872 m (2,860 ft)];
- Tributary to St. Francis River (WASCO220) – Perennial [approximately 301 m (989 ft)];
- North Greenville Stream (WASCO231) – Perennial [approximately 297 m (947 ft)];
- Pleasant Valley Creek (WASC0270 and WASC0271) – Intermittent losing stream [approximately 558 m (1,830 ft); and
- Widows Creek (WASCO345) – Intermittent [approximately 472 m (1,550 ft).

The total Wayne County stream impacts are 3,905 m (12,812 ft).

Butler County

There are ten jurisdictional stream crossings in Butler County, each of which is perennial (Figure 4-8 and Table 4-14). Most are manmade or modified ditches. Approximately 376 m (1,234 ft) of the Magill Hollow stream (perennial) will be relocated by the Preferred Alternative. The total Butler County stream impacts are 916 m (3,004 ft).

Bridges are recommended, to the extent practical, for most perennial stream crossings since bridges reduce hydrology impacts and allow greater wildlife movement. Companion culverts or a culvert extension will also be used at stream crossings. The intent of the preferred alternative is to match the existing construction where practicable. However, during the design phase of the project, it may become necessary to modify a culverted crossing to a bridged crossing based on more detailed information.

Table 4-14. Jurisdictional Stream Crossings and Stream Relocations

Stream Crossing ID*	Station Reference (Metric)†	Description	Stream Type	Crossing Type	Length of Impacts		Watershed	
					m	ft	km^2	mi^2
Madison County								
MASC0010	A5+250	Twelvemile Creek	I	Culverted	76	250	4.8	1.86
MASC0020	D0+300	Twelvemile Creek	P	Culverted	76	250	14.19	5.48
MASC0030	D1+600	Twelvemile Creek	P	Bridged	91	300	21.63	8.35
MASC0031	D1+150 to D1+600	Twelvemile Creek Side Channel Relocation	P	Filled	516	1,693	21.63	8.35
MASC0050	D3+250	Griffon Hollow	P	Culverted	76	250	3.73	1.44
MASC0060	D3+750	Tributary of Twelvemile Creek	I	Culverted	76	250	0.7	0.27
MASC0080	D5+200	Tributary of Twelvemile Creek	I	Culverted	76	250	2.56	0.99
MASC0110	D8+200	Tributary of Twelvemile Creek	I	Culverted	46	150	2.43	0.94
MASC0170	D11+950	Tributary of Twelvemile Creek	I	Culverted	64	210	1.42	0.55
MASC0210	F1+150	Tributary of Twelvemile Creek	I	Culverted	134	440	1.76	0.68
MASC0230	H0+600	Tributary of Greenwood Branch	I	Culverted	76	250	2.02	0.78
Madison County Total					1,309	4,293		
Wayne County								
WASC0010	H4+400	Coon Creek	P	Culverted	91	300	3.76	1.45
WASC0020	H5+200	Cedar Creek	P	Bridged	46	150	42.89	16.56
WASC0030	H5+900	Wilmore Creek	P	Culverted	76	250	10.23	3.95
WASC0060	H10+000	Hunter Creek	P	Culverted	76	250	9.35	3.61
WASC0070	H10+750	Bennett Creek	P	Bridged	46	150	13	5.02
WASC0080	H11+200	Tributary of Bennett Creek	I	Culverted	55	180	1.58	0.61
WASC0090	H12+300	Tributary of St. Francis River	I	Culverted	98	320	1.37	0.53
WASC0110	H15+850 to H16+000	Tributary of Hubble Creek Relocation	P	Culverted	152	500	0.67	0.26
WASC0120	J0+250	Tributary of Hubble Creek	I	Culverted	43	140	1.5	0.58
WASC0140	J1+100	Hubble Creek	P	Bridged	46	150	13.16	5.08
WASC0155	J1+450	Hubble Creek	P	Bridged	15	50	13.16	5.08
WASC0160	J2+200	Peters Branch	P	Bridged	76	250	5.59	2.16
WASC0165	J2+250 to L0+000	Silva Stream Relocation	P	Filled	872	2,860	--	--
WASC0170	L0+300	Frazier Creek	P	Bridged	23	75	11.21	4.33
WASC0175	L0+450	Hubble Creek	P	Bridged	30	100	--	--
WASC0180	L1+400	Bounds Creek	P	Culverted	43	140	15.62	6.03
WASC0210	L3+500	Tributary of St. Francis River	I	Culverted	61	200	0.73	0.28
WASC0220	L5+050 to L5+200	Tributary of St. Francis River Relocation	P	Culverted	301	989	6.94	2.68
WASC0231	L5+600 to L5+850	North Greenville Stream Relocation	P	Filled/ Culverted	297	947	0.23	0.09
WASC0251	L9+650	St. Francis River	P	Bridged	46	150	2,821	1,089
WASC0260	L9+950	Pleasant Valley Creek	P	Bridged	61	200	18.36	7.09
WASC0261	L11+350	Pleasant Valley Creek**	I	Culverted	46	150	--	--
WASC0270	L12+100	Pleasant Valley Creek Relocation**	I	Culverted	320	1,051	12.3	4.75
WASC0271	L12+600	Pleasant Valley Creek Relocation**	I	Culverted	238	780	--	--
WASC0340	N1+200	Widows Creek at Smoot Hollow	I	Bridged	46	150	12.61	4.87
WASC0341	O0+275 to O0+700	Widows Creek Relocation	I	Filled	472	1,550	--	--
WASC0350	O0+700	Otter Creek	P	Bridged	46	150	125.69	48.53
WASC0370	O1+650	Wolf Run Creek	I	Culverted	61	200	8.62	3.33
WASC0380	O2+250	Goldbeck Hollow	I	Culverted	76	250	1.32	0.51
WASC0390	O4+350	Walker Hollow	I	Culverted	55	180	4.17	1.61
Wayne County Total					3,905	12,812		
Butler County								
BUSC0010	O9+750	Magill Hollow	P	Culverted	0‡	0	2.72	1.05
BUSC0011	O10+100 to	Magill Hollow Stream	P	Filled	376	1,234	--	--

Table 4-14. Jurisdictional Stream Crossings and Stream Relocations

Stream Crossing ID*	Station Reference (Metric)†	Description	Stream Type	Crossing Type	Length of Impacts		Watershed	
					m	ft	km^2	mi^2
	O10+250	Relocation						
BUSC0020	O11+150	Black River	P	Bridged	23	75	2,984.00	1,152.00
BUSC0042	Q1+100	Cane Creek	P	Bridged	23	75	432.13	166.86
BUSC0060	T0+400	Epps Ditch	P	Culverted	55	180	5.21	2.01
BUSC0070	T1+150	Epps Ditch	P	Culverted	55	180	6.09	2.35
BUSC0080	T2+800	Harviell Ditch	P	Bridged	46	150	23.72	9.16
BUSC0100	T5+300	Hart Ditch	P	Culverted	98	320	3.47	1.34
BUSC0120	U1+600	Neelyville Ditch	P	Culverted	91	300	1.89	0.73
				Bridged	46	150		
BUSC0140	U4+000	Byrnes Ditch	P	Culverted	104	340	2.49	0.25
Butler County Total					916	3,004		
Project Total					6,130	20,109		

* *MASC = Madison County stream crossing*
WASC = Wayne County stream crossing
BUSC = Butler County stream crossing
† *The station references (metric) are from the U.S. 67 Location Study Preliminary Plan/Profile (Tech D).*
** *Losing stream.*
‡ *Existing culvert.*

I = intermittent; P = perennial

Source: MACTEC, 2003.

4.10.2 Potential Water Quality and Aquatic Life Impacts

Indirect impacts to water quality and aquatic life will occur as a consequence of the construction and operation of the Preferred Alternative. Impacts to surface water resources may be short-term or long-term in nature. Short-term impacts are primarily related to the construction phase, whereas long-term impacts may be associated with both the construction and operational and maintenance phases. Potential impacts during the construction phase include overall habitat loss (drainage of impoundments, culverting a stream) as well as sedimentation and siltation effects. Sediment yields from highway construction during an average storm can be as much as 10 times greater than that of cultivated land and 200 times greater than that of grassed and forested lands [National Cooperative Highway Research Program, 1979].

Prominent impacts to water quality during construction are typically from sediment that is transported by stormwater runoff from construction areas and deposited into neighboring surface waters. Sediment deposition covers the existing substrate and fills the water column with suspended solids. Increased sedimentation and turbidity can adversely affect aquatic primary production, feeding, reproductive success, upstream migration, and spawning in certain species. The sedimentation impact to neighboring surface water resources has been documented as a short-term disturbance in many cases (Chishom and Downs, 1978; Barton, 1977; Reed, 1977). These studies report that fish and benthic macroinvertebrate communities may or may not recover quickly after the cessation of construction activities. The implementation of erosion control methods combined with the avoidance of fish spawning periods are sometimes effective in reducing adverse impacts. Water column turbidity and sedimentation rates associated with construction activities may return to baseline levels upon the completion of project construction.

Short-term increases in sedimentation and turbidity levels in local waterways may be expected during construction within the proximity of surface water resources. Precipitation events during the construction phase may increase sediment loads to adjacent waterways. Erosion and sediment control measures will be instituted to insure minimal impacts during all phases of the project. There will be strict adherence to

MoDOT's Temporary Erosion and Sedimentation Control procedures during the construction of the Preferred Alternative. Although best management practices for erosion control will be installed during construction activities, in compliance with MoDOT's National Pollutant Discharge Elimination System (NPDES) stormwater permit, there may be some short term and localized increases in turbidity following rainfall events.

Direct habitat alterations through culvert and bridge construction can adversely impact surface water resources. Bridge crossings generally entail less habitat alteration than culvert crossings. Culverts can cause long-term impacts because of quality habitat reduction. By modifying flow regimes, culverts can create conditions where stream flow velocities increase downstream of where a culvert is placed. Higher velocities can cause higher rates of erosion and bank cutting, which creates an increase in sediment load within a stream. This type of condition can alter a sediment-free gravel bottom to a silt substrate and therefore change stream community composition. A decrease in sensitive fish, macroinvertebrates, and mussel species may cause an increase in tolerant species. Waters (1995) noted that a substrate change from gravel riffles to sand and silt deposits caused a species shift from large macroinvertebrates to populations of small burrowing species less available to foraging fish.

Potential impacts that could result from stream channel relocation include direct mortality to aquatic species, alteration of hydraulic environment upstream and downstream, increased erosion and sedimentation, a decreased area of instream and near-channel stream cover, a reduced amount of shading, and an increase in water temperature. Field reconnaissance occurred at each of those streams that could potentially require some extent of straightening or channel relocation. Representatives from USACE may conduct field visits of the stream crossings where relocation may occur in order to confirm the preliminary determinations of the project team. Proposed jurisdictional stream mitigation for relocated streams will be performed in accordance with the Missouri Aquatic Resource Mitigation Guidelines (MDNR, 1999) and in coordination with the USACE and MDNR. Replacing relocated streams with, to the extent practicable, similar stream systems to reduce the noted impacts will be considered during the design phase.

MoDOT initially coordinated with USFS and other appropriate agencies to address potential hydrologic impact issues to streams in accordance with the Forest Plan. Although the increase in impermeable surface area will alter runoff volumes, actual changes in stream flow would vary with design specifications. Stream flow changes cannot be calculated in their entirety until the implementation of the project design phase.

According to MDC, best management practices that could be utilized to minimize impacts to aquatic environments during culvert placement or maintenance include:

1. Culverts should be sized and placed to maintain at least 6 inches of water during average annual discharges.
2. Culverts should be sized and placed to maintain water velocities less than 2 feet per second during annual average discharge.
3. Culvert design should allow for no decrease in elevation between the downstream end of culverts and the receiving water channel.

Roadway operation and maintenance activities are associated with long-term effects of increased motor vehicle traffic resulting in higher pollutant levels reaching surface water resources. Some anticipated pollutants associated with motor vehicle operations are toxic heavy metals, asbestos, slowly biodegradable petroleum products, rubber, deicing salt, etc. These pollutants can move through the environment as runoff, splash, and spray. Highway runoff on receiving streams can be minimized through design, construction, and operational features such as the use of vegetated drainage ditches, preservation of riparian areas, wet detention basins, erosion control features, and deicing control management. Studies have indicated that rural highways have generally lower pollutant levels in runoff, and as a result, a smaller potential for receiving water problems (FHWA-RD-88-008, 1990).

The observance of a number of construction management practices for maintaining water quality during project design and construction can help to minimize impacts to aquatic environments. The MDC has developed Best Management Practices (BMPs) to protect the integrity of Missouri's watercourses. "Management Recommendations for Construction Projects Affecting Missouri Streams and Rivers" is a publicly available document that addresses management recommendations for access and staging areas, riparian corridors, and stream/river banks and channels. The following activities can assist in reducing impacts to receiving waters:

1. Channel modification and stream relocation should meet the Missouri State Channel Modification guidelines.
2. Disturbed areas should be graded and seeded as soon as possible after earth moving and grading activities to minimize erosion.
3. Minimize disturbance to streambanks and riparian areas.
4. Normal stream flows should be maintained. In instances where temporary in-channel fills are necessary, culverts should be used to allow for normal flow conveyance.
5. Avoid construction activities in stream channels between March 15 and June 15 in an effort to minimize impact on spawning activities.
6. Take all necessary precautions to prevent petroleum products from entering the stream.

Similar to the aforementioned guidelines, mitigation measures have been developed to help reduce the affects of roadway construction on surface water resources. Erosion and sedimentation can be minimized by strictly following erosion and sedimentation control plans. The seasonal timing of construction activities is also important to minimize impacts to surface water resources. Construction during the dry season reduces the chance to encounter precipitation events thereby keeping runoff and sedimentation to a minimum. Minimizing construction activities in stream areas is the best way to reduce the impacts to water resources.

MoDOT must comply with the provisions of the MDNR storm water regulations found at 10 CSR 20-6.010 to protect water quality during highway construction. In accordance with the National Pollutant Discharge Elimination System (NPDES) requirements of the CWA, MoDOT also operates under the provisions of NPDES Permit No. MO-R 100007, a 5-year, general permit issued for road construction projects statewide. This permit limits the amount of pollutants that can leave a job site and requires the implementation of erosion controls (Appendix F)

The following BMPs will be used during all phases of the project construction:

- Seeding/planting with native vegetation, mulching and fertilization shall be accomplished within 3 days of final contouring;
- Onsite inspections shall be conducted;
- Machinery shall be kept out of the waterway as much as possible;
- Fuel, oil, other petroleum products, equipment, and any solid waste shall not be stored below the ordinary high water mark at any time or in the adjacent floodway beyond normal working hours;
- Precautions shall be taken for preventing release of wastes or fuel to streams and other adjacent waterbodies as a result of this operation;
- Petroleum products spilled into any waterbody shall be immediately cleaned up and disposed of properly;
- Clearing of vegetation/trees shall be the minimum necessary to accomplish activities; and
- Impacts to riparian areas and banks shall be restored to a stable condition to protect water quality as soon as possible.

4.11 Jurisdictional Wetland Impacts

4.11.1 Alternatives Analysis

The avoidance and minimization of impacts to wetlands was a major consideration during the evaluation of locating the Preferred Alternative (Section 2.0). Study alternates were refined and evaluated with a goal of avoiding and minimizing impacts to wetland resources to the extent practicable. As Section 2.0 presents, numerous environmental and transportation/engineering variables were also considered during alternate development and evaluation.

Upon selection of a Preferred Alternative, jurisdictional wetlands within the proposed right of way were delineated in accordance with the USACE 1987 Wetland Delineation manual. This delineation effort was performed primarily in August and September 2002 by MACTEC personnel. The 1997 aerial photography of the Preferred Alternative was used in the field to mark wetland plot locations and wetland/stream boundaries. Many of the boundaries were measured from a reference point with a wheel tape or other means. These designations were then digitized from the field photographs into a GIS format, which was used to generate the figures and subsequent quantifications.

The delineation effort also included coordination with the USACE St. Louis District. This involved several field visits with USACE personnel to obtain concurrence with both wetland and stream jurisdictional determinations (April 13, 1999 and September 6 and 7, 2001). In addition, an office meeting was held with the USACE and MoDOT on August 9, 2002 to discuss the U.S. 67 wetland delineation effort. Since the issuance of the Draft EIS, the wetland impacts by the Preferred Alternative have been reduced due to wetland delineation efforts and the SWANCC ruling

4.11.2 Direct Wetland Impacts

Wetlands within the study corridor consist of palustrine forested (PFO), palustrine emergent (PEM), palustrine scrub-shrub (PSS) wetlands, farmed wetland (FW), and palustrine unconsolidated bottom (PUB). A description of these resources was presented in Section 3.8. The jurisdictional water resources were delineated in accordance with USACE methodology and presented in the Wetland TM (MACTEC, 2003). The following presents a summary of the direct jurisdictional wetland impacts (fill, culverts, bridges), as presented in the Wetland TM, followed by a discussion of potential indirect impacts.

The total wetland acreage impacted by the Preferred Alternative equals approximately 32.4 ha (80.1 ac). The predominant impacted wetland type was PFO, which comprised 21.8 ha (53.9 ac) or approximately 67 percent of the total impacted wetland acreage. The wetland type least impacted was PUB, comprising 0.59 ha (1.46 ac) or 1.8 percent of the total impacted wetland acreage. The areas that will be impacted for each of the five wetland types that occur along the Preferred Alternative are presented in Table 4-15.

Table 4-15. Total Wetland Impacts Per Wetland Type Per County

Wetland Type	Madison		Wayne		Butler		Total All Counties		Percent Total
	ha	ac	ha	ac	ha	ac	ha	ac	
FW	0.14	0.34	0.36	0.89	0.45	1.11	0.95	2.34	2.9
PUB	0.00	0.00	0.17	0.42	0.42	1.04	0.59	1.46	1.8
PEM	0.10	0.25	0.42	1.04	2.86	7.07	3.38	8.36	10.4
PSS	0.02	0.06	2.08	5.16	3.59	8.86	5.69	14.08	17.6
PFO	0.17	0.42	10.66	26.33	10.98	27.14	21.8	53.89	67.3
Total	0.43	1.07	13.69	33.84	18.30	45.22	32.41	80.13	100
Source: MACTEC, 2003.									

The acreage impacted for each wetland by the Preferred Alternative is presented in Table 4-16.

Table 4-16. Summary of Jurisdictional Wetland Impacts and Functional Assessment

Wetland ID*	Wetland Classification	Wetland Area Impacted		Hydrologic Functions	Water Quality Functions	Wildlife Functions	Habitat Connection	Land Owner†
		ha	ac					
Madison County								
MCWL14	PFO	0.02	0.04	High	High	High	High	MTNF
MCWL16	PFO	0.04	0.11	High	Medium	Med-Low	High	MTNF
MCWL28	FW	0.10	0.24	Low	Low	Low	Low	Private
MCWL30-PEM	PEM	0.02	0.05	High	Medium	High	Good	Private
MCWL30-FW	FW	0.04	0.10	Low	Low	Low	Low	Private
MCWL38	PFO	0.11	0.27	High	High	High	High	Private
MCWL40	PEM	0.08	0.20	High	High	High	High	Private
MCWL56	PSS	0.02	0.06	High	High	Medium	Low	Private
Madison County Total		**0.43**	**1.07**					
Wayne County								
WCWL08	PEM	0.01	0.03	High	Low-Med	Low-Med	High	Private
WCWL14	PFO	0.03	0.08	High	High	High	High	Private
WCWL19	PSS	0.01	0.02	High	Med-Low	Low	Low	Private
WCWL22-PFO	PFO	0.23	0.58	High	Med-High	Med-High	High	Private
WCWL22-PEM	PEM	0.12	0.29	High	Med-High	Med-High	High	Private
WCWL24	PEM	0.17	0.42	High	Medium	Medium	Low	Private
WCWL27	FW	0.03	0.07	High	Low	Low	Low	Private
WCWL28	PSS	0.04	0.11	High	High	High	High	Private
WCWL33	PFO	0.17	0.41	Medium	Med-High	Medium	High	USACE
WCWL34	PFO	0.04	0.10	High	High	High	High	USACE
WCWL35	PFO	0.87	2.14	High	High	High	High	USACE
WCWL36	PFO	0.07	0.15	High	High	High	High	USACE
WCWL38	PFO	0.18	0.45	High	High	High	High	USACE
WCWL40	PFO	0.54	1.35	High	High	High	Medium	USACE
WCWL44-PFO	PFO	3.66	9.04	High	High	High	High	USACE
WCWL44-FW	FW	0.33	0.82	Medium	Low	Low	Low	USACE
WCWL44-PEM	PEM	0.09	0.23	Medium	Med-Low	Med-Low	Low	USACE
WCWL46-PSS	PSS	0.19	0.47	High	High	High	High	USACE
WCWL46-PFO	PFO	2.73	6.74	High	High	High	High	USACE
WCWL47	PFO	0.21	0.52	Medium	Medium	Med-Low	Med-Low	USACE
WCWL48-PUB	PUB	0.09	0.23	Medium	Medium	Medium	High	USACE
WCWL48-PFO	PFO	0.38	0.94	Medium	Medium	Medium	High	USACE
WCWL50B	PSS	0.45	1.12	Medium	Medium	Low-Med	High	USACE
WCWL50D	PFO	0.07	0.17	Medium	Medium	Low-Med	High	USACE
WCWL52	PUB	0.08	0.19	Medium	Medium	Medium	High	Private
WCWL54-PEM	PEM	0.03	0.07	Medium	High	High	High	USACE
WCWL54-PFO	PFO	1.32	3.27	Medium	Medium	Med-High	High	USACE
WCWL55B	PSS	0.50	1.24	Medium	High	High	High	USACE
WCWL55C	PFO	0.16	0.39	Low	Low	Medium	Medium	USACE
WCWL56	PSS	0.89	2.20	High	Medium	High	Medium	USACE
Wayne County Total		**13.69**	**33.84**					
Butler County								
BCWL01-PEM	PEM	0.54	1.33	High	High	High	High	MTNF
BCWL01-PFO	PFO	1.75	4.31	High	High	High	High	MTNF
BCWL02	PFO	0.12	0.31	Low	Low	Low	Low	MTNF
BCWL04	PFO	0.35	0.86	Medium	Low-Med	Low-Med	Low	Private
BCWL13-PEM	PEM	0.39	0.96	High	High	Medium	Medium	Private
BCWL13-PFO	PFO	0.81	2.01	Medium	Medium	Medium	High	Private
BCWL15-C	PFO	0.11	0.27	Low-Med	Medium	Low	Medium	Private
BCWL15-D	PEM	0.22	0.54	High	High	Medium	High	Private
BCWL38-PEM	PEM	0.30	0.74	Medium	Medium	Medium	High-Med	Private
BCWL38-PFO	PFO	1.60	3.96	High	High	High	High	Private
BCWL38-PSS	PSS	0.05	0.12	Medium	Medium	Medium	High	Private
BCWL41	PUB	0.36	0.89	Medium	Low-Med	High-Med	Med-High	Private
BCWL42	PSS	1.87	4.62	Medium	Medium	High	High	Private
BCWL43-PEM	PEM	0.10	0.26	High	High	Medium	High	Private
BCWL43-PSS	PSS	1.35	3.33	High	High	High	High	Private
BCWL44-PEM	PEM	0.36	0.9	High	Medium	Medium	Medium	Private
BCWL44-FW	FW	0.45	1.11	Medium	Low	Low	Low	Private
BCWL46-PSS	PSS	0.32	0.79	High	Medium	Medium	High	Private

Table 4-16. Summary of Jurisdictional Wetland Impacts and Functional Assessment

Wetland ID*	Wetland Classification	Wetland Area Impacted		Hydrologic Functions	Water Quality Functions	Wildlife Functions	Habitat Connection	Land Owner†
		ha	ac					
BCWL46-PEM	PEM	0.18	0.45	High	High	Medium	Low	Private
BCWL48	PFO	0.36	0.88	Medium	Medium	Medium	Med-Low	Private
BCWL48-1	PFO	0.03	0.09	Low	Low	Medium	High	Private
BCWL50B	PFO	0.39	0.96	Medium	Medium	Low	Low	Private
BCWL51-PFO	PFO	2.79	6.90	High	High	High	High	Private
BCWL51-PEM	PEM	0.30	0.73	Medium	Medium	Medium	High	Private
BCWL53	PFO	1.62	4.01	High	High	High	High	Private
BCWL54	PFO	0.34	0.85	Medium	Medium	Medium	Medium	Private
BCWL56A	PFO	0.27	0.67	Medium	Low	Medium	Medium	Private
BCWL56B	PFO	0.23	0.56	Low	Low	Low	Medium	Private
BCWL57	PFO	0.16	0.39	Low	Medium	Low	Low	Private
BCWL61	PEM	0.39	0.96	Low	Medium	Low	Low	Private
BCWL62B	PFO	0.05	0.11	Low	Medium	Medium	Medium	Private
BCWL62C	PEM	0.08	0.20	High	High	Medium	Medium	Private
BCWL106A	PUB	0.06	0.15	Low	Low	Med-High	Low	Private
Butler County Total		**18.30**	**45.22**					
Project Total		**32.41**	**80.13**					

Note: County and project total wetland impacts are based on the Geographical Information System (GIS) quantifications.

* *MCWL = Madison County Wetland*
WCWL = Wayne County Wetland
BCWL = Butler County Wetland

† *USACE = U.S. Army Corps of Engineers.*
MTNF = Mark Twain National Forest

Source: MACTEC, 2003.

Madison County

Seven wetlands in Madison County are impacted by the Preferred Alternative (see Table 4-16). The total area of wetland impact is small at 0.43 ha (1.07 ac).

Three of the wetlands are classified as PFO (MCWL14, MCWL16, and MCWL38), two are classified as PEM (MCWL30 and MCWL40), one is classified as PSS (MCWL56) and one is classified as FW (MCWL28). MCWL30 has both PEM and FW components. Most of the wetlands are associated with springs or diffuse groundwater discharge. Only MCWL16 appears to have surface water runoff as a sole hydrology source.

Cold Spring and one of the Twelvemile Springs (MCWL30) will be directly impacted by the Preferred Alternative. Part of Geronimo Spring (MCWL40) will be impacted. In addition, several springs and fens (e.g., Lampher Spring, Self Fen) are located in proximity to the proposed right of way. Indirect impact, such as alterations in surface water and groundwater hydrology to the adjacent springs and fens will be considered in the design phase.

Wayne County

The Preferred Alternative impacts 24 wetlands in Wayne County. The total area of wetland impacts is 13.69 ha (33.84 ac) (see Table 4-16). Most of the impacts are to PFO wetlands with decreasing amounts of PSS, PEM, FW, and PUB impacts, respectively (see Table 4-15).

Most of the wetland impacts are associated with two St. Francis River floodplain areas: (1) North Greenville (WCWL40 and WCWL44); and (2) the Old Greenville Recreation Area (WCWL46, WCWL47, and WCWL48). The North Greenville wetland impacts [4.62 ha (11.44 ac)] and the Old Greenville Recreation Area wetland impacts [3.60 ha (8.90 ac)] combined total [8.22 ha (20.34 ac)]. This comprises approximately 60 percent of the Wayne County wetland impacts. The predominant impacts are to PFO wetlands developed in depressional areas, overflow channels, or relict scars on the St. Francis

River floodplain. Two PEM wetland (plots WC44I and WC44V), one FW (plot WC44H), one PSS (plot WC46A), and one PUB (plot WC48A) wetland(s) are also impacted in the Greenville area.

Wayne County wetland impacts are also associated with Cedar Creek, Hubble Creek, Bounds Creek, Pleasant Valley Creek, and Otter Creek. Again, the dominant impacts are to PFO wetlands. The largest PSS impacts are associated with Pleasant Valley Creek (WCWL50B) and Otter Creek (WCWL55 and WCWL56). Box Spring (WCWL56), a spring fed lake and wetland complex, will be impacted near Otter Creek. One PUB wetland (WCWL52) will be impacted adjacent to Widows Creek at Smoot Hollow.

Butler County

The Preferred Alternative impacts 24 wetlands in Butler County. The total area of wetland impacts is 18.30 ha (45.22 ac) (see Table 4-16) comprised predominantly of PFO, with lesser amounts of PSS, PEM, FW, and PUB (see Table 4-15). The presentation of the Butler County wetland impacts has been divided into three sections: Magill Hollow and Black River, Cane Creek, and the Mississippi lowlands (Sections 5.1 through 5.3).

The Magill Hollow (BCWL01 and BCWL02) wetland impacts total 2.41 ha (5.95 ac) and are comprised of PFO and PEM wetlands. The Black River crossing involves minimal PFO (BCWL04) wetland impacts [0.35 ha (0.86 ac)]. The Cane Creek crossing involves PFO and PEM wetland impacts (BCWL13 and BCWL15) totaling 1.53 ha (3.78 ac).

Most of the Butler County wetland impacts are within the Mississippi lowlands, which have low topographic relief drained by manmade ditches. The principal impacts involve the following wetlands: BCWL38, BCWL42, BCWL43, BCWL44, BCWL51, and BCWL53. Wetland BCWL38 [1.95 ha (4.82 ac)] is dominated by PFO, but also includes PEM and PSS components. Wetlands BCWL42 and BCWL43 are contiguous with a total impact of 3.32 ha (8.21 ac). In general, this wetland complex consists of "old field" type PSS, but also includes a small, higher quality PEM component. Wetland BCWL44 consists of PEM and FW components with a total impact of 0.81 ha (2 ac). Wetlands BCWL51 and BCWL53 are located along the Neelyville Ditch at State Road (SR) 142, and are dominated by PFO with a total impact of 4.71 ha (11.64 ac).

Land Owners

The owners of the impacted wetlands are presented in Table 4-16. The USACE-owned wetlands impacted total 12.97 ha (32.05 ac) and the MTNF-owned wetlands impacted total 2.47 ha (6.10 ac). No impacted wetlands are located on MDC land. The majority of wetland impacts are on private land.

4.11.3 Indirect Wetland Impacts

Indirect physical and biological impacts will occur to local wetland systems as a consequence of the construction and operation of the Preferred Alternative. Potential physical impacts include increased turbidity, sedimentation, accumulation of chemical pollution, alteration of local water tables, changes in periodicity, and changes in water retention. Resulting impacts to biological communities may involve plant community compositional shifts, alteration of local faunal assemblages, changes in productivity and biomass, mortality to aquatic species, and potential barriers to wildlife movement.

The relative magnitude of impact to each of these wetlands is dependent upon the manner in which they are crossed. Wetland crossings by bridging will have the least physical and biological impact. Bridge construction, however, does require the placement of bridge supports and the clearing of vegetation. This activity will result in a net loss of wildlife habitat and primary productivity through some habitat modification, shading, and decreased shoreline stability. In contrast, filled wetlands may result in the disruption of wetland hydrology; may pose a barrier to faunal movement; and may result in an alteration of sediment retention, nutrient retention and removal, and flood storage capacity.

Potential effects to wetland recharge areas (watersheds) is another type of indirect impact to wetlands. Size reduction or alteration, or elevation/gradient modifications of wetland watersheds will result in a change in hydrologic patterns that can either increase or decrease the amount and frequency of saturation or flooding of a given wetland. Potential impacts to wetland watersheds may occur as a result of the constriction of flow through culverts during wet seasons. In addition, drainage characteristics of the roadway and associated ditch system may result in increased conveyance rates and an alteration of surface and subsurface flow patterns.

In those wetland watersheds where highway design and construction results in unanticipated changes in wetland hydrology, modifications of the affected area or offsite mitigation may be implemented to avoid substantial loss of wetland functions and functional capacity.

4.11.4 Functional Assessment

A qualitative wetland functional assessment was performed as part of the wetland delineation (MACTEC, 2003) and is presented in the following text and Table 4-16.

Wetland functions can be divided into hydrologic, water quality, and wildlife habitat functions.

Hydrologic Functions

- Short- and long-term water storage,
- Subsurface water storage,
- Groundwater flow or discharge moderation,
- Dissipation of energy (erosion control),

Water Quality Functions

- Cycling of Nutrients,
- Removal of Elements and Compounds,
- Retention of Particulate (e.g. sediment),
- Export of Organic Carbon.

Wildlife Habitat Functions

- Maintenance of Plant Communities, and
- Maintenance of Animal Communities.

Various techniques have been used for assessing wetland functions: Missouri Wetland Evaluation Technique (MoWET) (MDC and USDA, 1990), and the HGM approach. (USACE, 1995a and 1995b). Currently there is no standard or required approach for performing functional assessments in Missouri (USACE personal communication, 2002). The HGM assessment requires detailed site-specific information that is compared to a regional reference wetland (USACE, 1995a). Currently there is no regional reference for Missouri wetlands. A regional guidebook for assessing the functions of low gradient, riverine wetlands has been developed for western Kentucky (USACE et al., 1999). There are also guidelines for other regions.

Several of the parameters can not be determined (e.g., nutrient cycling, organic carbon export, etc.) without detailed site-specific information and long-term monitoring that is not available. Several of the other parameters (water storage, wildlife habitat, etc.) can only be evaluated in qualitative terms. As an example, a wetland located in a floodplain with the presence of watermarks on trees and sediment deposits can be used to infer that the wetland has high surface water storage and water quality improvement functions. A wetland with a variety of community types (i.e., open water, emergent, and forested wetlands), and high plant diversity can be used to infer that the wetland has a high wildlife functional value.

Given the level of site-specific information needed to perform a quantitative functional assessment, a practical wetland assessment for the Preferred Alternative focuses on key functions that can be rated qualitatively (e.g., low, medium, high). The qualitative terms (low, medium, and high) are relative to the

other wetlands evaluated in this study. As an example, a wetland which is defined as having high hydrologic functions is based solely on a qualitative comparison to the other wetlands mapped in the study corridor. Key wetland functions considered are as follows:

- Hydrologic functions (water storage and flood attenuation);
- Water quality functions (retention of sediment, etc.);
- Wildlife habitat functions; and
- Connection to other wetlands, riparian corridors, or natural areas (habitat connection).

A qualitative assessment for each of the U.S. 67 impacted wetlands is presented in Table 4-16.

4.11.5 Wetland Impact Avoidance, Minimization, Rectification and Compensation

The avoidance of wetland resources was a consideration in the development and selection of the Preferred Alternative. According to Section 404 of the CWA and Executive Order 11990, unavoidable impacts to wetlands must be mitigated. Throughout the planning process, wetland systems were avoided wherever practical. The four sequential steps to mitigate highway-related impacts to wetlands include (1) impact avoidance, (2) impact minimization, (3) impact rectification, and (4) impact compensation.

Considerable effort was utilized to avoid and minimize impacts to wetlands including wetlands greater than 0.7 ha (2 ac) in size. Impacts to wetlands and other waters of the United States associated with the Preferred Alternative will be avoided to the extent practicable.

Impact avoidance is not always possible due to the absence of other feasible alternatives. Wetland impact avoidance and minimization was a consideration throughout the alternative development and evaluation processes. During the analysis of the preliminary alternatives, those alternatives that impacted the greatest number or total acreage of wetlands were eliminated or modified to the extent practical. Many wetland crossings along the U.S. 67 Preferred Alternative are as perpendicular as possible, thus demonstrating the greatest avoidance possible while also attempting to minimize displacement in residential and commercial areas and design constraint.

A second potential avenue of mitigation is impact minimization, which is applicable to other wetland crossings. MoDOT will reduce impact magnitude can be accomplished by proper scheduling of construction activities in wetlands during dry months to the extent practicable and by strict adherence to the MoDOT's Temporary Erosion and Sedimentation Control Program. Proper scheduling of construction can reduce erosion, sedimentation, and their associated impacts on aquatic resources. Additionally, wetland crossings can be designed to be the least disruptive to aquatic and wetland communities (e.g., perpendicular crossings, bridging, culvert design, etc.). Further avoidance and minimization to wetlands will be considered during the design phase.

Roadway design will include measures to minimize potential effects to wetland recharge areas. In areas of wetland crossings, culverts will be sized to allow the free flow of water to maintain hydrologic connection. In areas where adjacent wetlands are supported by surface water runoff, the runoff from the roadway will be routed to maintain the hydrology within the wetland system (to the extent practical). The design phase will consider methods to reduce indirect hydrologic impacts to wetlands such as directing stormwater flow through vegetated drainageways, energy dissipaters, and/or sedimentation or detention basins.

Minimization measures to reduce pollutant loading to wetlands may include the design of curbs, gutters, and inlets to enhance the retention of grit and other particles by diverting roadway runoff through grassed waterways and buffer strips prior to their discharge to nearby wetlands.

Some construction-related impacts may be rectified after the completion of the major construction phases (impact rectification). Such mitigative measures include the regrading of areas to natural contours, and the

seeding and planting of disturbed areas. These activities may restore to pre-construction condition the areas peripheral to the right of way.

Impact compensation is the fourth available avenue of mitigation. This process may involve wetland enhancement, wetland replacement, or wetland restoration. While the former mitigation alternative may enhance wetland functional value, it does not replace the net loss of wetland acreage and functional value in a given region or system. It is, therefore, proposed that wetland restoration be utilized to compensate for irretrievable losses of wetland resources. MoDOT will develop and implement the mitigation in consultation with USACE, MDNR, and other appropriate agencies involved in the regulatory process.

For unavoidable impacts, onsite mitigation (as close to the impacted wetland as possible) is preferred. However, mitigation for linear projects with impacts in several watersheds may be done at one or a limited number of mitigation sites. Several areas on the St. Francis River floodplain and one area on the Otter Creek floodplain could qualify as suitable wetland mitigation sites. Wetland impacts on USACE property will be mitigated on USACE property (preferably within the same watershed). A conceptual wetland mitigation plan has been prepared in conformance with the State of Missouri Aquatic Resource Mitigation Guidelines, and is included in the Wetland TM (available upon request) (MACTEC, 2003).

4.11.6 FHWA Only Practicable Alternative Finding – Wetlands

In accordance with Executive Order 11990, the FHWA ensures that this project avoids to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands.

The Preferred Alternative would affect as much as 32.41 ha (80.13 ac) of wetlands. As discussed in this Final EIS, there are no other practicable alternatives to the proposed action that would adequately serve the purpose and need of the project. Following coordination with the USACE and other resource agencies, MoDOT will compensate for unavoidable wetland losses by restoring, creating, and enhancing wetlands in a manner that will ensure no net loss of function or acreage as a result of this project. The compensatory mitigation site will be held in public ownership, or in an ownership arrangement suitable to both the USACE and MDNR (if a Memorandum of Understanding between MoDOT and MDNR, Management of Wetland Mitigation Lands Agreement, or a similar agreement is in force at time of the Section 404 permit authorization), and in a manner consistent with Section 4 of Executive Order 11990.

Based upon the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such action.

4.11.7 Executive Order 11990—Wetlands

Agency compliance with Executive Order 11990 regarding the protection of wetlands is a requirement (Table 4-17). This order stipulates the minimization of loss or degradation of wetlands and the preservation and enhancement of the natural and beneficial values of wetlands. The federal agency is also required to consider all practicable measures to minimize harm to wetlands and should provide opportunity for early public review of the Proposed Action. Consideration should be given to public health, safety, and welfare and to the maintenance of wetland functions.

Attempts to avoid and minimize impacts to wetlands were integral aspects of the overall planning process and study alternate development and evaluation phases. For example, initial build alternates were developed to avoid and minimize encroachments of recorded wetland areas, while several study alternates were eliminated from further consideration during the planning process that resulted in a greater impact to wetlands. In all cases, minimization of potential impacts will be accomplished by using approved temporary erosion and sedimentation control measures.

Table 4-17. Executive Order 11990 – Wetland Crossings

Station	Wetland No.	Wetland Type	Estimated Impact Type	Area of Impact		Crossing Considerations
				Hectares	Acres	
Madison County Wetlands (MCWL)						
D 0+250	14	PFO	F/C	0.02	0.04	This wetland is next to Cold Spring and Twelvemile Creek. Shifting the alignment west of the existing highway would result in more detrimental environmental impacts (several springs, one being Lampher Spring), a small fen, and other forested wetlands.
D 1+500	16	PFO	F/B	0.04	0.11	Shifting the alignment to the west side of U.S. 67 would impact Twelvemile Creek.
D 9+450 to D 9+600	28	FW	F	0.10	0.24	Avoidance by shifting is not practicable. If shifted east, the alignment would impact both Sanders and Settle Cemeteries. If shifted west, the alignment would impact greater area of the emergent wetland.
D 10+200	30	PEM/FW	F	0.04	0.10	Avoidance by shifting the alignment to the east would result in an impact to Settle Cemetery. Avoidance by shifting the alignment to the west would result in increased impacts to the emergent wetlands as well as potential impacts to Twelvemile Creek. Therefore, shifting the alignment is not practicable. This wetland is fed by a spring, which should be culverted to allow for uninterrupted flow from the spring outlet.
D 13+300 and D 13+500	38	PFO	F	0.11	0.27	Shifting the alignment west is not practicable because it would result in more severe impacts to the scrub shrub wetland and Twelvemile Creek. Shifting to the east would result in an impact to Mt. Pisgah Cemetery.
D 13+725	40	PEM	F	0.08	0.20	This wetland is fed by a spring and the flow should be uninterrupted; therefore a culvert should be installed to accommodate this flow. Avoidance by shifting the alignment is not practicable because of the presence of Mt. Pisgah Cemetery on the east and Twelvemile Creek on the west.
H 1+400	56	PSS	F	0.02	0.06	Shifting the alignment to the east would impact Greenwood Branch.
Wayne County Wetlands (WCWL)						
H 5+250	8	PEM	F	0.01	0.03	It is not practicable to shift the alignment at this location to avoid the wetland. If shifted west, the alignment would have significant greater impacts to Cedar and Wilmore Creeks. If shifted east, the alignment would eliminate the use of the existing highway as a service road, which would result in a loss of transportation continuity.
H 12+300	14	PFO	F	0.03	0.08	The terrain on either side of this impact is severe making an alignment shift to either side of the impact impracticable. An alignment shift would result in more significant environmental impacts.
H 16+200	19	PSS	F	0.01	0.02	These wetlands cannot be avoided by shifting the alignment. An eastern shift would result in impacts to Hubble Creek. A western shift would result in impacts to a spring and a fen immediately to the west, which would incur more damaging adverse impacts.
H 16+450 to H 16+950	22	PFO	F	0.35	0.87	Avoidance by shifting the alignment is not practicable. An eastern shift would result in more damaging environmental impacts to Hubble Creek. A western shift would result in a loss of continuity in the transportation system by introducing new crossings of existing U.S. 67. It would also result in a business displacement (Gooseneck SEMO).
J 0+050	24	PEM	F	0.17	0.42	Avoidance by shifting the alignment is not practicable. An eastern shift would result in more damaging environmental impacts to Hubble Creek. A western shift would result in an impact to Montgomery Church and Cemetery.
J 0+600	27	FW	F	0.03	0.07	
	28	PSS	F	0.04	0.11	

Table 4-17. Executive Order 11990 – Wetland Crossings

Station	Wetland No.	Wetland Type	Estimated Impact Type	Area of Impact		Crossing Considerations
				Hectares	Acres	
L 0+350	33A	PFO	F	0.17	0.41	Avoidance by shifting the alignment to the east is not practicable and would result in more damaging impacts to the community of Silva. A western shift would result in more damaging impacts to Hubble Creek.
L 0+350	34	PFO	F	0.04	0.10	
L 1+300 to L 1+400	35	PFO	F	0.87	2.14	Avoidance by shifting the alignment is not practicable and would result in more damaging environmental impacts. The Wappapello Lake 100-year flood pool lies to the west and a new electrical substation lies to the east at CR220.
L 1+450	36	PFO	F	0.07	0.15	
L 3+400	38	PFO	F	0.18	0.45	Avoidance by shifting the alignment is not practicable as a western shift would impact the Wappapello Lake 100-year flood pool. An eastern shift results in more damaging environmental impacts from road cuts in severe terrain.
L 5+000	40	PFO	F/C	0.54	1.35	A portion of wetlands 40 is culverted to accommodate hydraulics and a portion of wetland 44 is bridged to accommodate the proposed CR221 interchange. The rest of the wetlands are filled. No alignment shifts are practicable in this area. An eastern shift would result in severe impacts to Greenville. A western shift would result in damaging impacts to Wappapello Lake and would potentially require additional bridges over the lake. Avoidance by bridging would be too costly and would still result in some level of impact especially during construction.
L 6+150	44	PFO	F	3.66	9.04	
		FW	F	0.33	0.82	
		PEM	F	0.09	0.23	
	15	PSS	F	0.19	0.47	Avoidance of the Old Greenville Recreation Area.
		PFO	F	2.73	6.74	
L 9+100 to L 9+500	47	PFO	F	0.21	0.52	Maintenance of St. Francis River bridge alignment
L 9+625	48	PUB	B	0.09	0.23	Maintenance of the St. Francis River bridge alignment.
		PFO	B	0.38	0.95	
L 9+950 to L 10+550	50B	PSS	F	0.45	1.12	Avoidance by shifting the alignment is not practicable. An alignment shift to the east would result in impacts a grave of an unknown Civil War soldier and severe terrain. A western shift would result in additional impacts to the Pleasant Valley Creek floodplain.
						Avoidance by shifting the alignment to the west is not practicable primarily due to increased damaging impacts to the Wappapello Management Area. Additionally, an eastern shift would result in more impacts to the forested wetland and Otter Creek.
	52	PUB	F	0.08	0.19	
O 1+500 to O 1+700	54	PEM	F/C	0.03	0.07	
O 1+700 to O 1+850		PFO	F/C	1.32	3.27	
O 1+300 to O 1+600	55B	PSS	F/C	0.50	1.24	
	55C	PFO	F	0.16	0.39	

Table 4-17. Executive Order 11990 – Wetland Crossings

Station	Wetland No.	Wetland Type	Estimated Impact Type	Area of Impact		Crossing Considerations
				Hectares	Acres	
O 1+950 to O 2+100	56	PSS	F	0.89	2.20	Avoidance by shifting the alignment to the west is not practicable because it would result in more damaging environmental impacts to forested area which is part of the Wappapello Management Area. An alignment shift to the east would result in more damaging impacts to Goldbeck Hollow and the Wappapello Management Area.
Butler County Wetlands (BCWL)						
O 10+350	01	PFO	F	1.75	4.31	Shifting the proposed alignment to avoid these wetlands is not practicable as the alignment in this area is set by the Black River crossing which is approximately 1 km (0.6 mi) south. The Preferred Alternative will utilize the existing crossing in an effort to minimize impacts to the river.
		PEM	F	0.54	1.33	
	02	PFO	F	0.12	0.31	Refer to wetland BCWL-13.
O 11+950	04	PFO	F	0.35	0.86	Shifting the proposed alignment to avoid these wetlands is not practicable because the alignment in this area is set by the Black River crossing which is approximately 0.75 km (0.46 mi) north.
Q 0+250 to Q 0+700	13	PEM	F	0.39	0.96	Avoidance of these impacts by shifting the alignment are not practicable because the proposed alignment is set by the Cane Creek crossing.
		PFO	F	0.81	2.01	
	15	PFO	F	0.11	0.27	Refer to wetland BCWL-13.
		PEM	F	0.22	0.54	
R 3+850 to R 4+050	38	PFO	F	1.60	3.96	The alignment is set through this area based on the presence of the Fellowship Southern Baptist Church of Neelyville. It is not practicable to shift the alignment east because of this church. A shift further west would add length to the route, which would result in a loss of transportation efficiency.
R 3+900 to R 4+025		PEM	F	0.30	0.74	
		PSS	F	0.05	0.12	
T 1+000 to T 1+050	41	PUB	F	0.36	0.89	Avoidance by shifting the alignment is not practicable. A western shift would result in severances to farm ground and damaging impacts to Epps Ditch. An eastern shift would result in additional crossings of the existing highway.
T 3+075 to T 3+200	42	PSS	F	1.87	4.62	Avoidance by shifting the alignment is not practicable. A western shift would result in additional environmental impacts to large tracts of forested wetland. An eastern shift would result in additional crossings of the existing highway.
T 3+575	43	PEM	F	0.10	0.26	
T 3+575 to T 3+825		PSS	F	1.35	3.33	
T 4+075 to T 4+200	44	PEM	F	0.36	0.9	
		FW	F	0.45	1.11	
T 5+100 to T 5+225	46	PEM	F/C	0.18	0.45	Avoidance by shifting the alignment is not practicable. A western shift would result in farm ground severances. An eastern shift would result in additional crossings of the existing highway and impact to the Lakeview Golf Course and potentially additional impacts to forested wetlands on the east.
T 5+375		PSS	F	0.32	0.79	

Table 4-17. Executive Order 11990 – Wetland Crossings

Station	Wetland No.	Wetland Type	Estimated Impact Type	Area of Impact		Crossing Considerations
				Hectares	Acres	
T 6+250	48A	PFO	F	0.36	0.88	Avoidance by shifting the alignment is not practicable. A western shift would result in additional agricultural severances. An eastern shift would result in additional crossings of the existing highway an impact to the Lakeview Golf Course.
U' 0+400	48-1	PFO	F	0.03	0.09	Avoidance by shifting the alignment is not practicable and would result in additional impacts to other areas of this wetland to the west. An eastern relocation would result in a change in the placement of the interchange at Route 142 which has been established in order to avoid impacts to an archaeological site and Neelyville.
U' 0+850	50B	PFO	F	0.39	0.96	Avoidance by shifting the alignment is not practicable. A western shift would result in a loss of transportation efficiency with the proposed interchange location at Route 142. An eastern shift would result in additional impacts, and potential residential and commercial property.
U' 1+350 to U' 1+600	51	PFO	F/C	2.79	6.90	The location of the alternate U' has been established to avoid impacts to an archaeological site and the community of Neelyville. A shift to the west would result in impacts to the archaeological site. A shift to the east would result in additional displacements to residential and commercial properties along existing U.S. 67. Therefore, a shift in the alignment to avoid these wetlands is not practicable.
		PEM	F	0.30	0.73	
U' 1+650 to U' 1+800 and U' 2+900	53	PFO	F/C	1.62	4.01	
U' 2+075 to U' 2+425	54	PFO	F/C	0.34	0.85	
U' 2+450	56A	PFO	F/C	0.27	0.67	
U' 3+650	57A	PFO	F	0.16	0.39	The location of the alternate U' in this area is governed by the presence of the southern project terminus and the community of Neelyville. A shift to the east would result in additional damaging impacts to forested wetlands. A shift to the west would result in significant impacts to a parallel ditch system west of U.S. 67.
W 0+950 to W 1+075	61	PEM	F	0.39	0.96	
U' 3+750 to U' 4+050	62B	PFO	F	0.05	1.00	
	62C	PEM	F	0.08	0.20	
U' 3+500	106A	PUB	F	0.06	0.15	The location of the alternate U' in this area is governed by the presence of the southern project terminus and the community of Neelyville. A shift to the west would result in additional impacts to forested wetlands. A shift to the east would result in additional displacements of residential and commercial properties.

Further impacts to wetlands were reduced by crossing unavoidable wetlands as perpendicular as possible, and by shifting the proposed alignment.

Compliance with Executive Order 11990 is documented in this Final EIS on a site-by-site basis for the Preferred Alternative. Estimates of impact are based upon the anticipated right of way requirements for the Preferred Alternative and, therefore, may be reduced during the design phases (see Table 4-17). In response to the Executive Order, an opportunity for early public review will be provided by MoDOT as part of the joint Section 404 public comment period and the NEPA public hearing process.

4.12 Groundwater Resources

Potential impacts to groundwater from highway construction are typically related to interruption of existing well use, closing and sealing of existing wells, withdrawal of groundwater (i.e., dewatering), interruption/interference of groundwater recharge/discharge functions, and deterioration of water quality due to pollutants from stormwater runoff from highway surfaces. Such potential impacts are dependent upon a variety of factors including local geology, soil permeability, groundwater/surface water interaction, construction methods, and volume and composition of traffic.

Within the U.S. 67 project area, the presence of geologic formations characterized by karst topography could potentially increase the probability of certain impacts, such as water quality degradation from highway runoff. In the presence of karst topography and thin soils, pollutants in stormwater runoff can migrate rapidly into groundwater, and move significant distances from the original source. Relatively little research has been conducted toward assessing the impact of highway runoff on groundwater in karst areas. Most of the investigations that have been done were conducted in areas having relatively thick soils, which filter out many runoff pollutants (Stephenson and Beck, 1994).

Physical effects of highways on the hydrogeologic environment may include the obstruction of ground-water flow by abutments and retaining walls, and changes in runoff and recharge characteristics (Parizek, 1971). Leaking or failed subsurface drainage systems can concentrate large volumes of stormwater in bedrock channels, accelerating sinkhole development and potentially undermining highway structures.

Adverse impacts to groundwater resources during highway construction and operation are expected. Primary concerns within the project area are increased sediment loads and private well closures and subsequent relocations. As a consequence of residential displacements, it will be necessary to close existing private wells that occur within the proposed right of way of the Preferred Alternative. Any closed wells will be sealed according to state of Missouri guidelines to prevent surface infiltration to the groundwater. The total number of private wells that will be closed and sealed is approximately 134. This number has been estimated from the residential (single family and mobile home) displacements data presented in Section 4.1.1. Given the rural nature of the project corridor and the lack of public infrastructure, it has been assumed that there is one well per residential displacement. There are some situations where residences are sited on the same parcel which may indicate the sharing of wells. If more than 25 people (on average) are served by a well, it is considered a public water supply well. The MDNR has established a 1.6 km (1-mi) radius from a public water supply as the WHPA. The study corridor is within the following WHPAs: Cherokee Pass Restaurant, Madison County PWSD #1-South, Wayne County PWSD #1, Wappapello Res-Old Greenville, Butler County PWSD #1-South, and Neelyville.

Given the generally thick soil/residuum covers in these areas, the construction of the highway is not expected to impact the WHPAs. In addition, given the 1.6 km (1-mi) radius of each WHPA, the differing alternatives pass through approximately the same lengths of each WHPA. Therefore, the potential impacts of each alternate are approximately the same. The USEPA has established no Sole Source Aquifers in Missouri.

In order to compensate for impacts to wells, those affected will be sealed in order to prevent surface pollutants from entering the groundwater. Those private wells affected by dewatering procedures during construction will be identified, and the landowners will be compensated for the temporary interruption in well usage. Since some of the private wells may be primarily used for irrigation purposes, the construction procedures that will affect well usage will be scheduled during off-season periods when water usage is significantly reduced. This is anticipated to occur only in Butler County.

Construction and subsequent use of the new roadway will not directly involve withdrawal of groundwater. The roadway may interfere with the existing recharge/discharge functions. The roadway is not expected to have any significant impact on downgradient well yields.

Impacts to groundwater quality will depend, in part, on the composition and level of daily traffic. A report by Smith and Load (1990) which summarized 15 years of research on highway runoff, indicates that lower impacts are noted from highways carrying fewer than 30,000 cars per day. Accidents involving chemical spills may potentially result in groundwater contamination. The potential for impact to groundwater from an accidental spill/release will depend on the adequacy of local spill response and control plans, and the proximity of direct conduits into the groundwater system. Events affecting water quality (i.e., chemical spills and increased sediment loads) can spread rapidly, traveling in unexpected directions, making remediation difficult.

Constituents typically associated with the operation and maintenance of highway facilities include heavy metals, oil, grease, herbicides, de-icing salts, and rubber (Stephenson et al., 1994) or (Stephenson and Beck, 1994). Stormwater drainage and detention systems can be designed to avoid or minimize migration of these constituents to areas where there may be interaction with local groundwater resources and groundwater recharge areas.

Historic mining activities do not appear to pose any problems for construction in this area. Even though it appears unlikely, if a significant pyrite deposit is encountered during construction, appropriate measures will be taken to control or contain runoff. Exposure of pyrite-bearing areas during construction activities would create a potential for acidic runoff. Pyrite is a lead disulfide mineral that does occur in this area, although it is not abundant. Precipitation on exposed areas can produce an acidic runoff (Yew and Makowski, 1989).

Springs/Fens

Within the project corridor, karst aquifer systems are found within the St. Francois and Salem Plateau sections. The only surface expression encountered indicating karst aquifers was springs and fens. No known caves or sinkholes are located within the project corridor. The potentially impacted springs and fens are located in Madison and Wayne Counties. Some of these springs/fens contain diverse flora (Section 3.8, Wetlands).

Karst aquifer systems consist, in part, of groundwater flow through open conduits, fractures, and bedding planes which can allow the rapid transport of sediments and other contaminants. The susceptibility of the karst aquifer to degradation depends on several factors: thickness of soil/overburden, type of recharge (discrete points or diffuse), and the extent of the recharge area (localized or regional). Due to the lack of discrete recharge points (i.e., sinkholes) identified in the project area and the thickness of overburden (in most areas), the karst aquifers in the project corridor are considered, in general, to be less susceptible to degradation than more mature, open karst systems (Aley, 1978).

Due to the generally low discharge rates of the springs, however, the recharge areas of the springs are likely localized [less than 1 km (0.6 mi).] The more localized the recharge area of the spring, the more susceptible individual springs are to be affected by activities in the immediate vicinity. In the St. Francois Mountain section, the karst aquifers consist of limestones/dolomites in valleys separated by Precambrian igneous rock in the upland areas. The recharge area for springs in these areas are localized because the

igneous rock will not effectively transmit groundwater. The larger discharge volume (50+ gpm) springs (Box Spring, Geronimo Spring, etc.) likely have more extensive conduit systems feeding the springs and, therefore, larger recharge areas. The determination of the recharge areas for springs/fens would require dye tracer studies. No studies of the recharge area of springs/fens within the project corridor are known.

The removal of rock and overburden, the filling of areas, and the redirection of surface water flow can affect the recharge/discharge function of the karst aquifer systems. This can result in the degradation of water quality or decrease/increase in water discharge quantity. Although the transport of contaminants for several miles through karst aquifers is well documented, the closer the proposed activities to the spring/fen, the more likely for direct or indirect impacts.

No fens will be directly impacted by the Preferred Alternative. The Preferred Alternative will be designed so that it will not direct stormwater to fens or springs. Coordination with MDC, USFWS, and property owners could assist in protecting these areas. The Preferred Alternative will result in soil/rock removal and filling in close proximity to several springs/fens and may affect the water quality or quantity flowing to these water resources. These springs/fens include Cherokee Pass Springs, Twelvemile Springs, Geronimo Spring, Alexander Spring, and Self Fen. Pleasant Valley Creek in proximity to the U.S. 67 and SR A intersection is a losing stream which may provide water to Eva Spring, which is located adjacent to the St. Francis River. Construction of the Preferred Alternative will impact Pleasant Valley Creek and, therefore, may alter the water flow to Eva Spring.

To avoid and minimize indirect impacts to springs and fens, the design phase will consider local hydrogeology and reduce or eliminate cut/fill in proximity to the springs/fens.

4.13 Floodplains

Executive Order 11988, Floodplain Management, mandates the evaluation of potential floodplain impacts by major federal actions. FEMA FIRMs, dated 1986, and Flood Hazard Boundary Maps (FHBMs) were used to identify floodplains associated with the proposed project (Section 3.8.3, Floodplains). Flood boundary and floodway maps were used to identify regulatory floodways within the study corridor.

An evaluation of floodplain impacts is mandated by Executive Order 11988, Floodplain Management, and subsequent federal floodplain management guidelines. When available, FHBMs (National Flood Insurance Program) and flood insurance studies for the project area are used to determine the limits of the base (100-year) floodplain and the extent of encroachment.

The total new right of way of the Preferred Alternative is comprised of approximately 983 ha (2,429 ac). Current mapping indicates that land within the right of way designated as 100-year floodplain accounts for approximately 16.0 percent of the total right of way. A floodplain development permit will be required from SEMA prior to construction an development activities to ensure construction of the Preferred Alternative meets the requirements of the State of Missouri Executive Order 98-03.

The Preferred Alternative included elevating the project roadway surfaces above the base flood level and elevating those portions within the Wappapello Lake flood pool to the 405 ft elevation. The Preferred Alternative will potentially affect approximately 158.2 ha (390.9 ac) of designated 100-year floodplain (Figure 4-9). Table 4-18 presents each encroachment, the associated creek, acreage and length, and the type of crossing. These floodplains are associated with 24 different creeks and a number of associated unnamed tributaries. The affected floodplains cover a total length of approximately 24.08 km (14.96 mi), with 28 transverse encroachments and 22 longitudinal encroachments, totaling 50 floodplain encroachments.

Table 4-18. Floodplain (100-Year) Crossings Associated with the Preferred Alternative

Number	County	Creek	Encroachment*	Area			Length	
				ha	ac		km	mi
MAFP0010	Madison	Mill	L	0.27	0.66		0.08	0.05
MAFP0020	Madison	Twelvemile	T	0.78	1.94		0.10	0.06
MAFP0030	Madison	Twelvemile	T	0.73	1.81		0.16	0.10
MAFP0040	Madison	Twelvemile	T	3.79	9.36		0.43	0.27
MAFP0050	Madison	Twelvemile	L	0.02	0.05		0.05	0.03
MAFP0060	Madison	Griffon Hollow	T	0.98	2.41		0.11	0.07
MAFP0070	Madison	Twelvemile	L	1.34	3.31		0.23	0.14
MAFP0080	Madison	Twelvemile	L	0.20	0.49		0.18	0.11
MAFP0090	Madison	Twelvemile	L	0.07	0.18		0.03	0.02
MAFP0100	Madison	Twelvemile	L	0.05	0.13		0.11	0.07
MAFP0110	Madison	Twelvemile	L	1.38	3.40		0.55	0.34
MAFP0120	Madison	Twelvemile Trib.	L	0.10	0.24		0.06	0.04
MAFP0130	Madison	Greenwood Bran.	L	1.13	2.80		0.34	0.21
MAFP0140	Madison	Greenwood Bran.	L	0.84	2.06		0.26	0.16
MAFP0150	Madison	Greenwood Bran.	L	1.52	3.75		0.23	0.14
MAFP0160	Madison	Greenwood Bran.	L	1.00	2.47		0.24	0.15
WAFP0010	Wayne	Coon	T	2.0	4.95		0.14	0.09
WAFP0020	Wayne	Cedar	T	1.95	4.83		0.31	0.19
WAFP0030	Wayne	Wilmore	T	0.80	1.98		0.16	0.10
WAFP0040	Wayne	Hunter	T	0.43	1.06		0.06	0.04
WAFP0050	Wayne	Bennett	T	0.75	1.85		0.11	0.07
WAFP0060	Wayne	St. Francis	T	0.16	0.39		0.09	0.06
WAFP0070	Wayne	Hubble	T	1.17	2.90		0.32	0.20
WAFP0080	Wayne	Frazier	T	1.57	3.88		0.43	0.27
WAFP0090	Wayne	Bounds	T	2.30	5.69		0.32	0.20
WAFP0100	Wayne	St. Francis	T	0.13	0.32		0.05	0.03
WAFP0110	Wayne	St. Francis	T	0.74	1.83		0.14	0.09
WAFP0120	Wayne	St. Francis	T	0.43	1.07		0.14	0.09
WAFP0130	Wayne	St. Francis	T	0.40	0.98		0.08	0.05
WAFP0140	Wayne	St. Francis	L	24.42	60.34		1.32	0.82
WAFP0150	Wayne	St. Francis	L	2.23	5.52		0.98	0.61
WAFP0170	Wayne	P. Valley	L	12.95	32.00		1.73	1.11
WAFP0180	Wayne	Smoot Hollow	T	4.02	9.93		0.74	0.46
WAFP0190	Wayne	Widow	T	0.11	0.27		0.18	0.11
WAFP0200	Wayne	Otter	L	1.56	3.85		0.45	0.28
WAFP0210	Wayne	Otter	T	1.53	3.77		0.43	0.27
WAFP0220	Wayne	Goldbeck Hollow	T	0.68	1.67		0.13	0.08
BUFP0230	Butler	Black River	L	1.14	2.81		0.55	0.34
BUFP0240	Butler	Cane	L	1.15	2.83		0.63	0.39
BUFP0250	Butler	Harviell Ditch	T	39.89	98.56		5.47	3.40
BUFP0260	Butler	Harviell Ditch	T	0.29	0.72		0.05	0.03
BUFP0270	Butler	Harviell	T	1.13	2.79		0.13	0.08
BUFP0280	Butler	Hart Ditch	T	0.02	0.06		0.02	0.01
BUFP0290	Butler	Hart Ditch	T	0.20	0.49		0.03	0.02
BUFP0300	Butler	unnamed	L	0.50	1.23		0.08	0.05
BUFP0310	Butler	unnamed	L	6.04	14.93		0.93	0.58
BUFP0320	Butler	Neelyville Ditch	T	6.62	16.35		0.92	0.57
BUFP0330	Butler	Neelyville Ditch	T	13.15	32.50		1.38	0.86
BUFP0340	Butler	Neelyville Ditch	L	6.16	15.21		0.82	0.51
BUFP0350	Butler	unnamed	L	3.54	8.74		0.79	0.49
Total				140.15	346.31		20.11	12.55

** T = transverse encroachment; L = longitudinal encroachment.*
Source: MACTEC, 2001.

The Preferred Alternative has the potential to impact a total of 14.19 ha (35.06 ac) of floodplains in Madison County. These floodplains are associated with five different creeks and related tributaries, covering a total length of approximately 3.16 km (1.96 mi) (Figure 4-9). There is a total of four transverse encroachments and 12 longitudinal encroachments, totaling 16 encroachments in Madison County.

The Preferred Alternative has the potential to impact a total of 60.33 ha (149.1 ac) of floodplains in Wayne County. These floodplains are associated with 15 different creeks and related tributaries, covering a total length of approximately 8.3 km (5.2 mi). There is a total of 17 transverse encroachments and four longitudinal encroachments, totaling 21 encroachments in Wayne County.

The potential impact to floodplains in Butler County totals 79.8 ha (197.2 ac). This consists of 7 transverse encroachments and 6 longitudinal encroachments, for a total of 13 floodplain encroachments. This covers a total length of approximately 11.8 km (7.3 mi). These are floodplains primarily associated with five different creeks or ditches and several unnamed tributaries.

The regulatory floodway, as defined by FEMA, is the stream channel plus that portion of the overbanks that must be kept free from encroachment in order to discharge the 1 percent annual chance flood without increasing flood levels by more than 1 foot. The FEMA regulatory floodway associated with the Black River in Butler County north of Poplar Bluff is currently bridged. A two-lane companion bridge is proposed east of the existing bridge on the Black River. The only other FEMA regulatory floodway is associated with Cane Creek in Butler County south of Poplar Bluff. At this location, a two-lane companion bridge is proposed to be located to the west of the existing bridge. These bridges will be designed so that there will be no increase in flood levels within the floodway during the occurrence of the base (100-year) flood discharge to obtain the no-rise certificate). A no-rise certificate will be required for each structure and obtained prior to the request for a floodplain development permit.

Beyond the direct impacts of direct conversion of floodplain area to an expanded transportation corridor, impacts to floodplains are largely based on the consequences of roadway development on floodplain functions. Potential floodplain impacts would include decreases in natural and beneficial floodplain value such as the reduction of floodplain habitat and storage capacity. Indirect impacts could include structures and/or construction activity initiating localized erosion and channel instability. Flood flow patterns redirected by poorly aligned structures, constrictions of flow at traversing structures resulting in flow acceleration, and remnant unstabilized conditions following construction have the potential to erode stream banks, produce sediment deposits, and increase water turbidity. If structures are appropriately designed and constructed, no additional streambed erosion or interference with the flood conveyance capacities is anticipated.

Hydraulic studies will be completed during the design phase for the proper sizing of all bridges and culverts. Within the 100-year floodplain, bridges and culverts will be designed such that the cross sectional area available for flood flow through structure openings is sufficiently large to result in upstream flood level increase of not more than 0.3 m (1 ft) for the design flood. Structures are designed as such for both public safety and to prevent stream bank erosion. Additionally, the structures and associated activities in and near the stream banks can be performed such that the activities do not result in short-term or long-term erosion of stream banks or stream bed.

To quantitatively assess impacts to floodplain functions, a site-by-site evaluation will be required. Each encroachment location will need to be evaluated to determine what hydrologic or hydraulic analyses may be required to determine impacts of loss of floodplain storage and/or impacts of obstructions to flow created by fill that may be needed for roadway embankments.

The No Action Alternative will result in no additional impacts to floodplains in the study corridor. The existing U.S. 67 crosses 28 floodplain areas, comprising a total approximate area of 101.84 ha (251.64 ac) of floodplains. The current roadway includes 21 traverse and 7 longitudinal floodplain crossings.

FHWA Only Practicable Alternative Finding – Floodplain

The crossings of all regulated floodplains will be designed and constructed in compliance with applicable floodplain regulations, including Executive Order 11988. There will be no increases in base flood elevations attributable to the implementation of the proposed roadway improvements. During the design process, a detailed hydraulic analysis of the flows and water surface elevations will be made in accordance with the requirements of FEMA and USACE to ensure the absence of any encroachments upon regulatory floodways as well as to avoid any adverse impacts.

The Proposed Action conforms to applicable state of Missouri and local floodplain protection standards.

Based on the above considerations, and for the reasons stated in this Final EIS, the FHWA determines that the Preferred Alternative is the only practicable alternative.

Executive Order 11988—Floodplain Management

Floodplains are a valuable resource of the study area. These areas perform many of the same functions as wetlands including flood desynchronization, wildlife habitat, food chain support, nutrient retention and removal, and erosion control (sediment trapping and bank stabilization). Many of the wetlands potentially affected by the Proposed Action are located on floodplains (Figure 4-9). Flood desynchronization and erosion control are closely related functions that are important during storm events. The dissipation of stormwater through floodplains reduces flow velocity and results in the retention of water-carried silt and the desynchronization of stormwater.

Regulated floodplains are those with a designated 100-year floodplain that are mapped on National Flood Insurance Rate Maps by FEMA. Encroachments of the alignment on these designated floodplains requires a formal response under Executive Order 11988: Floodplain Management.

Executive Order 11988 regarding floodplain management requires that federal agencies evaluate any agency activities proposed in floodplains. The agency should provide leadership in reducing the risk of flood loss; minimizing impact of floods on human safety, health, and welfare; and restoring and preserving the natural and beneficial values of floodplains. The agency is required to (1) evaluate potential impacts of the Proposed Action on floodplains, (2) consider flood hazards and floodplain management in designs, (3) modify designs to the extent practicable to minimize potential harm to or within the floodplain, and (4) prepare and circulate a notice containing an explanation of why the Proposed Action is to be located in the floodplain.

As presented in Section 4.13, encroachment of floodplains will be occurring at 50 locations. A consequence of these encroachments is the reduction of flood storage capacity. However, all crossings will be designed to ensure that the base flood level will not be increased by more than 1 foot.

The evolution from study corridor establishment to the development of the project corridor (as discussed in Section 2.0) involved the consideration of floodplains as well as a number of other environmental, engineering, and transportation factors. Measures to avoid, minimize, and reduce direct and indirect impacts to floodplains have been integral in locating the alignment of the proposed right of way of the Preferred Alternative. Due to a number of variables, absolute avoidance of floodplains is not practicable. Most of the existing surface waters and associated floodplains occur perpendicular to the existing U.S. 67 facility (Figure 4-9) thereby making avoidance of most floodplain crossings impractical. Avoiding the crossings would require the shifting of the right of way of the Preferred Alternative relatively far to the east or west (i.e., WAFP0020, WAFP0050, WAFP0090, WAFP0150, and all Butler County crossings south of Route 158; see Figure 4-9 and Table 4-18). Minimization and potential impact reduction measures involved shifting the right of way of the Preferred Alternative, where practicable (i.e., WAFP0060, WAFP0100, WAFP0110, WAFP0120; see Figure 4-9 and Table 4-18). Additional measures

of minimization and reduction of impact to floodplains consisted of utilizing as much of the existing facility and right of way as practicable, orienting crossings as perpendicular as possible, and by bridging.

Compliance with Executive Order 11988 and 23 CFR, Part 650, Subpart A is documented on a site-by-site basis for the Preferred Alternative. Estimates of impact are based upon the anticipated right of way requirements for the Preferred Alternative and, therefore, may be reduced during the design phases. In response to the Executive Order, an opportunity for early public review of the Proposed Actions in floodplains will be provided by MoDOT as part of the public hearing process.

Station H4+300 to Station H4+525 – The total length of this crossing is approximately 140 m (459 ft) which would result in impacts to approximately 2.00 ha (4.95 ac) of floodplain. The Preferred Alternative minimizes impacts to floodplain by crossing near the upper limit of the mapped floodplain associated with Coon Creek. To the east of the existing road, the floodplain mapping shows the floodplain becoming broader and longer (in a north-south direction) as Coon Creek drains toward the confluence with Cedar Creek. Minimization efforts are demonstrated by crossing within the upper reach of the floodplain and avoiding the broader floodplain to the east. Minimizing the encroachment further by elevating the alignment on structure was an additional consideration to locating the proposed roadway to the west of the existing facility. Other considerations included the need for an interchange to maintain access to Route EE and avoidance of wetland habitat, Alexander Spring, and residences. Additionally there is a mapped archaeological site to the north of this area and east of existing U.S. 67. The crossing of the Coon Creek floodplain is proposed to be culverted and filled. Potential impacts associated with the construction of the Preferred Alternative include loss of flood storage area, and reduction of aquatic and riparian habitat in the vicinity of Coon Creek.

Station H5+100 to Station H5+400 –This crossing involves the floodplain of Cedar Creek which is proposed to be bridged. The total length of the crossing is approximately 310 m (1,017 ft), which would comprise an estimated impact area of 1.95 ha (4.83 ac). The Preferred Alternative is proposed to occur to the west of existing U.S. 67 for those reasons stated for the Coon Creek floodplain crossing. Impacts are being minimized by bridging the crossing of Cedar Creek which will reduce the total amount of fill placement within the floodplain. Additionally, the proposed crossing location is narrower than upstream or downstream areas. Potential impacts include the loss of flood storage from the placement of fill within the floodplain, impacts to an emergent wetland south of Cedar Creek, and the loss of trees along Cedar Creek.

Station H5+900 to Station H6+000 – The total length of this crossing is approximately 160 m (525 ft), comprising 0.8 ha (1.98 ac). This crossing involves culverting Wilmore Creek and placing fill within the floodplain. Encroachment minimization is being implemented by crossing the floodplain in an area that is mapped as relatively narrow. The floodplain broadens to the west as Wilmore Creek drains into Cedar Creek. Further minimization of encroachment to the floodplain by raising the alignment on structure may not be practicable due to the increase in project cost. Potential impacts include the loss of flood storage area, placing fill within the vicinity of three small springs, and impacts to aquatic and faunal communities within the proposed right of way of the Preferred Alternative. Other considerations involved in locating the proposed improvement on the west side of existing U.S. 67 are the same as those for the Coon and Cedar Creek crossings, as well as the need to maintain access to CR209, and avoid impacts to residences and forested wetlands to the east of U.S. 67.

Station H9+950 to Station H10+250 – The crossing of Hunter Creek will be culverted and will involve the placement of fill within the floodplain. The total length of the floodplain crossing is 68 m (223.1 ft) for an estimated total impact area of 0.43 ha (1.06 ac). Minimization of encroachment efforts is demonstrated by aligning the Preferred Alternative across the floodplain where it is mapped as relatively narrow. The floodplain associated with Hunter Creek broadens to the west of existing U.S. 67 as Hunter Creek drains toward the St. Francis River. The alignment of the Preferred Alternative is located to the

west of existing U.S. 67 in order to avoid impacts to the town of Lodi, residences, the Lewis Cemetery, and a spring.

Potential impacts are associated with the loss of flood storage capacity, the filling of an excavated pond (PUBGh), and the limited reduction in local terrestrial and aquatic habitats.

Station H10+600 to Station H10+750 – This crossing involves the bridging of Bennett Creek. The total length of the crossing is 110 m (361 ft) with the estimated right of way impact of 0.75 ha (1.85 ac). Impact minimization is occurring at this location by raising the alignment on structure over Bennett Creek and some of the floodplain area. The Preferred Alternative is located adjacent to, and to the east of, the existing facility, thus reducing impacts to the floodplain by crossing at a narrower location. Floodplain width increases to the west of U.S. 67 as Bennett Creek flows toward the confluence with the St. Francis River. As indicated for the Hunter Creek crossing, the alignment of the Preferred Alternative is located to the east to avoid impacts to Lodi. Additional constraints to the west include forested and emergent wetlands, a church, and the potential of a channel relocation along an unnamed tributary to the St. Francis River.

Potential impacts are primarily associated with the placement of fill, which will decrease the flood storage area and some reduction in forested habitats.

Station H12+200 to Station H12+300 – This crossing is aligned across the uppermost limits of the floodplain of an unnamed tributary to the St. Francis River. The total length of the crossing is approximately 90 m (295 ft) in length and 0.16 ha (0.39 ac) in estimated area. The crossing will involve the placement of a box culvert in the creek channel and fill within some of the floodplain area. Impact minimization is occurring by locating the crossing close to the existing facility, where the floodplain width is relatively narrow. An additional measure of minimization is accomplished by utilizing the existing two lanes for the northbound lanes, thus reducing the extent of local disturbance. Potential impacts will occur from the placement of fill within the floodplain, reduction in flood storage area, and some loss of riparian habitat along the creek. The placement of the box culvert in the stream channel may cause changes aquatic and terrestrial faunal occurrence and movements.

Station J1+150 to Station J1+350 – This crossing involves constructing a bridge over Hubble Creek and the placement of fill within areas of the mapped floodplain. The approximate length of the crossing is 319 m (1,046.6 ft), comprising an area of approximately 1.17 ha (2.90 ac). In order to minimize the encroachment, the alignment of the Preferred Alternative is proposed to be elevated over Hubble Creek, thus minimizing the fill volume within the floodplain. The mainline of the Preferred Alternative and the proposed interchange with Route 34 are located on the west, in part, to minimize impacts to emergent and open water wetlands, springs, forested areas, and to minimize cut and fill requirements that would be necessary to cross the steep terrain to the east of the existing facility.

Potential impacts include some loss of flood storage due to the placement of fill within the floodplain and loss of forested riparian habitat in the vicinity of the proposed bridge crossing. The local change in riparian structure may affect aquatic faunal and vegetative community compositions.

Station L0+300 to Station L0+700 – This crossing includes the bridging of Frazier Creek and filling the floodplain associated with Hubble Creek due west of the existing facility. The Preferred Alternative is located over the existing U.S. 67 and minimizes impacts by utilizing the existing roadway as the southbound lanes to the improved facility. Access roads are proposed to provide connection to Silva by linking CR219 with CR220 on the east, and providing access to the Wappapello Wildlife Management Area on the west.

This crossing is approximately 430 m (1,411 ft) in length and totals approximately 1.57 ha (3.88 ac) in area. Much of the impacts to the Hubble Creek floodplain arise from providing the access road between

CR306 and the WWMA. Encroachment of floodplains has been minimized in this area by locating the alignment of the Preferred Alternative over, and to the east of, the existing right of way. The floodplain becomes wide and broad to the west of existing U.S. 67. Locating the alignment to the east also reduces impacts to forested wetlands and eliminates the possibility of a skewed crossing at Bounds Creek. Impact minimization is also exhibited by elevating the alignment on structure over Frazier Creek and locating the proposed bridge adjacent to the existing crossing.

Potential impacts arise from the placement of fill within the floodplain by reducing flood storage area. Other impacts include minor loss of riparian habitat at the Frazier Creek crossing.

Station L1+250 to Station L1+450 – The total length of this crossing is approximately 320 m (1,050 ft), which includes the mainline of the Preferred Alternative and the access road between the WWMA and CR306. The total area of impact is approximately 2.30 ha (5.69 ac). The encroachment of floodplains has been reduced between Frazier and Bounds Creeks by aligning the proposed facility over the existing, thus avoiding the wide and broad floodplain areas to the west of existing U.S. 67. Other considerations included reducing impacts to forested wetlands and riparian habitat to the west of U.S. 67, along the Bounds Creek drainage.

Potential impacts include reduction of flood storage area and impacts to wetlands, forested riparian habitats, and locally occurring terrestrial and aquatic faunal communities.

Station L3+050 to Station L3+100 – The crossing of this intermittently flowing tributary to the St. Francis River is proposed as a box culvert. Consequently, some area of the mapped floodplain associated with the creek will be filled. The total length of the crossing is 42 m (137.8 ft), with a total estimated area of impact of 0.13 ha (0.32 ac). Impact minimization is proposed in this area by aligning the proposed alignment over, and to the east of, the existing facility. By maximizing the use of existing right of way, the Preferred Alternative is proposed to utilize the existing lanes for southbound traffic. In addition, the crossing of this floodplain is narrow; the mapped floodplain of the St. Francis River lies to the west. Maintaining increased distance from the St. Francis River and the associated floodplain minimizes potential impacts to documented sensitive species, wetlands, and forested land.

Potential impacts include reduction in storage volume by the placement of fill in the floodplain and localized impacts to the creek substrates by the extension of a box culvert within the creek channel. Elevating the alignment was not considered practical due to the significant increase in project costs.

Station L3+400 to L3+450 – The Preferred Alternative crosses a small and narrow floodplain of a tributary to the St. Francis River. The length of crossing is approximately 135 m (442.9 ft), comprising 0.14 ha (1.83 ac). The minimization efforts are the same as those detailed for the previous crossing (Station L3+050 to Station L3+100). The proximity of the St. Francis River and associated floodplain exclude the development of practicable alternates to the west of the existing facility. The development of alternates further to the east was determined not to be reasonable or practicable as described in Section 2.3.4.2.

Potential impacts include loss of flood storage area and modification of the creek substrates by extending a box culvert. Other impacts will potentially occur to wetlands, forested land, and locally occurring aquatic and terrestrial fauna.

Station L3+800 to Station L3+900 – The total length of this crossing is approximately 140 m (459 ft), which would include an estimated impact area of 0.43 ha (1.07 ac). Minimization efforts are the same as those detailed for the previous two floodplain crossings. The crossing is proposed to occur by placing fill within this narrow floodplain area.

Potential impacts include loss of flood storage area, filling of a scrub-shrub wetland, and conversion of forested land.

Station L4+600 to Station L4+700 – This crossing involves the placement of fill within an upper "finger" of the St. Francis River floodplain. There is no mapped creek or drainage in this area. The total length of the crossing is approximately 85 m (278.9 ft), comprising an estimated area of 0.40 ha (0.98 ac). Minimization efforts are the same as those detailed in the previous three crossings. The St. Francis River channel meanders to the east in this area, which disallows the development of other reasonable and logical alternates. The potential impacts arise from the placement of fill (loss of flood storage area) and the conversion of forested land (occurrence and use of area by locally occurring terrestrial fauna).

Station L4+950 to Station L6+400 – This floodplain crossing occurs to the west of the City of Greenville and existing U.S. 67. The total length of the crossing is approximately 1,320 m (4,331 ft), totaling an estimated 24.42 ha (60.34 ac). These estimates include the right of way for the mainline of the Preferred Alternative and the access roads that are proposed to provide connection to the City of Greenville, and between the St. Francis River boat ramp (north of Greenville) and CR221. Two creeks and tributaries to the St. Francis River, will be culverted. The remaining floodplain will be crossed on fill. Impact minimization measures involve crossing the floodplain near the eastern limits where the floodplain is somewhat narrower. Any shifting of the alignment of the Preferred Alternative to the west would increase the length and area of floodplain crossing. Other issues of minimization to the west include reducing the amount of USACE property crossed and avoidance of recorded archaeological sites. Considerations to the east involved avoiding businesses, the Greenville Cemetery, a church, the Greenville nursing home, and the City's sewage settling ponds.

Potential impacts include reduction in flood storage area, loss of wetlands, conversion of forested land, impacts to locally occurring aquatic and terrestrial faunal communities, and the modification of substrates within the creek channels. Due to the expanse of the floodplain in this area and the resulting additional costs, it is not practicable to elevate the alignment.

Station L8+250 to Station L9+750 – This area entails the crossing of floodplain and the St. Francis River, south of Greenville. The total length of crossing, which includes the access road to Historic Greenville and the Wappapello Lake boat access, is approximately 1,720 m (5,643 ft), comprising an estimated area of 4.35 ha (10.77 ac).

A majority of the crossing will be on fill. The bridge over the river begins in the vicinity of Station L9+470. Impact minimization efforts include locating the mainline of the Preferred Alternative over the existing facility. By maximizing the use of existing right of way, the proposed facility will utilize the existing two lanes for northbound traffic. Other considerations included avoiding and minimizing impacts to the Historic Greenville property; avoiding impacts to the boat ramp and camping facilities to the east and west of existing U.S. 67; avoiding and minimizing impacts to forested wetlands on the east and west; avoiding and minimizing impacts on state listed species on the east; and maintaining access.

Potential impacts arise from the placement of fill within the floodplain. There will be a reduction in flood storage area, wetland impacts, acquisition of some area of Historic Greenville, conversion of forested land, and impacts to locally occurring faunal and vegetative species.

Station L9+850 to Station L11+700 – This area includes the crossing of Pleasant Valley Creek at three locations and the floodplains associated with the St. Francis River and the creek. The total length of crossing is approximately 1,792 m (5,879.6 ft), with an estimated area of 12.95 ha (32.00 ac). Efforts to minimize encroachment of floodplain included locating the Preferred Alternative as close as practicable to the existing facility. The crossing of Pleasant Valley Creek due south of the St. Francis River crossing will be bridged, thus reducing the fill requirements within the floodplain and maintaining natural substrates within the creek channels. Other variables of consideration included maintaining access to

Route FF, avoiding the relatively severe terrain on the east, avoiding the gravesite of a Civil War soldier in the east, minimizing impacts to the Ozark Trail, avoiding Pleasant Valley Cemetery, and minimizing impacts to wetlands.

Potential impacts include loss of flood storage area, impacts to wetlands, conversion of forested land, and impacts to locally occurring terrestrial and aquatic species. Minimizing impacts further by elevating the alignment was considered not practicable due to the total length that would be required on structure and the resulting additional project costs.

Station N0+850 to Station N1+250 – This crossing involves bridging Widows Creek and placing the Preferred Alternative on fill through mapped floodplain. The total length of crossing is approximately 740 m (2,428 ft), comprising an estimated area of 4.02 ha (9.93 ac). The Preferred Alternative has been oriented to minimize impacts to floodplains by the shifting of the alignment to the west of existing U.S. 67 upon crossing Widows Creek. The floodplain is broader and wider on the east side of U.S. 67. Locating to the west also avoids the potential for relocating the Widows Creek stream channel, which parallels the existing facility. Impacts will be minimized at the crossing of Pleasant Valley Creek by bridging, thus reducing the amount of fill required in the floodplain. Other issues of consideration involved maintaining access to CR543 and CR545, avoiding residential displacements, avoiding Solid Rock Baptist Church, and maintaining access to the church.

The placement of fill within the floodplain will reduce the flood storage area, reduce riparian habitat at the creek crossing, reduced area of forested land, and potential impact the occurrence of locally occurring terrestrial and aquatic faunal species. Elevating the alignment on structure through this area is not considered practicable due to the increase in project costs.

Station O0+000 to Station O0+650 – The total length of this crossing is approximately 180 m (591 ft), which could result in an estimated 0.11 ha (0.27 ac) of impact. The Preferred Alternative is located over the existing facility for most of this crossing, thus minimizing impacts to floodplains. The mapped floodplain is relatively narrow on the west side of the existing road and wider to the east. The crossing of Widows Creek will involve the relocation of the channel; the remaining floodplain will be crossed on fill. Additional issues of consideration in this area include maintaining access to CR545 and CR546, minimizing impacts to wetlands, and avoiding the potentially historic remnants of the old town of Taskee.

Potential impacts include loss of flood storage area, impacts to wetlands, reduction of natural substrate within the stream channel, relocation of Widows Creek channel, and disturbance to locally occurring terrestrial and aquatic fauna.

Station O0+250 to Station O0+750 – This area involves the crossing of Otter Creek and associated floodplain. The approximate length of crossing is 450 m (1,476 ft), which would result in approximately 1.56 ha (3.85 ac) of impact to floodplains. Measures of minimization include the bridging of Otter Creek to reduce fill volume, and locating the Preferred Alternative adjacent to the existing facility. Other issues of consideration through this area involved avoiding impacts to a large emergent/scrub-shrub wetland complex adjacent to Wolf Run Creek on the west side of U.S. 67, minimizing residential displacements, and utilizing the existing facility as a service road.

Impacts include the loss of flood storage area, impact to wetlands, stream channel relocation of Widows Creek, reduction of forested riparian habitat, conversion of forested land, and disturbance to locally occurring terrestrial and aquatic faunal communities.

Station O1+350 to Station O1+850 – This area involves the crossing of a small intermittent drainage, Wolf Run Creek, and mapped floodplain associated with Otter Creek and tributaries. The total length of the crossing is approximately 430 m (1,411 ft), which would result in an estimated 1.53 ha (3.77 ac) of impact to the floodplain. The crossing of the small drainage will be culverted, and Wolf Run Creek will

be crossed using a box culvert. Minimization efforts have been accomplished by locating the Preferred Alternative adjacent to the existing facility on the east side of U.S. 67. The floodplain is broad, extending eastward beyond Otter Creek. The proximity of the Preferred Alternative to the existing facility will allow use of existing U.S. 67 as a service and access road to local residents. Another minimization effort involved locating the Wolf Run Creek crossing adjacent to the existing crossing, thus impacting previously disturbed habitats.

Other considerations in the area involved avoiding and minimizing residential displacements, avoiding a large emergent and scrub-shrub wetland north of the Wolf Run Creek crossing (west of existing U.S. 67), and avoiding diagonal severances of parcels.

Potential impacts include loss of flood storage area, impacts to wetlands, conversion of forested land, modification of channel substrates within Wolf Run Creek, and impacts to locally occurring aquatic and terrestrial faunal species.

Station O2+200 to Station O2+350 – This area involves crossing Goldbeck Hollow and associated floodplain. The Goldbeck Hollow crossing will be culverted; the remaining floodplain crossing will be on fill. The total length of the crossing is approximately 134 m (439.7 ft), comprising an estimated area of 0.68 ha (1.67 ac). Minimization efforts have been accomplished by locating the Preferred Alternative adjacent to, and west of, existing U.S. 67. The floodplain is broader and longer to the east of U.S. 67.

Other considerations include maintaining access to CR547 and local residents, avoiding residential displacements, and avoiding open water wetlands.

Potential impacts include loss of flood storage area, impacts to emergent wetland, conversion of forested land, and impacts to locally occurring aquatic and terrestrial species.

Station O10+950 to Station O11+900 – This area involves the crossing of the Black River and associated floodplain. The total length of crossing is approximately 550 m (1,804 ft), which would result in an estimated area of 1.14 ha (2.81 ac). The crossing of the Black River will be on structure, thus elevating the Preferred Alternative over some of the floodplain area. Some fill placement will be required as the alignment transitions from structure to a fill roadbed. Further minimization efforts include placing the alignment of the Preferred Alternative directly adjacent to the existing facility. This will allow the use of existing U.S. 67 for southbound traffic so that only two new lanes of roadway will be constructed through the floodplain.

Other considerations involved avoiding impacts to the Black River, avoiding impacts to listed aquatic species documented as occurring in the Black River, avoiding and minimizing impacts to wetlands, avoiding impacts to the Williamsville Stone Company, maintaining access to CR401, and allowing for access to the planned boat ramp and river access along the north bank of the river east of U.S. 67.

Potential impacts include loss of flood storage area, impacts to wetlands, and impacts to locally occurring terrestrial and wetland faunal species.

Station Q0+100 to Station Q1+150 – This area involves the crossing of Cane Creek and the associated floodplain. The total length of the crossing is approximately 630 m (2,067 ft), which would result in an estimated impact of 1.15 ha (2.83 ac) to floodplains. Cane Creek will be crossed by bridging at two locations; the remainder of the floodplain area will be crossed on fill. Measures to minimize impact have been accomplished locating the alignment of the Preferred Alternative over the existing facility. This orientation of alignment allows the use of the existing two lanes for northbound traffic, thus reducing the volume of fill required.

Other considerations in this area include maintaining access to CR478, avoiding and minimizing impacts to wetlands in the vicinity of Cane Creek, and maintaining access for local residents.

Potential impacts include the loss of flood storage area, impacts to wetlands, impacts to riparian habitat, and impacts to locally occurring aquatic and terrestrial communities.

Station R2+800 to Station W1+722 – This area involves the entire bottomland within Butler County due south of CR360. Most of the bottomland area has been mapped as occurring within the 100-year floodplain. The total length of the Preferred Alternative through the floodplain is approximately 13.6 km (8.46 mi), which would result in an estimated impact area of 77.54 ha (191.52 ac). In order to minimize encroachment, the alignment of the Preferred Alternative was located as closely as practicable to the existing facility. Within this stretch there are three locations where the proposed alignment veers away from the existing route. In order to maximize use of the existing right of way, existing U.S. 67 will be utilized as a service road.

There were numerous environmental and transportation engineering considerations that were involved in determining the location of the Preferred Alternative. These factors included maintaining access to primary and secondary roads, minimizing impacts to cropland and agricultural operations, avoiding and minimizing cultural resources, avoiding parks and conservation land, avoiding and minimizing impacts to listed species, and avoiding and minimizing residential and business displacements.

The potential impacts that may occur as the result of the construction of the Preferred Alternative include loss of flood storage area, impacts to wetlands, impacts to agricultural production and land, impacts to businesses and residences, conversion of forested tracts, and impacts to locally occurring aquatic and terrestrial faunal communities.

4.14 Aquatic Ecology

Aquatic biota could potentially be impacted by the roadway construction, maintenance, and operation of the U.S. 67 highway project. Some of these mechanisms of impact include siltation/sedimentation, pollutant loading, and habitat alteration. Each one of these mechanisms varies in degree of potential impact extent and intensity depending on individual site characteristics. Potential impacts can be either short term or long term in nature.

Potential effects on aquatic communities may come in the form of species avoidance during construction activities. The composition of the local fish population may be altered by a decrease in intolerant fish and increase in more tolerant species (carp and bullhead). The benthic macroinvertebrate community composition may also be modified. Less tolerant insects (Ephemeroptera and Trichoptera) may disperse downstream and the more tolerant (Oligocheates and Chironomids) may colonize the area. This shift in species composition may be temporary, and if pre-construction conditions return, the pre-disturbance balance may return.

The construction phase may cause gross mortality for local aquatic organisms by burying them in sediment. Mobile faunal groups such as fish and certain aquatic insects (water beetles and damsel flies) may escape by swimming away or drifting downstream. Sedentary benthic invertebrates, freshwater clams, mussels, and unhatched fish eggs may be covered in sediment resulting in local mortality rates and causing a decline in the local community. Erosion and siltation/sedimentation are often short term, and weather is an important determinant of the degree to which erosion and siltation/sedimentation will occur. For instance, increased precipitation results in the higher probability of increased rates of erosion and sedimentation.

The type of stream crossing may also determine the impact received by the resource. Culverts and bridges can cause long-term impacts by reducing quality habitat to a lesser or undesirable habitat. Roadway construction involving bridge crossings reduces habitat alteration compared to culverts and thus

minimizes the degree of impact. Bridge crossings start at one shore and cross over the stream channel to the next. In contrast, culverts are placed in the stream and cover existing habitat. Culverts may replace a sediment-free gravel bottom stream with a silty substrate. The local loss of habitat could lead to a decline in a more diverse fish, macroinvertebrate, or mussel fauna and an increase in less desirable species. Desired game fish may decline in numbers or move to other areas. Other less desirable fish (carp or suckers) may benefit from the substrate transition and increase their numbers. A change in substrate can also change macroinvertebrate community composition from silt-intolerant species to tolerant species. The reduction, or alteration, of habitat from that of a natural stream to a channelized condition with artificial substrates (for culverts) may also change local hydrology and flow patterns. Such habitat modification could result in the isolation of fish communities and/or localized changes in community structure.

Pollutant loading is a mechanism that may impact the surface water resources throughout the life of the roadway. Long-term degradation in water quality may result in shifts in community composition or the local elimination of certain species. However, given the rural, low traffic volume of the proposed roadway, no significant impacts to water quality are anticipated with the Preferred Alternative. However, it should be noted that pollutant loading is a mechanism that could adversely impact the surface water resources throughout the life of the roadway.

It is anticipated that MoDOT's Temporary Erosion and Sedimentation Control procedures, and the conditions of MoDOT's NPDES permit, will be followed during all construction activities. The use of bridges, the appropriate design of culverts, and minimizing the need for stream channel relocations and the channelization of streams will all reduce adverse impacts to the aquatic habitats that occur along the proposed right of way of the Preferred Alternative.

4.15 Terrestrial Ecology and Cover Types

The overall ecologic structure of the project corridor has largely been defined by local land use practices, public land management efforts, and natural forces that created the existing geomorphological setting. As indicated in various sections of this document, land within the project corridor is predominantly undeveloped, mostly comprised of forest and vacant land. The landscape matrix is forest with other elements including old field, pasture, cropland, wetland, and developed land.

The fundamental characteristics of a landscape is structure, function, and change (Forman, 1986). The overall structure of the landscape within the project corridor refinement efforts and the development of study alternates were based, in part, on the avoidance and minimization of direct impacts and disruption to ecological resources. One such factor entailed the consideration of habitat fragmentation. The discussion below addresses the potential impacts of the Preferred Alternative to terrestrial communities. There are two prominent impact classes: (1) direct impacts resulting from the conversion of habitats to developed land; and (2) the indirect impacts that arise as a consequence of habitat modification/ conversion. Discussion on the potential effects of the project on each terrestrial cover type focuses on direct impacts as presented in Table 4-19. However, potential indirect, or consequential impacts, that are likely common to each of the natural communities include, but are not limited to:

- reduction in local floral and faunal species diversity due to the effects of habitat fragmentation;
- alteration of wildlife movement patterns;
- increased incidence of road kills;
- construction-phase displacement of wildlife (e.g., avoidance);
- reduction of annual plant productivity; and
- greater potential for local erosion and increased sediment loads due to the increase in impervious surfaces.

Table 4-19. Potential Impacts to Ecological Cover Types Associated with the Preferred Alternative

Cover Type	Estimated Impact Area	
	Hectare	Acre
Forest		
Deciduous-Mixed	524.3	1,295.5
Coniferous-Mixed	81.8	202.1
Tree Farm	0.9	2.2
Subtotal	607.0	1,499.9
Pasture	88.8	219.4
Old Field	66.5	164.3
Developed	144.6	357.3
Wetland	59.3	146.5
Cropland	71.1	175.7
Open Water	15.3	37.8
Total	1048.7	2,591.3

4.15.1 Forest

The forested cover type is the predominant cover type within the project corridor, comprising approximately 58 percent of the total area. Build alternate development, refinement, and evaluation was based, in part, on minimizing disruption to, and loss of, this resource. Direct impacts to forested land as a result of the construction of the Preferred Alternative would result in the conversion of 607.0 ha (1,499.9 ac). This estimate is based upon the proposed right of way for the Preferred Alternative.

Potential impacts to forested cover types within each of the three counties are as follows:

- Madison 198.6 ha (490.7 ac)
- Wayne 292.8 ha (723.5 ac)
- Butler 115.6 ha (285.6 ac)
- Total 607.0 ha (1,499.9 ac)

These estimates include impacts to coniferous-mixed and deciduous-mixed forest types, and small impacts to a tree farm located in Butler County. The deciduous-mixed forest will be impacted the greatest [524.3 ha (1,295.5 ac)] due to the prevalence of overall occurrence within the project corridor. The fragmentation of relatively contiguous forested habitat was reduced as much as practicable. MoDOT's tree planting policy consists of planting more trees than removed (generally two to one).

4.15.2 Pasture/Old Field

These cover types exist as transitional ecological communities due to current and/or historic disturbances caused by land use practices and human activities. Typically, in rural areas the distinction between pasture and old field is temporal and other times difficult to ascertain. Particular parcels, for a given landowner, may currently be within an active livestock grazing rotation, while other parcels may not. Those areas that exhibited current and recent use for grazing and for hay production were identified as pasture. Those areas that exhibited no such recent activities and contained a greater diversity and structure in vegetative composition were considered old field habitats.

The proposed right of way for the Preferred Alternative will potentially impact a total of 88.8 ha (219.4 ac) of pasture and 66.5 ha (164.3 ac) of old field. The following provides a summary of impact for these cover types within each of the counties:

	Madison County			Wayne County			Butler County	
	Ha	Ac		Ha	Ac		Ha	Ac
Pasture	38.7	95.6		30.4	75.1		19.7	48.7
Old Field	19.1	47.2		31.2	77.1		16.2	40.0

The potential impacts to pasture and old field are the least in Butler County largely as a result in the reduced occurrence of these cover types and the predominance of cropland.

4.15.3 Developed

The potential impacts to the developed cover type as a result of the construction and operation of the proposed Preferred Alternative are estimated to total 144.6 ha (357.3 ac). Analyzing impacts to the developed cover type at the county level indicates the following:

- Madison County 32.4 ha (80.1 ac)
- Wayne County 57.5 ha (142.1 ac)
- Butler County 54.7 ha (135.2 ac)

4.15.4 Wetlands

The examination of impacts to wetlands is multi-dimensional as there are a number of interrelated issues that include direct habitat alteration, modification to wetland hydrology, and potential effects to vegetation and wildlife communities. Relative to direct losses to the wetland cover type in the project corridor, potential impacts arising from the Preferred Alternative are estimated to be 32.41 ha (80.13 ac). The avoidance of wetland systems was an integral component of project corridor development and refinement, as well as the study alternate evaluation process. The following impacts to wetlands have been calculated:

- Madison County 0.43 ha (1.07 ac)
- Wayne County 13.69 ha (33.84 ac)
- Butler County 18.30 ha (45.22 ac)

4.15.5 Cropland

The cropland cover type is largely limited to Butler County, south of Poplar Bluff. Attempts to minimize impacts to cropland and farm operations included avoiding and reducing cropland areas and minimizing the number of diagonal severances across cropped parcels. Cropland comprises approximately 6.8 percent of the total project corridor. Of this total, it is estimated the 71.1 ha (175.7 ac) will be directly converted from highway construction. These impacts are almost entirely limited to Butler County [61.4 ha (151.7 ac)], with some cropland areas being altered in Wayne County [9.7 ha (24.0 ac)].

4.15.6 Open Water

The open water resource is limited and scattered throughout the project corridor, with Wappapello Lake being the largest and most prominent. This cover type accounts for 1.5 percent of the project corridor. Approximately 15.3 ha (37.8 ac) of open water will be affected by the Preferred Alternative.

The No Action Alternative will not result in any direct and foreseeable impacts to terrestrial cover types.

4.15.7 Terrestrial Wildlife

Coordination has occurred with the natural resources agencies on issues of wildlife within the project corridor. Communication has been in the form of written correspondence and agency meetings (see Section 9.2 and Appendix C). Highway construction affects wildlife through the direct loss and fragmentation of habitat by increasing direct mortality for wildlife populations, and by disrupting animal movement and dispersal (Jackson and Griffin, 2000). There is evidence that roads and highways represent substantial barriers to wildlife movement (Jackson and Griffin, 2000). The impacts can be especially severe on less mobile species, such as amphibians (frogs, salamanders, etc.). Although efforts were made to minimize cross-country severances, fragmentation of habitat types will result, thereby reducing habitat contiguity. This effect will likely alter dispersal and movement patterns of fauna and reduce gene pool exchange. Fragmentation of large tracts of forest land have been shown to reduce the habitat availability for neotropical migratory birds and may decrease production of forest species nests. The expansion of the existing facility to four lanes with outer roads will increase the frequency of road kills within the project corridor. The protection of buffer zones around wetland and riparian habitats is essential for maintaining amphibian and reptile populations (Semlitsch and Bodie, 2003). The population of cliff swallows currently nesting under the existing U.S. 67 Black River bridge are not expected to be adversely impacted because the existing bridge will remain and a companion bridge built to the south.

Some design features and subsequent maintenance activities for the proposed improvements would serve to avoid or minimize harm to wildlife resources. The design features may include drift fencing, oversized bridges and culverts, dry drainage culverts, bottomless culverts, tunnels, and forested medians. Maintenance activities include selective clearing and grubbing; reseeding of native herb, shrub and tree species typical of the habitats impacted; restrictions in the time of use and application of herbicides; and the use of selective mowing to maintain ecotone and habitat diversity. Stream crossings will be bridged (to the extent practical) instead of culverted to assist movement.

In recognition of the MTNF Plan and the inherent emphasis on wise, sustainable fish and wildlife management, priority will be given to the avoidance or minimization of impacts to wildlife known to occur on MTNF lands potentially impacted by the Proposed Action.

4.15.8 Ecologically Sensitive Areas/Potentially Unique Habitats

The field reconnaissance and wetland delineation efforts identified several areas (springs, fens, dune/swale wetlands, glades) that could potentially be considered unique and/or sensitive habitats (see Section 3-8). These areas have the potential to provide habitat for listed species or glacial relic species. Some of the areas are considered to represent uncommon community types such as fens or dune/swale wetlands. Springs and fens are considered sensitive to indirect hydrologic impact such as changes in groundwater recharge/discharge.

The following subsections present a listing of these areas, from the northern to southern termini as presented in Section 3-8). The direct impacts (i.e., filling, bridging, etc.) are presented along with the potential for indirect impacts.

Madison County

Cherokee Pass Springs – Approximately 0.02 ha (0.04 ac) of forested wetland MCWL-14 and Cold Spring will be directly impacted by the Preferred Alternative. A shift in the alignment to the west of existing U.S. 67 would have impacted three springs, forested wetlands, and the fen. Given the steep topography, the number of springs, the two Twelvemile Creek crossings, and the relocation of the Twelvemile Creek side channel (MASC0031), cumulative hydrologic impacts to this sensitive area will be evaluated during the engineering phase. Engineering controls (i.e., detention basins, etc.) will be considered to reduce water quality impacts.

Twelvemile Spring Area –Due to design constraints resulting from the proximity of Settle Cemetery to existing U.S. 67, approximately 0.06 ha (0.15 ac) of MCWL-30 will be directly impacted by construction activities. Culverts will be utilized to retain the hydrology of the wetland complex. The design phase will consider indirect hydrologic impacts.

Self Fen – Direct impacts to this large [1.2 ha (3 ac)] fen were avoided. Indirect impacts will be evaluated in the design phase. Highway stormwater runoff will be diverted away from this fen.

Geronimo Spring – The outer road was designed around the Geronimo Spring pool, but will impact the associated emergent wetland. The location of the outer road was changed to minimize the impacts to this area and maintain wetland hydrology. Although the quantified area of direct impact is listed as 0.08 ha (0.20 ac), a bridge will be constructed to minimize direct impacts. An indirect effect of a constructed bridge could be the change in local primary productivity of the aquatic system due to an increase in shading. Proposed bedrock cut and fill in proximity to the spring could have indirect hydrologic impacts. An alternative to the east would have impacted Mt. Pisgah Cemetery.

Wayne County

Alexander Fen – Direct impacts to this spring and fen complex were avoided. The design phase will consider reducing bedrock cut/fill at the U.S. 67 and SR EE interchange to reduce indirect hydrologic impacts to this area.

Bounds Springs and Fen – Direct impacts to the fen and springs were avoided. Impact minimization has resulted in an estimated direct impact of 0.01 ha (0.02 ac) to PSS wetland MCWL-19.

St. Francis River Bluff Glade – Impacts to this glade have been avoided.

Box Spring (WCWL-56A) –Approximately of 0.89 ha (2.20 ac) will be directly impacted by the construction of the Preferred Alternative. The design phase will consider shifting the alignment of the southbound lanes to the west, thereby locating the spring in the median of the Preferred Alternative. Thus, the wetland hydrologic source will be maintained. A shift to the east of existing U.S. 67 would have resulted in relocating Otter Creek and greater wetland impacts.

Butler County

Cane Creek – The Cane Creek slough is classified as an open water/emergent wetland (BCWL-15). The slough will be bridged with a total impact of 0.22 ha (0.54 ac). Due to the existing steep banks and the previously disturbed nature of the area, indirect impacts are expected to be minimal. A shift to the east of existing U.S. 67 would have resulted in greater impacts to slough habitat.

Old Oaks – Impacts to this old growth forest have been avoided.

Dune and Swale Wetlands –Two forested dune/swale wetland complexes, CR338 (BCWL-38) and Route 142 wetlands (BCWL-51 and BCWL-53), will be impacted by the Preferred Alternative. Approximately 1.6 ha (3.96 ac) of wetland BCWL-38, 2.79 ha (6.90 ac) of wetland BCWL-51, and 1.62 ha (4.01 ac) of wetland BCWL-53 will be impacted by the Preferred Alternative. These wetlands have, in part, been previously disturbed (i.e., logged). Shifting the alignment east to avoid the BCWL-38 wetland would impact a new church. Shifting the alignment to avoid the BCWL-51 and BCWL-53 wetlands would either impact Neelyville (eastern shift) or an archaeological site (western shift). The design phase will consider impact minimization steps (e.g., small alignment shifts, narrowing the median, etc.) to reduce impacts to these wetlands.

Impacts to the CR272 mixed wetland complex were avoided.

4.16 Threatened/Endangered Species and Species of Conservation Concern

4.16.1 Terrestrial Species

The bald eagle is a federally threatened bird, known to occur in the general region of the study corridor. Bald eagles may occur incidentally within the vicinity of U.S. 67 during seasonal roosting and feeding activities due to their large territories and winter ranges. There were no incidental sightings of the bald eagles during field activities. Due to the lack of large river corridors and large open water bodies within the project corridor, the bald eagle is not expected to be directly affected by the construction and utilization of the Preferred Alternative.

The swamp rabbit (*Sylvilagus aquaticus*) is a state listed (S2) (MDC, 2004). There are no documented swamp rabbit observations or occurrences within the designated right-of-way. No swamp rabbits were observed during field reconnaissance activities. Therefore, swamp rabbits are not expected to be directly affected by the construction and utilization of the Preferred Alternative. However, suitable habitat for the swamp rabbit may be affected by the Preferred Alternative.

Cooper's hawk (*Accipiter cooperii*) is a seasonally rare and uncommon resident (S3) in Missouri. This species was reported to occur at only one location site near the study corridor in Butler County. There was one unconfirmed sighting of an individual during wetland reconnaissance efforts east of existing U.S. 67, north of Neelyville. Cooper's hawk may incidentally occur within the vicinity of the Preferred Alternative, but is not expected to be impacted by the project.

Potential Hine's emerald dragonfly breeding habitat within the vicinity of the study corridor includes Self Fen, Alexander Fen, and Bounds Fen. These fens will not be directly impacted by the construction of the Preferred Alternative. Due to the distance [3 km (1.9 mi)] of foraging flights from breeding habitat, there may be incidental take and reduction in foraging habitat if this species is determined to utilize breeding habitat in proximity of the Preferred Alternative. After completing the design phase of this project and prior to construction, MoDOT will reinitiate informal consultation with the USFWS to discuss potential construction impacts to any threatened or endangered species and the best ways to minimize those impacts.

The Indiana bat (*Myotis sodalis*) is a federal and state listed endangered species with a state ranking of S1. Due to the lack of suitable caves or mines (hibernacula) within the study corridor, direct impacts to Indiana bat winter habitat are not anticipated. Construction activities will include the removal of trees from riparian (bottomland) areas adjacent to creeks and rivers and upland areas. The removal of bottomland and upland forests may reduce Indiana bat foraging habitat and may impact potential maternity roost trees.

Impacts to this species during summer months result from destruction or disturbance of their roost trees and foraging habitat. The USFWS previously recommended not cutting suitable Indiana bat roost trees during the breeding season (April 1 through September 30) to avoid negative impacts to this species. After reviewing new information on summer Indiana bat use and roost tree availability in Missouri, the USFWS determined that the best scientific and commercial information did not support seasonal tree cutting as a general measure to avoid impacts and formal consultation. The USFWS now requests that impacts of Proposed Actions be evaluated on a case-by-case basis, taking into consideration the value of the site for Indiana bats and all relevant factors pertaining to the action that could impact the species. This evaluation must consider summer habitat as well as winter habitat. Examples of such factors are: (1) whether the action occurs in a county or general part of the state that Indiana bats are known or expected to occupy during summer; (2) proximity of the action to known hibernaculum, maternity, or male roosts, and/or important foraging areas; (3) the composition and extent of trees to be cut; (4) land use of the action area after project completion; and (5) consideration of the magnitude, scope, frequency, duration, and other pertinent environmental changes associated with the action in reference to the

importance of the area to the Indiana bat. However, things could change between now and the beginning of project construction. For example, new information about the species may become available or the species status could change.

Approximately 22.3 ha (55 ac) of the Brown's Hollow Area of Influence, established to protect the Indiana bat (see Section 3.10.1), will be impacted by the proposed project. Most of these impacts will occur on private land with only a small 0.16-ha (0.4-ac) tract of MTNF land impacted near the Pleasant Valley Cemetery.

The gray bat (*Myotis grisescens*) is a federal and state listed endangered species with a state ranking of S3. The lack of suitable caves or mines indicates that direct impacts to gray bat winter/summer roosts are not anticipated. Construction of the Preferred Alternative will result in the removal of bottomland and upland forests which could provide summer foraging habitat for the gray bat.

The percentage of forested land by county that has the potential to be impacted by the Preferred Alternative is presented in Table 4-20. Additionally, the fragmentation of relatively contiguous forested habitat was reduced as much as practicable, in part, to avoid potential impacts to Indiana bat and gray bat popoulations.

Table 4-20. Forest Land Impacts

County	Total Forested Land in County* Hectare (Acre)	Forested Land Impacted	
		Hectare (Acre)	Percent
Madison	249,400 (100,929.0)	198.6 (490.7)	0.5
Wayne	402, 600 (162,927.1)	723.5 (292.8)	0.2
Butler	136,700 (55,320.8)	285.6 (115.6)	0.2

* *Source: USFS, RPA 2002 Tabler/Mapmaker Version 1.0, data is Missouri 1989: http://ncrs2.fs.fed.us/4801/fiadb/rpa_tabler/webclass_rpa_tabler.asp*

Since project construction is not scheduled to begin for several years and designs for the project have not been completed, it cannot be determined now how the project may impact the Indiana bat or gray bat. After completing the design phase of this project and prior to construction, MoDOT will reinitiate informal consultation with the USFWS to discuss potential construction impacts to any threatened or endangered species and the best ways to minimize those impacts. Ideally this consultation will occur 2 to 3 years prior to construction, allowing ample time to complete the consultation and implement any modifications needed to avoid or minimize impacts. If impacts to federally listed species cannot be avoided, FHWA and MoDOT will initiate formal consultation with the USFWS. Conducting consultation at that time should be more productive for all the participants and will facilitate consideration of the latest information on listed species and construction technologies that will have developed during the interim.

4.16.2 Aquatic Species

Mussels

There are documented, historic occurrences of the federally listed endangered pink mucket (*Lampsilis abrupta*) and Curtis' pearly mussel, (*Epioblasma florentina curtisi*) in the project area. Therefore, freshwater mussel (unionid) surveys were conducted above and below the proposed river crossings at Black River, St. Francis River and Cane Creek (see Section 3.10.2.1). Neither of these federally listed species was sampled, live or dead, during survey activities.

No live unionids were collected near the potential bridge crossings at the St. Francis River and Cane Creek. The lack of preferred habitat is most likely the reason for the lack of unionids at these locations. Numerous unionids, however, were collected near the Black River Crossing. Although no federally listed unionids were collected during Black River survey; three species with a Missouri S-ranking were collected. These include elktoe (*Alasmidonta marginata*) (S2), western fanshell (*Cyprogenia aberti*)

(S1S2) and ebony shell (*Fusconaia ebena*) (S1). Although unionid concentrations typically considered to be a "mussel bed," were not observed, areas with higher concentrations of specimens were recorded. In general, unionids were primarily collected within 10 m (32.8 ft) of the right descending bank and the greatest concentrations of individuals were found in Search Areas 1 through 3.

Since unionids were found throughout the Black River study site, construction activities could affect some unionids at this location. However, new bridge piers are anticipated to be similar in structure, and location compared to the existing U.S. 67 bridge. Consequently, direct impacts to the streambed will be minimized as the existing bridge piers are out of flow during typical river stages. Although, changes to flow dynamics, and resulting scour and deposition can not be determined without performing hydraulic modeling, placement of the proposed bridge piers outside of normal flow conditions will reduce the likelihood of indirect streambed changes. Implementation of sediment barriers, sheet piling, and minimizing in-stream activities will reduce direct impacts to unionids and stream flow alterations.

Prior to construction, MoDOT will coordinate with USFWS and MDC to resurvey and re-locate listed mussel species as needed and appropriate at the proposed site for the Black River bridge.

Fish/Crustaceans

A number of state listed fish species and the state listed Big Creek crayfish have been reported for streams and rivers within the project corridor (see Section 3-10 and Table 3-16). No fish/crustacean sampling was conducted as part of the EIS process.

Potential direct and indirect impacts to these species are dependent upon their distribution within their respective watersheds at the time of construction, the degree of habitat alteration resulting from the construction and future utilization of the Preferred Alternative, and the long-term adequacy of erosion and sedimentation control procedures implemented during the construction process. Therefore, species sensitivity has been addressed where applicable depending on the availability of species-specific information.

It is not anticipated that the proposed action will adversely affect fish or crustacean species (including Big Creek crayfish) on a whole. Impacts to fish/crustaceans will be minimized by strict adherence to MoDOT's Temporary Erosion and Sediment Control Procedures. Prior to construction, MoDOT will coordinate with MDC (as feasible) regarding the distribution, seasonal movements, and reproductive periods of fish/crustacean species. Construction activities near streams and their tributaries for the Preferred Alternative will avoid fish spawning periods (to the extent practicable).

4.16.3 Plant Species

No federally-listed plant species were reported to exist in the project corridor. Three state ranked plant species were observed within the project corridor: Corkwood (*Leitneria floridana*), water canna (*Thalia dealbata*), and water oak (*Quercus nigra*).

Corkwood (*Leitneria floridana*) (S2) is a woody shrub or small tree that inhabits wooded or open swamps and wet thickets and ditches along roadsides in Missouri's southeast lowlands (Steyermark, 1963). Corkwood populations were identified at three locations in Butler County that will be impacted by the Preferred Alternative:

- Corkwood was observed along the fringe of emergent Wetland BCWL-44.
- A few corkwood saplings were observed in forested Wetland BCWL-50.
- Corkwood was observed at several locations along the edge of the Neelyville Ditch at proposed stream crossing BUSCO120 and the adjacent Wetland BCWL-51.
- Occasional, individual corkwood plants were observed in several of the area ditches (i.e., Epps Ditch, etc.) but these locations are not within the proposed right of way.

These populations may occur due to establishment from the 176 ha (434 ac) MDC Corkwood Conservation Area located adjacent to the Preferred Alternative west of Neelyville. Although populations of corkwood will be impacted by the Preferred Alternative at three locations, it is not anticipated that the proposed action will adversely affect this species as a whole.

Water canna (*Thalia dealbata*) is an emergent aquatic plant whose historical distribution is associated with natural lakes and lowland swamps. This species is presently known to additionally occur in ponds, streams and ditches in five Missouri counties (Yatskievych, 1999). This species was observed in Butler County south of CR142 at the edge of forested Wetland BCWL-54. This population of water canna is outside of the proposed right of way and, therefore, will not be impacted by the Preferred Alternative.

Water oak (*Quercus nigra*) is a medium to large tree found in wet bottomland forests in Missouri's southeast lowlands (MDC, 2003). A single water oak was observed in the forested (dune and swale) Wetland BCWL-53. Water oaks were also observed in forested Wetland BCWL-56. Both of these locations will be impacted by the Preferred Alternative. Although two small populations of water oak will be impacted by the Preferred Alternative, it is not anticipated that the proposed action will adversely affect this species on a whole.

Several other state listed plants (leather flower, crane-fly orchid, *Cyperus retroflexus*, finger dog-shade, juniper leaf, Loesel's twayblade, strawberry bush, and smallflower fumewort) were reported to occur within proximity of the Preferred Alternative (see Section 3.10) but were not observed during the site reconnaissance or wetland delineation. Although these species were not observed, suitable habitat for these species may be impacted by the Preferred Alternative.

4.17 USFS Eastern Region Sensitive Species

Most of the proposed crossings of MTNF property are adjacent to the existing U.S. 67 facility. Consequently, impact to USFS lands and potential impact to R9 species are reduced because those areas that will be affected are disturbed "edge" habitats. Areas where there are severances of USFS property away from the existing U.S. 67 will require more intensive consideration.

As indicated in Section 3.11, the USFS maintains a list of sensitive species for the eastern region (R9) (Appendix C, USFS letter). Presented in Table 3-19 is information on animals and plants from the R9 list that would likely occur on MTNF lands and could potentially be affected by the U.S. 67 build alternates. To assist with the evaluation of species occurrences and the potential for impact, GIS files containing locations for R9 species were provided by MTNF to MoDOT biologists. These files were used in conjunction with the Heritage Database Information, provided by MDC, to determine where R9 species have been observed in relation to the proposed improvements, and what habitat types within MTNF would be affected by the Preferred Alternative. A classification of specific habitats within each stand was conducted, which included a combination of geology, landform soil type, slope, and aspect. The specific habitat classification process was used to determine what species of plants and animals may be expected to occur within the areas proposed for crossing by the Preferred Alternative.

Based upon the results of the habitat classification and R9 species cross referencing process, it has been determined that 21 animal and 49 plant species required further investigation to determine if the proposed improvements to U.S. 67 would result in adverse impacts to these species. The MoDOT field survey team conducted surveys on May 1-5 and August 14-17, 2000, and June 3 and 4, 2003, to determine the occurrence of any R9 plant species or their habitats.

As a result of these field investigations, 412 species of plants were identified from 188.7 ha (466.34 ac) of MTNF lands that lie within the proposed U.S. 67 right of way. The survey methods and identified plants are listed in the MoDOT technical report, *A Survey for Plants on the USDA, Forest Service Eastern Region – Regional Forester's Sensitive Species List (R9 Species) within Mark Twain National Forest*.

Species that were abundant in the study area include shortleaf pine, white oak, northern red oak, black hickory, black gum, black oak, shagbark hickory, gray dogwood, flowering dogwood, fragrant sumac, low bush blueberry, deerberry, and sassafras. No state or federally listed rare or endangered plant species were observed. Furthermore, no species that appear on the R9 plant list were observed.

Since the beginning of the study, USDA published an updated R9 list on August 30, 2002. The USFWS added three new plant species to the MTNF R9 list. None of these additional listed plants [yellow coneflower (*Echinacea paradoxa* var. *paradoxa*), southern catalpa (*Catalpa bignonioides*), and a panic grass (*Panicum bicknelli*)], were observed during the R9 plant surveys.

In addition to identifying flora, MoDOT field investigators were instructed to make every effort to examine and evaluate the quality of any "potential natural feature" site they may discover. However, in all of the MTNF land areas investigated within the alternative study areas, only a single natural community with a degree of habitat suitability for an R9 species was discovered. A stand of giant cane (*Arundinaria gigantean*) was found near the Black River. A bird survey was conducted in the stand of giant cane and 15 bird species were observed. These species are listed in the MoDOT technical report. Specifically, the survey team was looking for nesting Swainson's warbler, an R9 species, which uses canebrakes for nesting habitat. The warbler was not observed at this site.

Also since the beginning of the study, three new fish species, which have been known to occur in the Black River or its tributaries, have been added to the updated R9 list. These include the Ozark sculpin (*Cottus hypselurus*), brook darter (*Etheostoma burri*), and current darter (*Etheostoma uniporum*).

The additional fish species listed on the latest R9 list and the mussels discussed in Section 4.16.2 will receive further evaluation as project funding becomes available. At that time, more detailed surveys will be conducted, if warranted, to determine the potential affects on these species.

Biological assessments are part of the process that the MTNF will use to determine effects on R9 species. A summary of findings, based on the results of the biological assessments will be developed through additional coordination with MTNF. It is anticipated that the finding of the MTNF will recommend avoiding and minimizing all potential impacts to water quality and terrestrial habitats, thereby, maintaining the integrity of aquatic and terrestrial communities within the MTNF boundaries.

If the scope of the potential impacts should change or there are additional impacts discovered during the design phase of this Proposed Action, which are deemed unacceptable to the MTNF, the issue will be resolved through additional coordination to the satisfaction of the agencies involved.

Forest Plan standards (MTNF Land and Resource Management Plan) require that federally listed threatened and endangered species, species listed as endangered or rare by the state of Missouri (i.e., species of concern), and R9 species be protected from disturbance. MODOT will coordinate with MTNF as necessary to ensure the continued existence of these species as a viable population within MTNF lands. Likewise, the Forest Plan standards provide guidelines for protection of special habitats and require compliance with Executive Orders 11988 (Floodplain Management) and 11990 (Wetland Protection). Implementation of the Proposed Action as described in this Final EIS will accomplish the following: (1) compliance with the stated objective of the Forest Plan and its standards and guidelines and will not require amendments to the Forest Plan, (2) complies with the Endangered Species Act, Section 7 consultation and does not jeopardize the continued existence of a threatened or endangered species, species of concern, or sensitive species, and (3) complies with Executive Orders 11988 and 11990.

The proposed project should comply with the reasonable and prudent measures outlined in *Biological Opinion on the Impacts of Forest Management and Other Activities to the Gray Bat, Ball Eagle, Indiana Bat, and Mead's Milkweed on the MTNF* (USFWS, 1999) as needed and appropriate. The reasonable and prudent measures with their implementing terms and conditions are designed to minimize the impact of

incidental take and adverse affects that may otherwise result from the proposed action. The reasonable and prudent measures discussed in the BO fall within the USFS's responsibilities to conserve federally listed species as outlined in Sections 3(c)(1) and 7(a)(1) of the Endangered Species Act of 1973.

4.18 Cultural Resources

4.18.1 Architectural and Bridge/Culvert Resources

Of the eight architectural resources within the study corridor which contain properties eligible for listing in the NRHP (buildings 22a, 38a, 39a, 62a, 78a, 317a, and 317b; and B84-the St. Francis River bridge), four resources are within the area of potential effect (APE), defined as 30.5 m (100 ft) beyond the right of way for the Preferred Alternative. These properties are building 78a, building 317a, building 317b, and B84-the St. Francis River bridge.

Building 78a

Building 78a is a two-story, transverse-crib barn of wood-frame construction. It was built in the early 1900's, probably just before or during 1922 when U.S. 67 was built. The construction of U.S. 67 bisected the original homestead. Another barn at this location was torn down to accommodate construction of present U.S. 67. A two-story, wood-frame farm house which is located on the west side of U.S. 67 was part of the early farmstead.

The Preferred Alternative initially impacted this building. Since the issuance of the Draft EIS, the Preferred Alternative has been revised to avoid building 78a. The proposed outer road was shifted approximately 100 feet east of building 78a. As a result of this revision, SHPO has concurred that there will be no adverse effect to building 78a by the Preferred Alternative (MDNR letter dated September 15, 2003, Appendix C).

Buildings 317a and 317b

Building 317a is a one-story house of horizontal-log construction. A single-story accessory building, property number 317b, is also horizontal-log construction. Both buildings date from circa 1930.

The Preferred Alternative initially impacted building 317a and 317b. Since the issuance of the Draft EIS, the Preferred Alternative has been revised to avoid buildings 317a and 317b. The proposed outer road was shifted approximately 85 feet east of buildings 317a and 317b. As a result of this revision, SHPO has concurred that there will be no adverse effect to building 317a and 317b by the Preferred Alternative. (SHPO letter dated September 15, 2003, Appendix C).

Bridge B84 (St. Francis River Bridge)

The St. Francis River bridge is a two-lane facility with no shoulders. By today's engineering standards, the St. Francis River bridge is functionally obsolete and cannot be used for the ultimate design facility. A bridge on a new freeway system must be designed with 3.05-m (10-ft) shoulders. The type of construction of the existing bridge (overhead truss) does not allow the existing bridge to be widened to accommodate shoulders. The construction of the Preferred Alternative will require the removal of the eligible St. Francis River bridge and was included in the Final Section 4(f) Evaluation (Section 5.0). Physical destruction of this bridge is considered an adverse effect when applying the requirements of Section 106 of the National Historic Preservation Act (36 CFR Part 800.5). The SHPO has determined that the Preferred Alternative will have an adverse effect on the St. Francis River bridge (SHPO letter dated February 7, 2003, Appendix C). The Final Section 4(f) Evaluation includes an MOA (Section 5.0) between FHWA and SHPO that provides for the development of a mitigation plan for this adverse effect. The treatment of the St. Francis River bridge will be handled in accordance with the Missouri Historic Bridge Preservation Plan.

4.18.2 Archaeological Resources

4.18.2.1 Phase I Archaeological Investigations

A Phase I archaeological survey was conducted for the U.S. 67 Preferred Alternative right of way between the fall of 1999 and the summer of 2002. Both the USACE and MTNF have reviewed the results of the Phase I survey regarding archaeological sites on USACE and MTNF properties respectively (Appendix E). Right of entry was denied on nine land tracts, in total measuring slightly less than 3 km (1.9 miles). Consequently, approximately 43 ha. (107 acres) of the project area were not surveyed. Table 4-21 lists the 47 archaeological resources that were investigated during the survey. These sites include 22 prehistoric sites, 12 historic sites, 12 sites containing both prehistoric and historic components, and one site of unknown age or cultural affiliation. Due to changes in the Preferred Alternative, three of these sites (23BU77, 23WE761, and 23WE765) will not be impacted by the proposed project.

Of the 39 previously recorded archaeological sites reported to be located within the study corridor, 21 sites were possibly entirely or partially situated within the Preferred Alternative right of way. Twelve of these sites (23BU77, 23BU179, 23BU297, 23BU299, 23MO40, 23MO116, 23WE262, 23WE293, 23WE575, 23WE576, 23WE637, and 23WE694) were identified within the project area during the survey. The remaining nine previously recorded sites (23BU201, 23WE123, 23WE124, 23WE261, 23WE263, 23WE290, 23WE313, 23WE475, and 23WE494) were not identified within the right of way of the Preferred Alternative. Results of the survey indicate that site 23WE261 is outside the right of way while sites 23WE263, 23WE313, and 23WE475 are probably outside the boundary. Although not located during the survey, site 23WE494, a mound site, is situated within the project area. Previous construction of U.S. 67 has reportedly partially destroyed this site and may have completely destroyed it. Construction activities in the vicinities of the remaining four sites have possibly destroyed the portion within the Preferred Alternative, or, due to the less accurate labeling and mapping techniques used for recording these sites, they may not be located within the right of way.

Of the 34 prehistoric sites investigated during the Phase I survey, 19 are habitation sites (base camp/village sites and field camps) while the remaining 15 are interpreted as limited activity, specialized extraction sites associated with the procurement of specific local resources. The majority of the prehistoric sites are temporally non-diagnostic lithic scatters. Temporal affiliations have been determined for four sites, 23BU77, 23BU179, 23WE262, and 23WE293, based on the results of the current survey, as well as earlier work at these previously recorded sites. A Middle Mississippi occupation is present at site 23BU77, site 23WE262 dates to the Early and Middle Archaic periods, and site 23WE293 dates to the Early Archaic, Middle Archaic, and Late Woodland-Mississippi periods. Site 23WE179 was possibly in use during the Late Woodland period.

The 24 sites containing historic components that were recorded during the survey consist of a portion of the town of Taskee (23WE775), four rural commercial properties (a sawmill, 23BU391; a machine shop, 23WE762; a restaurant/tavern, 23WE763; and a roller mill at Old Greenville, 23WE637), the Greenville CCC camp (23WE761), a roadside park (23BU293), and two isolated wells (23BU397 and 23WE576). The remaining 15 historic sites are interpreted as farmsteads/rural households. The majority of these sites span a temporal range from the late nineteenth century or early twentieth century through the mid- to late twentieth century. Only one site, site 23BU399, a farmstead/rural household, falls outside this range with an initial occupation dating to the mid-nineteenth century. USGS maps indicate that previously existing buildings are known on 10 of the 24 historic sites investigated.

The temporal and cultural affiliation of one site, site 23MO159, is not known. This site is interpreted as a possible cairn. Cairns have multiple uses such as grave-markers, ceremonial sites, and trail/location markers and are known from the earliest prehistoric period through the modern historic period.

The proposed right of way for the Preferred Alternative will potentially impact a total of 88.8 ha (219.4 ac) of pasture and 66.5 ha (164.3 ac) of old field. The following provides a summary of impact for these cover types within each of the counties:

	Madison County			Wayne County			Butler County	
	Ha	Ac		Ha	Ac		Ha	Ac
Pasture	38.7	95.6		30.4	75.1		19.7	48.7
Old Field	19.1	47.2		31.2	77.1		16.2	40.0

The potential impacts to pasture and old field are the least in Butler County largely as a result in the reduced occurrence of these cover types and the predominance of cropland.

4.15.3 Developed

The potential impacts to the developed cover type as a result of the construction and operation of the proposed Preferred Alternative are estimated to total 144.6 ha (357.3 ac). Analyzing impacts to the developed cover type at the county level indicates the following:

- Madison County 32.4 ha (80.1 ac)
- Wayne County 57.5 ha (142.1 ac)
- Butler County 54.7 ha (135.2 ac)

4.15.4 Wetlands

The examination of impacts to wetlands is multi-dimensional as there are a number of interrelated issues that include direct habitat alteration, modification to wetland hydrology, and potential effects to vegetation and wildlife communities. Relative to direct losses to the wetland cover type in the project corridor, potential impacts arising from the Preferred Alternative are estimated to be 32.41 ha (80.13 ac). The avoidance of wetland systems was an integral component of project corridor development and refinement, as well as the study alternate evaluation process. The following impacts to wetlands have been calculated:

- Madison County 0.43 ha(1.07 ac)
- Wayne County 13.69 ha (33.84 ac)
- Butler County 18.30 ha (45.22 ac)

4.15.5 Cropland

The cropland cover type is largely limited to Butler County, south of Poplar Bluff. Attempts to minimize impacts to cropland and farm operations included avoiding and reducing cropland areas and minimizing the number of diagonal severances across cropped parcels. Cropland comprises approximately 6.8 percent of the total project corridor. Of this total, it is estimated the 71.1 ha (175.7 ac) will be directly converted from highway construction. These impacts are almost entirely limited to Butler County [61.4 ha (151.7 ac)], with some cropland areas being altered in Wayne County [9.7 ha (24.0 ac)].

4.15.6 Open Water

The open water resource is limited and scattered throughout the project corridor, with Wappapello Lake being the largest and most prominent. This cover type accounts for 1.5 percent of the project corridor. Approximately 15.3 ha (37.8 ac) of open water will be affected by the Preferred Alternative.

The No Action Alternative will not result in any direct and foreseeable impacts to terrestrial cover types.

Table 4-21. Summary Data for Sites Investigated During the U.S. 67 Phase I Archaeological Survey

Site Number	Site Type	Identified Components	Site Area (m^2)	Site Condition	Impacted by Preferred Alternative	NRHP Status	Recommended Work
23MO170	Limited Activity	Unknown Prehistoric	729	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE262	Base Camp	E.A., M.A.	54,400*	Severely Disturbed	Yes	Potentially Eligible	Avoid/Phase II
23WE293	Field Camp Farmstead/Rural Household	E.A., L.A., L.W.-M. Late 19th-Mid-20th c.	12,000	Moderately Disturbed	Yes	Potentially Eligible Ineligible	Avoid/Phase II No Further Work
23WE575	Field Camp	Unknown Prehistoric	22,500*	Minimally Disturbed	Yes	Potentially Eligible	Avoid/Phase II
23WE576	Well	Unknown Historic	1	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE637	Old Greenville-Roller Mill	Late 19th-Mid-20th c.	Undetermined	Severely Disturbed	Yes	Listed 1990	Avoid/Phase III
23WE694	Farmstead/Rural Household	Late 19th-Early 20th c.	1,802	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE760	Farmstead/Rural Household	Late 19th-Early 20th c.	1,115	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE761	Greenville CCC Camp	Early 20th c.	26,136	Moderately Disturbed	No	Potentially Eligible	Avoid/Phase II
23WE762	Machine Shop	Early-Late 20th c.	4,000	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE763	Restaurant/Tavern	Early-Mid-20th c.	2,637	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE764	Field Camp	Unknown Prehistoric	2,041	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE766	Limited Activity	Unknown Prehistoric	376	Severely Disturbed	Yes	Ineligible	No Further Work
23WE765	Limited Activity Farmstead/Rural Household	Unknown Prehistoric Late 19th c.	3,575	Minimally Disturbed	No	Ineligible Ineligible	No Further Work No Further Work
23WE767	Field Camp	Unknown Prehistoric	3,097	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE768	Limited Activity	Unknown Prehistoric	173	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE773	Field Camp	Unknown Prehistoric	875	Moderately Disturbed	Yes	Ineligible	No Further Work
23WE774	Limited Activity Farmstead/Rural Household	Unknown Prehistoric Late 19th-Mid-20th c.	1,125	Moderately Disturbed	Yes	Ineligible Ineligible	No Further Work No Further Work
23WE775	Taskee Station	Late 19th-Mid-20th c.	Undetermined	Severely Disturbed†	Yes	Ineligible**	No Further Work†
23WE776	Field Camp	Unknown Prehistoric	600	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE777	Field Camp	Unknown Prehistoric	600	Minimally Disturbed	Yes	Ineligible	No Further Work
23WE778	Limited Activity	Unknown Prehistoric	4,200	Minimally Disturbed	Yes	Ineligible	No Further Work

* Estimated
† Reflects only portion of site investigated during the current survey
Source: ARG, 2003.

4.18.2.2 Impacts to Archaeological Resources

The Preferred Alternative and its associated right of way will impact 44 of the 47 sites investigated during the Phase I archaeological survey (Table 3-19). Due to shifts in the Preferred Alternative, three of the 47 sites will no longer be impacted by the proposed project. Of the 44 sites located within the right of way, 31 sites have been evaluated as ineligible for listing on the NRHP. The remaining 13 sites include one site (23WE637) that is already listed on the NRHP and 12 sites (23BU179, 23BU297, 23BU392, 23BU399, 23MO159, 23MO161, 23MO162, 23MO166, 23MO167, 23WE262, 23WE293, and 23WE575) that contain prehistoric and/or historic components that may meet the eligibility requirements for the NRHP.

Nine previously recorded archaeological sites (23BU201, 23WE123, 23WE124, 23WE261, 23WE263, 23WE290, 23WE313, 23WE475, and 23WE494) possibly located within the Preferred Alternative were not located within the right of way during the Phase I survey. The previously reported site information for site 23WE494, a prehistoric mound site, indicates this site is situated within the project area and has been partially destroyed by previous construction of U.S. 67. Monitoring is recommended in the vicinity of site 23WE494 during the initial ground disturbances by the proposed project. Based on the reported site locations, site 23WE261 is outside of the right of way, while three sites (23WE263, 23WE313, and 23WE475) are probably located outside the project boundary or previous construction activities may have destroyed the portion located within the right of way. Of these nine sites, one site (23WE494) may be eligible for the NRHP. As they could not be re-located, the remaining eight sites have not been evaluated for NRHP eligibility.

The potential to minimize or avoid impacts to the 13 sites within the right of way with components listed on, or possibly eligible for, the NRHP was evaluated by considering a shift in the alignment of the Preferred Alternative. It was determined that a Phase III mitigation at site 23WE637 and a Phase II investigation at each of the other 12 sites is more practical than modifications to the Preferred Alternative. This information is presented below.

Madison County

Five (23MO159, 23MO161, 23MO162, 23MO166, and 23MO167) of the 12 sites that may be eligible for the National Register and will be affected by the Preferred Alternative are located in Madison County. Three build alternates, Alternates A, B, and C, were developed in the vicinity of sites 23MO161 and 23MO166. Site 23MO161 is a prehistoric field camp located at the northern terminus of the project area which is also the southern end of the relocation of U.S. 67 at Mill Creek (MoDOT Project J0P0562). The Mill Creek Reliever project has already impacted a portion of the site. All three alternates follow the same course in this location; consequently, there is no difference on the impact to site 23MO161. Since the site is located at the intersection of the earlier project and the proposed one, it is considered more feasible to conduct a Phase II investigation than revise the junction. Alternates A, B, and C also impact site 23MO166, a prehistoric field camp and early twentieth century farmstead/rural household. The alternates would equally impact site 23MO166 as they follow the same course in the vicinity of this site. Shifting the alternates west would have a greater effect on water resources, which include several springs, Twelvemile Creek, and its associated floodplain. A shift to the west would impact two previously recorded archaeological sites, site 23MO138 which is eligible for the NRHP and site 23MO153 which may be eligible.

Only one alternate, Alternate D was developed in the vicinity of sites 23MO159 and 23MO167 and one alternate, Alternate H in the locale of site 23MO162. Site 23MO159 is a possible cairn of unknown temporal or cultural affiliation and sites 23MO167 and 23MO162 are prehistoric field camps. Impediments to shifting the alternates in these locations include cemeteries (Barber Cemetery and Settle Cemetery), greater impacts to the Twelvemile Creek or Greenwood Branch floodplains, greater habitat fragmentation, and severe terrain resulting in greater project costs due to increased cut and fill requirements. Consequently, Phase II investigations of these sites are considered more practical.

Wayne County

Site 23WE637, Old Greenville National Historic Site that is listed in the National Register and three sites (23WE262, 23WE293, and 23WE575) that may be eligible for the National Register are located within the right of way for the Preferred Alternative in Wayne County. These sites are located within the Greenville area, which contains numerous environmental, cultural, and socioeconomic resources.

Site 23WE637, Old Greenville National Historic Site (Old Greenville), is the location of the former town of Greenville. Old Greenville was founded in 1818 on the St. Francis River at the crossing of the Natchitoches Trace. Old Greenville served as a prominent political and trade center until the Civil War. During the war, Old Greenville was occupied several times by both Union and Confederate armies and over half of the town was burned. Old Greenville suffered a slow economic and political recovery after the war and did not fully recover until the logging boom in the last two decades of the nineteenth century. It continued to flourish until the construction of Wappapello Reservoir by the USACE in 1941. Between 1940 and 1942 all buildings within the town were razed or moved to a new town site 3.2 km (2 mi) to the north.

Old Greenville was listed on the NRHP in 1990 as a site, under Criterion D because this site can yield important, historic archaeological information. Old Greenville is of local significance as a frontier town and a county seat important in the initial and expanding frontier settlement of the Eastern Ozarks of southeast Missouri and northeast Arkansas. Settlements, such as Old Greenville, functioned to centralize social, political, and economic activities. Old Greenville has high potential for producing data to assess these functions. The site has high archaeological site integrity as the town does not lie under an existing town and was moved prior to the installation of underground utilities.

Only a very small portion of Old Greenville extends into the Preferred Alternative right of way. During the Phase I archaeological survey six features were identified within the project area. These features include a concrete foundation, two concrete features, two concrete and stone walls, and a relic, domestic well. Archival research indicates these features are associated with the Greenville Roller Mill and Restaurant and possibly with a railroad track or households located in this vicinity. The building housing the mill and restaurant was constructed around 1889. During the 1930s the eastern portion of the mill building was converted into a restaurant and, subsequently, a gas station was constructed nearby.

These physical features that contribute to the historic significance of Old Greenville will be affected by the Preferred Alternative; therefore, when applying the requirements of Section 106 of the National Historic Preservation Act [36 CFR Part 800.5], there will be an adverse affect to Old Greenville National Historic Site. Section 4(f) of the Department of Transportation Act [49 USC 303(c)] protects publicly owned parks, recreation areas, wildlife refuges, waterfowl refuges, and significant historic and archeological resources. The Old Greenville National Historic Site qualifies as a Section 4(f) resource for the proposed project. For detailed information, see Section 5.0, Final Section 4(f) Evaluation. The potential to minimize or avoid impacts to this site was evaluated by considering four subalternates in this location. Subalternative 1 had the highest impacts to Old Greenville, including the identified features, and minimized those to Greenville Recreation Area, wetlands, and floodplains east of U.S. 67 while Subalternative 2 would not impact the site but had the maximum impact on the resources to the east. Subalternative 3 minimized the impacts to Old Greenville and the identified features, the Greenville Recreation Area, wetlands, and floodplains, however, it had a higher accident cost. Subalternative 4, the preferred subalternate, had similar impacts to Old Greenville, Greenville Recreation Area, and natural resources as Subalternative 3 but had lower accident costs. In addition to the four subalternates, a complete avoidance alternative was developed that would avoid Old Greenville and Greenville Recreation Area. This alternative, which also avoided the North Greenville Recreation Area/Greenville ballpark, would have to be constructed to the 405-ft elevation within the Wappapello Lake flood pool, result in two additional crossings of the Ozark Trail, require a longer bridge over the St. Francis River due to a skewed crossing, impact large tracts of USACE managed multiple resource property, bypass the City of

Greenville, increase the number of lane miles to the state highway system, result in higher costs to the project. For these reasons, a complete avoidance alternative was eliminated and a Phase III recovery operation to mitigate impacts to this portion of Old Greenville.

Site 23WE262 was previously recorded as a prehistoric village and burial ground during the 1920s when construction of U.S. 67 uncovered house patterns and human remains on a terrace above the St. Francis River. No evidence of burials was found during the Phase I survey. Diagnostic artifacts indicate the site was in use during the Early and Middle Archaic periods. Site 23WE262 is located on both sides of U.S. 67 and may be eligible for inclusion in the NRHP. The portion of the site to the southwest of U.S. 67 warrants preservation in place; therefore this part of site 23WE262 qualifies as a Section 4(f) resource. The portion of the site to the northeast of U.S. 67 does not appear to warrant preservation in place. Four subalternates and a complete avoidance alternative were developed in this area (North Greenville Recreation Area.) Subalternative 1 initially impacted the portion of Site 23WE262 located southwest of U.S. 67. Since the issuance of the Draft EIS, Subalternative 1 was modified to avoid the portion of 23WE262 southwest of U.S. 67. Subalternative 1 has the best design because it has no horizontal curves, which provides a more desirable alignment compared to the other subalternates. Subalternates 2 and 3 would impact the portion of Site 23WE262 located west of U.S. 67 that qualifies as a Section 4(f) resource and Subalternative 4 would avoid 23WE262. The complete avoidance alternative, previously discussed under Site 23WE637, was not considered practical and was eliminated [Final Section 4(f) Evaluation, Section 5.0]. Based on the survey results, previously reported site information, and prehistoric site prediction models, if human burials are present at site 23WE262, they will most likely be found in the western portion of the site. The portion to the southeast of U.S. 67 that will be impacted exhibits very low artifact density and diversity indicating that it was lightly utilized by the site occupants. Given the low artifact density in the portion of the site to be impacted, a Phase II investigation (and subsequent mitigation if necessary) of the impacted portion of the site is considered more practical than relocating the alignment. In the event that human remains are encountered during the Phase II investigation, additional proceedings will comply with all relevant statutes and consultation with Native American groups will proceed under the direction of the FHWA as needed and appropriate.

Site 23WE575 is a prehistoric field camp of unknown temporal affiliation. This site is located west of existing U.S. 67 at the northern end of the Greenville ballpark, a Section 4(f) and Section 6(f) resource, and extends into the USACE North Greenville Recreation Area, a Section 4(f) resource. Four subalternates were developed west of the highway to minimize or avoid impacts to the ballpark and the recreation area [Final Section 4(f) Evaluation, Section 5.0], and, as a consequence, site 23WE575. The western extent of the corridor was limited by the St. Francis River and impacts to the floodplain. Additionally, there is a greater potential for archaeological sites closer to the river. Subalternate 1 has the maximum impact on the site while Subalternates 2 and 3 affect a smaller portion of the site. Subalternate 4 avoids the site completely. In addition to the four subalternates, a complete avoidance alternative was developed that would avoid the Greenville Recreation Area and Old Greenville. As discussed under Site 23WE637 (Old Greenville), this avoidance alternative was not considered feasible and was eliminated. It may be more practical to conduct Phase II testing at site 23WE575 and minimize any social, economic, engineering, and environmental consequences associated with site avoidance.

Site 23WE293 is a multicomponent site consisting of a prehistoric field camp and late nineteenth century historic farmstead/rural household. No temporally diagnostic prehistoric artifacts were recovered during the Phase I survey, however, the previously reported site information indicates the site was in use during the Early Archaic, Late Archaic, and Late Woodland-Mississippi periods. The site is located on property managed by the USACE within Greenville Recreation Area and is adjacent to the southern end of Old Greenville. Four subalternates as well as a complete avoidance alternate were developed at Old Greenville. Subalternates 1 and 3 have the same impact to the site while Subalternate 2 avoids the site. Subalternate 4, the preferred subalternate in this location, has the greatest impact on the site but is the most effective at minimizing impacts to Old Greenville, natural resources in Greenville Recreation Area,

and project costs. Additionally, shifting the alignment east in the vicinity of site 23WE293 would impact two or more previously recorded archaeological sites, including one site (23WE635) that may be eligible for the NRHP, and possibly an NRHP listed cemetery. The complete avoidance alternative, which has been previously discussed under Old Greenville, was not practical and was eliminated.

Site 23WE761 is the Greenville CCC camp which was established in 1934. The men at this camp were mainly responsible for fire-fighting but also installed telephone lines and performed U.S. 67 road construction and timber stand improvement. The CCC camp closed in 1935 and the buildings were then used as a transient camp for older, homeless men. A year later the transient camp closed and the buildings were removed. Surface features identified during the Phase I survey include a rock-lined depression, one cistern and one well, four concrete piers, three concrete troughs, three concrete pads, two stone walls, and two dumps. Since the issuance of the Draft EIS, Alternate L of the Preferred Alternative was shifted east to avoid the site and the surrounding area. Should site avoidance become impractical, Phase II testing is recommended to further assess the NRHP eligibility of the site.

Butler County

Four sites (23BU179, 23BU297, 23BU392, and 23BU399) that may be eligible for the National Register are located within the Preferred Alternative right of way in Butler County. One final build alternate was developed for each of the areas in which the sites are located. Site 23BU179 is a field camp possibly dating to the Late Woodland period. A portion of the site is located within Alternate Q which does not require the acquisition of additional right of way at the site location, therefore, only the portion of the site located within the existing right of way will be impacted. Based on the results of the Phase I survey and previously reported site information, the more significant portion of the site lies west of the existing right of way outside the project area. The area to be impacted has already been disturbed by previous U.S. 67 construction, therefore, it is considered more practical to conduct Phase II testing than shift the alignment which would result in greater impacts to the floodplain as well as increased project costs.

Site 23BU297 is a historic well located within Alternate P that incorporates the use of the existing four-lane divided pavement. The site is located just north of the Route 60-west interchange and will be impacted by improvements to the interchange. Due to the existing interchange and four-lane divided pavement at this location, it is considered more practical to conduct Phase II testing than shift the alignment.

Site 23BU392 is a prehistoric field camp and late nineteenth to mid-twentieth century farmstead. Data from the Phase I survey indicate only the prehistoric component may be eligible for the National Register. The site lies within Alternate O in the right of way previously acquired by MoDOT for the construction of two additional lanes east of existing U.S. 67. An interchange with Route JJ is also proposed for this location. The site would not be impacted if the ramps were placed north of Route JJ; however, this is not feasible as an electrical substation and the Black River quarry are located in this area.

Site 23BU399 is interpreted as a prehistoric limited activity site and mid-nineteenth to mid-twentieth century farmstead/rural household. Results of the Phase I survey indicate only the historic component may be eligible for the NRHP. The site lies within Alternate T at the intersection of U.S. 67 and Route MM where a grade-separated crossing is proposed. The entire length of Alternate T is adjacent to the existing western right of way. In general, shifting the alignment east of the highway would result in a greater impact to residential and commercial property and wetlands. Additionally, three NRHP sites (23BU59, 23BU60, and 23BU127) that are listed as part of the Little Black River Archaeological District would be impacted if the alignment was shifted east in the site vicinity.

The Preferred Alternative was shifted in the Neelyville area to avoid site 23BU77, a Middle Mississippi Powers Phase village, commonly known as the Wilbourn Site. According to Dr. James E. Price, the Powers Phase was a short-lived Mississippi manifestation dating circa A.D. 1275 to 1320 and located in southeastern Missouri and northeastern Arkansas within the Western Lowlands of Central Mississippi

Valley. People of the Powers Phase, who were not indigenous to the area, built a major civic-ceremonial center (Powers Fort) and occupied several villages, hamlets, and base camps in the region. The Wilbourn Site is considered a major village of the Powers Phase. Although the site contains no earthen mounds, excavations conducted in the early-to-mid 1970s by Dr. James Price revealed the presence of wall fortifications and over 60 house structures (Dr. James Price, personal communication, February 28, 2000). Intact cultural midden deposits, as well as human burials, are occasionally found on the margins of such major Mississippi village sites due to the concerns of space use and intrasite organization among sedentary populations. To date, no human burials have been identified at the Wilborn Site, but the possibility still exists that human burials may be present within the periphery of the site (Dr. James Price, personal communication, February 28, 2000). The Wilborn Site was listed on the NRHP in 1972. It is one of the few remaining Powers Phase sites that has not been impacted by modern development and excavation. The Preferred Alternative and its associated right of way have been shifted to the east with the placement of Alternate UN. This will avoid the site and adjacent areas. If future changes in construction plans make avoidance unfeasible, a Phase III mitigation is recommended for the impacted portion of the site.

Archaeological Sites Not Eligible for the NRHP

The remaining 31 of the 44 archaeological sites that will be impacted by the Preferred Alternative do not meet the eligibility requirements of the NRHP. Thirty of these sites consist primarily of small prehistoric or historic sites that lack integrity and have been adversely impacted by previous construction, erosion, or agriculture. The historic sites are also of a temporal period and site type that are numerous and well documented within the region. The Phase I survey has exhausted their research potential, therefore, the proposed project is not expected to adversely affect these sites. The remaining site (23WE775) is the town of Taskee. Only a small portion of the town extends into the right of way. This portion has been severely damaged by previous U.S. 67 construction and has been evaluated as not eligible for the NRHP. However, the remainder of the town has not yet been assessed and it is likely that it may meet the NRHP requirements of significance.

4.18.2.3 Additional Archaeological Investigations Recommended

Additional archaeological resources may be present within the Preferred Alternative right of way. Nine tracts of land within the project area were not surveyed as right of entry was denied by the property owners.

Two tracts were located in Madison County, two in Wayne County, and five in Butler County. Based on the prehistoric and historic site prediction models, the results of the records search and literature review, and the Phase I Survey results, an assessment of the potential for archaeological remains has been made for each of these parcels.

The two tracts in Madison County are located within the Ozark Highlands portion of the project area. The northern parcel is approximately 128 m (420 ft) long, while the southern parcel is approximately 300 m (984 ft) long. Both of the areas are situated within the Greenwood Branch stream valley, and incorporate terrace bluffs to the west. The 1980 7.5 foot Coldwater, Missouri quadrangle map shows three buildings within the northern area, and Greenwood Cemetery within the southern area. Greenwood Branch is located approximately 100 m (328 ft) to the east of both areas. Previous work conducted within the MTNF suggests that prehistoric sites located in the Ozark Highlands are concentrated in major stream valleys, and close to permanent water sources. The current ARG U.S. 67 Phase I survey results support this settlement pattern. Approximately 88 percent of the prehistoric sites located by ARG were situated in the Ozark Highlands, and of those, 82 percent were situated on stream valley landforms (Aberle et al. 2003:228-231). The Ozark Highland stream and river valleys also exhibit a fairly high potential for historic sites. The presence of a cluster of buildings in the northern area and a cemetery in the southern area add to the potential that historic archaeological resources may be present within these two parcels.

The two tracts in Wayne County are also located within the Ozark Highlands portion of the project area. The northern parcel is very small and positioned on a ridge slope above a paved road. An unnamed intermittent stream is located approximately 91 m (300 ft) to the west. The southern parcel, also small [approximately 15 m (50 ft) long], is positioned on a ridge slope approximately 100 m west of the intersection of U.S. 67 and Route K, with an unnamed intermittent stream located approximately 91 m (300 ft) to the southwest. Previous work in the MTNF indicates the upland ridges of the Ozark Highlands do not appear to have a high potential for historic or prehistoric sites. The potential for prehistoric cultural resources decreases dramatically in the dissected uplands, and data derived from the U.S. 67 Phase I survey (Aberle et al. 2003:233) suggests that only a very small percentage of prehistoric sites are located in an upland ridge setting. The fact that these two parcels are so small and are situated on a slope, also lessens the potential for cultural resources.

Of the five tracts situated in Butler County, two are located within the Ozark Highlands, one is near the Ozark Escarpment, and two are located within the Western Lowlands. The northern parcel within the Ozark Highlands is small (about 60 m in length) and is positioned on the crest of an upland ridge, approximately 15 m (50 ft) from an unnamed intermittent stream. A building is shown adjacent to the south of this area on the 1980 7.5 foot Stringtown, Missouri quadrangle map. The upland ridges of the Ozark Highlands do not appear to have a high potential for historic or prehistoric sites, however, the presence of a building just east of the area may increase the potential for the presence of historic cultural resources. The southern parcel in the Ozark Highlands is approximately 182 m (600 ft) long and is situated on the Cane Creek floodplain. The 1964 (photo-inspected 1979) 7.5 foot Harviell, Missouri quadrangle does not show any buildings within this area. This area has a good potential for the presence of prehistoric sites. The U.S. 67 Phase I survey found that of the 34 prehistoric sites recorded, 27 percent were situated on floodplains (Aberle et al. 2003:231). Buried archaeological sites may occur on the floodplains and alluvial fans of the Ozark Highlands. Four nearby sites, 23BU179 and 23BU400-402, recorded during the Phase I survey are situated on similar landforms.

One parcel in Butler County is located just north of the escarpment that divides the Ozark Highlands from the Western Lowlands. This area is approximately 350 m (1,148 ft) long, and is situated on a dissected upland ridge. The area is 100 m (328 ft) west of one unnamed intermittent stream and about 200 m (656 ft) east of another. Although the dissected uplands of the Ozark Highlands have a low potential for cultural resources, there is a very high potential for prehistoric sites along the Ozark Escarpment. Additionally, this area is situated between two water sources increasing the probability that cultural resources may be present.

Of the two tracts located in Butler County within the Western Lowlands, the northern area is approximately 1.5 km (0.9 mi) long and is crossed twice by the same unnamed intermittent stream. The topography of the area consists of lowland with a few slight rises. Two buildings (one house and one barn or outbuilding) are shown situated on slight rises within this area on the 1979 7.5 foot Fairdealing and Naylor, Missouri quadrangle maps. The southern parcel is approximately 400 m long and consists of the same topography. One building is shown within this area on the 1979 7.5 foot Naylor, Missouri quadrangle map. Both of these parcels may include archaeological sites since sandy ridges and natural levees of the Western Lowlands have a high potential for containing cultural resources. The U.S. 67 Phase I survey recorded three multi-component sites (23BU394, 23BU398, and 23BU399) on similar landforms in this vicinity. Several previously recorded sites (23BU34, 23BU59, 23BU60, and 23BU77) are also nearby on similar landforms. The presence of the buildings and the nearby water sources add to the potential that archaeological resources may be present.

There is also the potential for buried cultural deposits in the stream valleys of the project area. Geomorphological and geoarchaeological investigations are recommended to determine if buried, native soils having the potential to contain cultural materials are present, and, if present, whether the buried paleosols contain cultural material (American Resources Group, Ltd., 2001). Areas recommended for

deep-testing include Twelvemile Creek, Cedar Creek, the St. Francis River, the Black River, and Cane Creek and possibly Bennett Creek, Frazier Creek, Bounds Creek, Widows Creek, and Fork Creek.

Phase II investigations are recommended to further assess the NRHP eligibility of 12 sites located within the Preferred Alternative right of way. These sites include sites 23BU179, 23BU297, 23MO159, 23MO161, 23MO166, 23WE262, 23WE293, and 23WE575, the prehistoric components of sites 23BU392, 23MO162, and 23MO167, and the historic component of site 23BU399. Testing plans will be developed for each site in consultation with MoDOT, SHPO, and the state or federal agency on whose land the site is located. Based on the Phase II testing results, recommendations will then be made regarding avoidance and minimizing impacts, and possible Phase III mitigation. If human remains are encountered during the investigations, additional proceedings will comply with all relevant statutes and consultation with Native American groups will proceed under the direction of the FHWA as needed and appropriate.

Additional investigations are necessary for some of the sites. At site 23WE293, the prehistoric component is buried by relatively thick alluvial deposits, therefore, the testing program should include deep testing guided by geomorphological investigations (American Resources Group, Ltd. 2001). Selected mechanical stripping trenches should be subject to deep trenching to investigate the buried soils present at the site and to determine if subsurface features are present. Archival research should be conducted for the sites containing historic components that may be eligible for the NRHP (sites 23BU297, 23BU399, 23MO166, and 23WE293) and at site 23MO159 where the temporal affiliation is unknown. This would include a deed search and a review of census, tax, and probate records to identify the former occupants of these sites and their roles within the community.

One site, Old Greenville (23WE637), is listed on the NRHP. Consequently, as a portion of this site is located within the Preferred Alternative right of way and avoidance is not feasible, a Phase III mitigation is recommended. The objective would be to mitigate the adverse effects of the proposed highway construction on the significant cultural deposits by conducting extensive data recovery operations within the threatened portions of the site. A mitigation plan will be developed in consultation with MoDOT, SHPO, FHWA, and USACE.

4.18.3 Historical Investigations

Of the 86 known and potentially known historic resources listed in Table 3-23, the Preferred Alternative will impact a portion of four of these resources. These include Taskee Station (23WE775), Harviell Ditch, Hart Ditch, and Neelyville Ditch. The impacted portions of these resources lack the qualities of historic integrity and are not eligible for listing on the NRHP.

4.18.4 SHPO Coordination

Architectural and Bridge/Culvert Resources

Within the APE for the Preferred Alternative, the SHPO has concurred that there will be no adverse effect to structures 78 and 317 because the Preferred Alternative was revised and there would be an adverse effect to the St. Francis River bridge.

Archaeological Resources

The SHPO noted that 23MO161, 23MO166, 23MO159, 23MO167, 23MO162, 23WE262, 23WE575, 23WE637, 23WE293, 23WE761, 23BU297, 23BU392, 23BU179, 23BU399, and 23BU77 are eligible for listing, listed in the NRHP or need to under go further testing to determine if they are eligible for listing in the NRHP (Appendix E). The SHPO concurred that the following sites are either not eligible for listing in the NRHP or the portions of the site that will be impacted does not appear to retain any integrity: 23MO158, 23MO40, 23MO170, 23MO116, 23MO160, 23MO169, 23MO168, 23WE764, 23WE766, 23WE760, 23WE762, 23WE768, 23WE694, 23WE763, 23WE778, 23WE776, 23WE777, 23WE774,

23WE773, 23WE765, 23BU391, 23BU403, 23BU393, 23BU299, 23BU401, 23BU402, 23BU400, 23BU398, and 23BU394. As some portions of the Preferred Alternative right of way were not surveyed (right of entry denied), the SHPO reserves their final comment until those areas have been surveyed and the work on the sites listed above that need to under go further testing has been completed.

A meeting was also held during the spring 2001 at Wappapello Lake. Representatives from the USACE and Missouri SHPO discussed potential mitigation plans for Old Greenville. For detailed information on Old Greenville, see the Final Section 4(f) Evaluation (see Section 5.0).

4.18.5 Memorandum of Agreement (MOA)

A project-specific MOA between the FHWA and the Missouri SHPO has been developed to comply with Section 106 of the National Historic Preservation Act. The MOA is included as Exhibit 5-4 (Section 5.0) The MOA provides for development of a mitigation plan for the adverse effect to the St. Francis River bridge and development of a mitigation plan for impacts to Old Greenville National Historic Site; additional testing (Phase II investigations) for sites: 23BU179, 23BU297, 23MO159, 23MO161, 23MO166, 23WE262, 23WE293, and 23WE575; the prehistoric components of sites 23BU392, 23MO162, 23MO167, and the historic component of site 23BU399; an archaeological survey for those tracts that were not initially surveyed as right of entry was denied by the property owner, evaluation of any sites that may be present, and provides a framework for mitigation of impacts to any NRHP eligible resources that cannot be avoided.

Any archaeological sites that may be affected by the project will be evaluated and addressed in accordance with the regulations (36 CFR 800) implementing Section 106 of the National Historic Preservation Act [16 United States Code (USC) 470]. Identified cultural resources will be evaluated according to the Department of the Interior's "Standards and Guidelines for Archaeology and

4.19 Noise

The FHWA's Noise Abatement Criteria (NAC) and MoDOT's interpretation of the NAC were used in the analysis of the noise impact of the Preferred Alternative. The analysis was conducted according to the guidelines as presented in 23 CFR, Part 772, which provided procedures whereby the acoustic impact of the Proposed Action can be assessed and the needs for abatement measures can be determined when the noise levels approach or exceed the FHWA NAC for various land uses as presented in Table 4-22.

Table 4-22. NAC Hourly A-Weighted Sound Level – dBA

Activity Category	L_{eq} (1 hour)	Description of Activity Category
A	57 dBA (exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 dBA (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 dBA (exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

MoDOT has defined the NAC approach or exceed criteria for Activity Category "B" as being equal to or greater than 66 dBA L_{eq} for noise sensitive receptors such as residences, churches, schools, libraries,

hospitals, nursing homes, apartment buildings, condominiums, etc. The criteria for commercial establishments is 72 dBA L_{eq}.

Based on the Federal Aid Highway Act of 1970 (23 CFR 772), MoDOT has implemented a noise abatement policy that is approved by FHWA. The policy states that noise abatement measures will be considered as part of the highway construction project if they are deemed reasonable and feasible and meet the requirements of the noise abatement criteria. When the 66 dBA L_{eq} criteria is exceeded, noise abatement procedures are to be reviewed for effectiveness and feasibility according to the following criteria:

- Noise wall must provide noise reduction of at least 5 dBA for all primary receptors. Primary receptors are those which are closest to the highway.
- Noise wall must provide attenuation for more than one receptor.
- Noise wall must be 5.5 m (18 ft) or less in height above normal grade.
- Noise wall must not interfere with normal access to property.
- Noise wall must not pose a traffic safety hazard.
- Noise wall must not exceed a cost of $30,000 per benefited receptor. A benefited receptor is defined as a receptor which receives a noise reduction of 5 dBA or more.
- The majority of affected residences (primary and benefited receptors) must concur that a noise wall is desired.

The FHWA highway traffic noise prediction computer program, TNM 1.06, was used to project future design hour traffic noise levels for the year 2025. The following parameters were used in the model to calculate

- Distance between roadway and receiver;
- Hourly traffic volumes for traffic mix;
- Vehicle speed; and
- Noise source height of the vehicles.

Much of the alignment of the Preferred Alternative is located adjacent to the existing U.S. 67 facility. Consequently, those receptors that are likely to be impacted are located in the vicinity of existing U.S. 67. Existing noise levels modeled from TNM varied widely throughout the entire project area. The lowest level is 37.3 A-weighted dBA at a receiver located approximately 400 m (1,312.4 ft) from the existing U.S. 67 and shielded by a hillside from Alternate H. This receiver is a residence along CR213 approximately 2.4 km (1.5 mi) south of Lodi. The highest level is 72.3 dBA at a receiver located approximately 13.5 m (44.3 ft) from the existing U.S. 67 on Alternate R. This receiver falls on the property approximately 0.72 km (0.44 mi) north of Route 160 along U.S. 67. However, the existing noise levels for much of the route range between approximately 45 dBA and 64 dBA. The noise level analysis shows that there are 131 existing receptors impacted by noise along U.S. 67. By comparison, 73 receptors would be affected under the Preferred Alternative scenario in 2025 if the current land use remains the same as present conditions.

The greatest amount of receptors along the Preferred Alternative occur on Alternates P, A, and Q where the amount of receptors are 17, 13, and 12, respectively. Alternates P and Q are associated with the urbanized area of Poplar Bluff and Alternate A is associated with the urbanized area of Cherokee Pass. Some current receptors will actually have a reduction in noise primarily due to the relocation of U.S. 67 such as at Cherokee Pass.

It should be noted that in areas where U.S. 67 is being widened adjacent to the existing pavement, the amount of new impacts is reduced because many of the receptors along the existing alignment would be displaced by the Preferred Alternative.

The final decision on the installation of abatement measures will be made upon completion of detailed design and the public involvement process.

4.20 Energy

Increases in traffic are expected for U.S. 67 due to growth in neighboring communities and regional traffic. The existing traffic facility would provide a LOS D/E throughout U.S. 67 in the design year, 2025 (see Section 1.3.1). The No Action Alternative will result in lowered energy efficiency due to reduced system efficiency and increased probability of congestion.

Construction of the Preferred Alternative will require energy for processing materials, construction of the route, and maintenance activities. Energy consumption by vehicular traffic has the potential to increase during the construction period due to traffic delays and rerouting of the traffic. Construction of the Preferred Alternative will improve overall transportation system efficiency for local and through traffic and thereby reduce energy consumption per motor vehicle. In the long term, post-construction operational energy requirements should

4.21 Hazardous Waste

Depending on the actual characteristics of the hazardous/special waste sites encountered, there are potential consequences attributable to the acquisition of properties containing hazardous materials for the Preferred Alternative. In contrast, the No Action Alternative is not expected to result in any consequences attributable to hazardous materials. A summary of the anticipated relative clean-up effort and relative ease of avoidance for each site listed in Section 4.21.1 is provided on Table 4-23. Hazardous wastes encountered during construction will be handled according to all applicable state and federal guidelines.

4.21.1 Active Sites

York Village Conoco, located at the intersection of Routes 67 and 172 (Figure 3-9 Map ID 49), has a total of four petroleum storage tanks, three USTs, and one AST. The MDNR on-line database identifies one of the USTs as having leaked, with remedial effort begun in December 1998. The only impacted medium identified is soil. The cleanup at the facility should be eligible for reimbursement under the Petroleum Storage Tank Insurance Fund (PSTIF). Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater sampling should be conducted within the tank pit, fueling area, and below the product piping to verify that no impacted soils or groundwater are present.

Cherokee Pass Coastal Mart, located on the west side of U.S. 67 approximately 305 m (1,000 ft) south of State Route A (Figure 3-9, Map ID 95), has five ASTs, ranging in size from 2,000 to 12,000 gallons. No releases were reported within the MDNR LUST database. At present, the Preferred Alternative does not involve the acquisition of this parcel. If this parcel is acquired due to a change in the location of the selected alternative, soil and groundwater sampling should be conducted within the AST containment, fueling area, and below the product piping to verify that no impacted soils or groundwater are present.

Fowlers Handi-Mart, located on the west side of U.S. 67 approximately 305 m (1,000 ft) north of Butler CR270 (Figure 3-9, Map ID 9), is a closed gas station. The facility is identified within the MDNR database as having two USTs which are listed as temporarily out of service. The facility is being decommissioned, and the tanks are to be removed from the ground. The facility should be eligible for reimbursement under PSTIF. At present, the Preferred Alternative does not involve the acquisition of this parcel. If this parcel is acquired due to a change in the location of the selected alternative and the owner has not completed remedial activities associated with the removal of the USTs, soil and groundwater sampling should be conducted within the tank pit, fueling area, and below the product piping to verify that no impacted soils or groundwater are present.

Table 4-23. Relative Clean-Up/Avoidance of Hazardous/Special Waste Sites

Site Name	Map ID	Relative Clean-Up Effort*	Ease of Avoidance†	Comment
York Village Conoco	49	Low	Low	Take
Cherokee Pass Coastal Mart	95	Low	High	--
Fowlers Handi-Mart	9	Low	High	--
Vel's Antiques	8	Low	High	--
Neelyville Water Plan and Bus Barn	13	Low	High	--
Penningtons Self-Storage	20	Low	Low	Take
Price Property	24	Low	High	--
Former Service Station	25	Low	High	
KC and Sons Krafts	30	Medium	Low	Take
Pleasant Valley Eagles Hall	54	Low	Low	--
Costephens-Barbers Cash Store	59	Low	Low	--
Small Sawmill	63	Low	High	--
The Glass Shop	75A	Low	Low	Take
Junk Alley Antiques	74B	Low	Low	Take
Highway 67 Collectibles	75	Low	Low	Take
Gregory's	78	Low	High	--
Belken Auto Repair	82	Low	Low	Take
Auto Repair Shop	87	Low	High	--
Residence	88	Low	High	--
Small Scrap Yard	91	Medium	High	--
Frontier Flea Market	96	Medium	High	--
Cherokee Pass Ice	97	Medium	High	--
W.E. Sears Youth Center	112	Low	High	--
McClane Livestock Transport	113	None	High	--
Vacant Facility	114	Medium	High	--
Berry Wood Products, Inc.	58	High	High	--
Francis Satellite/Salvage Yard	23	High	Low	Take
Libla Industries	65 & 66	Medium	Low	Partial Take
City of Greenville Maintenance Yard	68	Low	High	--
Robinson's Recycling	89	Medium	High	--
Solid Rock Baptist Church	51	Low	High	--

* *Relative clean-up effort, ranked as low for easy clean-up, high for more difficult clean-up, based on estimated length of time and cost of effort.*

† *Ease of avoidance, ranked as high for easily avoided, low for not avoidable.*

4.21.2 Inactive Sites

Vel's Antiques, located on the east side of U.S. 67 approximately 260 m (850 ft) north of CR270 (Figure 3-9, Map ID 8), is a former car dealership. At present, the Preferred Alternative does not involve the acquisition of this parcel. If this parcel is acquired due to a change in the location of the selected alternative, a detailed magnetometer survey of the site should be conducted to determine if USTs are present onsite and, if so, sampling should be conducted to determine if petroleum impacted soils and groundwater are present onsite.

The Neelyville water plant and the old Neelyville bus barn are located approximately 375 m (1,230 ft) east of U.S. 67 on the north side of Route 142 (Figure 3-9, Map ID 13), and are not anticipated to be affected by the Preferred Alternative in the Neelyville area.

Penningtons Self-Storage, formerly Wards Store, is located on the west side of U.S. 67 approximately 305 m (1,000 ft) south of CR340 (Figure 3-9, Map ID 20). No information concerning the tank status at

the site was found within the MDNR databases and no evidence of petroleum dispensing equipment or USTs was noted at the time of the site inspection. Since the Preferred Alternative will involve acquiring this parcel, the facility should be investigated for the presence of an UST using a magnetometer and soil and groundwater samples should be collected and analyzed to determine if petroleum hydrocarbons are present.

The Price property, located at the northeast corner of the U.S. 67/CR360 intersection (Figure 3-9, Map ID 24), is reportedly a former gasoline station which has been inactive at least since the 1960's. No evidence of USTs or ASTs was noted at the time of the site inspection nor was the site listed within the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, the facility should be investigated for the presence of an UST using a magnetometer, and soil and groundwater samples should be collected and analyzed to determine if petroleum hydrocarbons are present.

A former service station, located on the east side of U.S. 67 approximately 835 m (2,740 ft) north of CR340 (Figure 3-9, Map ID 25), is a former gas station. The site has been inactive since about 1972 and the tanks and piping were reportedly removed by the owner. The site is not listed on the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, the facility should be investigated for the presence of petroleum hydrocarbons to determine if spills or leaks occurred at the facility.

KC and Sons Krafts, located on the east side of U.S. 67 approximately 50 m (165 ft) west of CR343 (Figure 3-9, Map ID 30), is an inactive gasoline station. The current tenant stated that he had removed the ASTs and AST containment area with a bulldozer. No reference to the facility was found within the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater samples should be obtained from the former AST containment area, the pump island area, and the product delivery line locations.

The Pleasant Valley Eagles Hall, located on the east side of U.S. 67 approximately 810 m (2,650 ft) north of CR403 (Figure 3-9, Map ID 54), is a former UST site which has had the tank(s) pulled and a clean closure letter issued by the MDNR. No impacts to the Preferred Alternative are expected from this site.

Costephens-Barbers Cash Store, located on the east side of U.S. 67 at the intersection of CR220, Old U.S. 67 and U.S. 67 (Figure 3-9, Map ID 59), is a former gas station. The owner reported that the USTs (two) had been removed and that a closure letter had been issued by MDNR. The MDNR database lists the site USTs (two) as temporarily closed. Unless the owner can produce the closure letter, soil and groundwater samples should be obtained from the former UST pit, the pump island area, and the product delivery line locations to determine if the operation of the former gasoline station had caused the soil or groundwater to become impacted by petroleum hydrocarbons.

A small sawmill, located on the west side of U.S. 67 at the intersection with Route 34 (Figure 3-9, Map ID 63), is an operating saw mill with several field mounted ASTs onsite. In addition to the ASTs, the site has a sawdust pile which is regulated under MDNR Solid Waste Regulations. This site is not anticipated to be impacted by the Preferred Alternative. The MDNR Sawdust Guidance Document details the appropriate actions necessary to manage sawdust. The management options for sawdust include reuse, recycling, disposal in a permitted sanitary landfill, or disposal as a special waste in a demolition landfill. One reuse option, which may be exempt from additional stormwater permitting requirements, involves the use of the sawdust as mulch to establish vegetation or for erosion protection for embankments or road construction projects. The Sawdust Guidance Document applies only to sawdust generated from untreated wood. The ultimate disposition of the sawdust should be coordinated with the MDNR Solid Waste Management Program and the MDNR Water Pollution Control Program if the size of the sawdust pile necessitates a stormwater permit. Additionally, the surface application of sawdust as mulch or for erosional control should also be coordinated with a qualified professional agronomist or the University of Missouri Extension Service to determine proper application rates and fertilizer application, and with approval from the Water Pollution Control Program.

The Glass Shop, located on the west side of U.S. 67 immediately north of CR454 (Figure 3-9, Map ID 74A), is a former gas station. The facility is not listed on the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

Junk Alley Antiques, located on the west side of U.S. 67 immediately south of CR454 (Figure 3-9, Map ID 74B) is a former gas station. The facility is not listed on the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

Highway 67 Collectibles, located on the west side of U.S. 67 north of CR454 and immediately north of The Glass Shop (Figure 3-9, Map ID 75), is a former gas station. The facility is not listed on the MDNR database. Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

Gregory's, located on the east side of U.S. 67 approximately 150 m (500 ft) north of CR411 (Figure 3-9, Map ID 78), is a former gas station. No evidence of tanks, pump islands, or product lines was noted at the time of the site inspection. Since the Preferred Alternative will involve acquiring this parcel, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

The Belken Auto Repair/Salvage yard, located on the east side of U.S. 67 approximately 1,940 m (6,365 ft) north of the south intersection of CR417 and U.S. 67 (Figure 3-9, Map ID 82), is a small auto repair and auto salvage operation. Since the Preferred Alternative will involve acquiring this parcel, soil samples should be obtained and analyzed for constituents common to auto repair/salvage operations, including total petroleum hydrocarbons (TPHs), volatiles, semi-volatiles, and heavy metals. The results of the sampling should then be compared to the appropriate MDNR cleanup levels to determine if a remedial effort is necessary to protect human health and the environment.

An auto repair shop, located on the east side of U.S. 67 approximately 890 m (2,920 ft) south of Route C (Figure 3-9, Map ID 87), is a small auto repair shop. No impacts from this property are expected.

A residence, located at 6952 U.S. 67, approximately 475 m (1,558 ft) south of Route C (Figure 3-9, Map ID 88), is the location of a former gas station. The location of the pump islands is still visible at the site. Although the site is not listed on the MDNR LUST database, if this parcel is acquired due to a shift in the location of the Preferred Alternative, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

A small scrap yard, located at 6878 U.S. 67, approximately 150 m (500 ft) south of Route C (Figure 3-9, Map ID 91), is currently a small scrap yard and is the location of a former gas station. Although the site is not listed in the MDNR tank database, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations if this parcel is acquired due to a change in the location of the selected alternative. In addition, soil samples should be obtained and analyzed for constituents common to auto repair/salvage operations, including TPH, volatiles, semi-volatiles, and heavy metals. The results of the sampling should then be compared to the appropriate MDNR cleanup levels to determine if a remedial effort is necessary to protect human health and the environment.

The Frontier Flea Market, located on the west side of U.S. 67 approximately 80 m (260 ft) north of Route C (Figure 3-9, Map ID 96), is a former gas station. Based on information obtained from the owner, two USTs may still be in the ground. If this parcel is acquired due to a change in the location of the

selected alternative, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations.

Cherokee Pass Ice, located on the east side of U.S. 67 approximately 215 m (700 ft) north of Route C (Figure 3-9, Map ID 97), is a former gas station. The disposition of the tanks is not known. If this parcel is acquired due to a change in the location of the Preferred Alternative, soil and groundwater samples should be obtained from the former tank area, the pump island area, and the product delivery line locations prior to acquisition of the facility.

The W.E. Sears Youth Center, located on the west side of U.S. 67 approximately 360 m (1,180 ft) north of CR522 (Figure 3-9, Map ID 112), has one unused UST on the site. Prior to acquisition of right of way from the sight, soil and groundwater samples should be collected to determine if leaks or spills from the UST have impacted the proposed right of way.

McClane Livestock Transport, located on the east side of U.S. 67 approximately 590 m (1,936 ft) south of CR522 (Figure 3-9, Map ID 113), does not have ASTs or USTs onsite. No impact from this facility is expected.

A vacant facility, located on the east side of U.S. 67 approximately 590 m (2,850 ft) south of CR522 (Figure 3-9, Map ID 114), appears to be the location of a former gas station. At present, no impacts from this facility are expected.

4.21.3 RCRA/CERCLA Sites

The Berry Wood Products, Inc. facility, locate on the east side of U.S. 67 approximately 650 m (2,130 ft) north of CR401 (Figure 3-9, Map ID 58), is a site currently undergoing investigation by MDNR (as the lead agency under the Superfund Cooperative Agreement Program) and the responsible party. The construction of the east outer road will include the acquisition of some right of way from the Berry Wood Products, Inc. Based on a review of the investigations conducted to date, the soil and groundwater within the right of way acquisition area has not been impacted by the operations at the facility. It would be prudent to obtain soil and groundwater samples, to be analyzed for pentachlorophenol and total petroleum hydrocarbons (TPH), prior to right of way acquisition and construction in order to limit liability and to ensure protection of the health of construction workers.

Additional facilities within the study area which may fall under the RCRA regulations include:

- Francis Satellite/Salvage Yard;
- Libla Industries;
- City of Greenville Maintenance Yard; and
- Robinsons Recycling.

Francis Satellite/Salvage Yard is located at the northwest corner of CR360 and U.S. 67 (Figure 3-9, Map ID 23) and is an approximately 16-acre site with about 300 salvage vehicles. Since the Preferred Alternative will involve acquiring a portion of this parcel, a site characterization should be performed on the portion of the property to be acquired. The site characterization should include soil and groundwater sampling, with analyses to include, at a minimum, the following:

- Volatile organics;
- Semi-volatile organics;
- TPH;
- Metals [total and total characteristic leaching procedure (TCLP)];
- PCBs; and
- Dioxin screening.

Upon completion of the site characterization, estimates for the remediation of the property can be prepared.

Libla Industries, located at the northwest corner of CR309, Route 34, and U.S. 67 (Figure 3-9, Map ID 65 and 66), is a former pallet manufacturing plant. On the site, three vacant buildings were burned by the local fire protection district as training drills. The site also has a sawdust pile located on the northwest portion. Since the Preferred Alternative will involve acquiring the portion of the parcel with the sawdust pile, the sawdust pile will need to be handled in accordance with MDNR regulations. If the parcel which contains the three burned buildings is acquired due to a change in the location of the selected alternative, the soil and groundwater near the three burned buildings should be sampled to determine if waste materials regulated under RCRA or special waste materials are present. The RCRA constituents could include accelerant used during the burning of the buildings, or waste combustion byproducts. Additional constituents of concern include, but are not limited to, PCBs, asbestos, dioxins, and dibenzofurans. It is also possible that home heating oil USTs are still present on the site.

The acquisition and construction of the Preferred Alternative will include a minimal portion of the City of Greenville Maintenance Yard (Figure 3-9, Map ID 68). No impacts are expected from the acquisition of this right of way.

Robinson's Recycling, located on the west side of U.S. 67 approximately 675 m (2,215 ft) south of Route C (Figure 3-9, Map ID 89), is a small aluminum/steel/auto recycling yard. If this parcel is acquired due to a change in the location of the selected alternative, a site characterization should be performed on the property. The site characterization should include soil and groundwater sampling, with analyses to include, at a minimum, the following:

- Volatile organics;
- Semi-volatile organics;
- TPH;
- Metals (total and TCLP);
- PCBs; and
- Dioxin screening.

Upon completion of the site characterization, estimates for the remediation of the property can be prepared.

4.21.4 Other Sites of Concern

The Solid Rock Baptist Church, located on the west side of U.S. 67 approximately 1,200 m (3,937 ft) north of CR546 (Figure 3-9, Map ID 51), has a large sawdust pile at the southwest corner of the property. No impact from this property is expected on the acquisition of right of way or construction of the Preferred Alternative. If this parcel is acquired due to a change in the location of the selected alternative, the sawdust pile will need to be handled in accordance with MDNR regulations.

4.22 Construction Impacts

4.22.1 Drainage

As discussed in Sections 3.8.1 and 3.8.2, a prominent characteristic within the project corridor is the expression of surface water systems and groundwater recharge areas. Drainage of these systems occurs across existing U.S. 67 and will be a primary consideration during the design and construction of the Preferred Alternative. It is anticipated that all existing drainage patterns and regimes will not be significantly modified as a result of the construction of the Preferred Alternative.

Control of erosion from construction areas within the project corridor and the reduction of siltation will be principal concerns during construction activities. The Preferred Alternative will utilize current MoDOT standards for erosion control and retainage of silt onsite to prevent or reduce impacts to receiving streams, creeks, rivers, and drainageways due to construction. These procedures are detailed in MoDOT's Temporary Erosion and Sedimentation Control Program and have been approved by MDNR. These measures include the use of temporary berms, slope drains, ditch checks, sediment basins, seeding and mulching, straw bales, and silt fences. Other measures to reduce and minimize impacts are presented in Section 4.10 and 4.20.5.

4.22.2 Solid Waste Disposal/Hazardous Waste

Any solid waste impacts generated during construction will be temporary. Solid waste produced by clearing operations would normally be disposed of onsite by controlled burning, in compliance with all local, state, and federal regulations; or the transportation of items to an approved landfill. Construction debris such as used forms, maintenance waste, and general trash will be collected and disposed of at local landfill locations. There will be no long-term impacts associated with solid waste disposal.

Any waste or debris produced during construction will be properly disposed of, in accordance with local, state, and federal regulations.

4.22.3 Detours and Accessibility

Construction activities are likely to cause local traffic to be affected on a short-term basis. Where access is provided from a local road or driveway to existing U.S. 67, these local roads and driveways would experience impacts resulting from the construction of the proposed freeway. Construction activities may include detours, temporary road closures, and temporary pavement bypasses. Ultimately, access to the local road system will be affected for much of the length of the project by the presence of a freeway given the proposal of a freeway which does allow direct access. The construction activities, when compared to the presence of an ultimate freeway, would occur over a relatively short period of time (1 to 3 years). All construction activities should follow all applicable traffic control guidelines as directed by the MUTCD or by MoDOT. The safety of the facility during construction is dependent upon how well these traffic control guidelines are followed. A summary of the impacts to the local road system, given the ultimate freeway conditions, is provided in Table 4-11.

At this time, the disposition of those portions of existing highway bypassed by the proposed highway is not known. Presumably, MoDOT would not like to increase the number of lane miles in the state system. However, this may not be possible as the counties and cities in the study area typically do not have the financial resources to accept maintenance responsibilities of the old highway. A decision on the disposition of the existing highway would be based on how the existing highway functions as part of the new system and will be made when MoDOT begins to acquire right of way for the new highway.

4.22.4 Utility Service

The construction impacts to utility service is not expected to be significant. As discussed in Section 4.3.7, there will be some impacts to existing utility infrastructures. These impacts are largely associated with buried optic fiber cables for telephone service and the crossing of a pipeline transmission corridor. Utility service to the user can be maintained during construction by phased adjustments to the utility in conjunction with construction operations on the roadway.

4.22.5 Water Quality and Ecology

Several of the construction-related impacts are expected to be temporary. If siltation and turbidity has not been excessive, fish and benthic macroinvertebrate communities are known to recover quickly once construction activity has ceased. During the construction phase, however, siltation and sedimentation may result in the displacement of aquatic fauna and reduced reproductive success. The utilization of best management practices, such as erosion control devices and scheduling of construction during dry seasons and after fish spawning, will further reduce construction-related impacts to water quality and existing aquatic habitats. Roadway construction activities that would result in long-term impacts, such as alteration of substrates by filling, the relocation and characterization of stream channels, must be minimized with the utilization of mitigation techniques as described in Section 4.10.

In addition, potential effects of the proposed construction include increased turbidity and sedimentation at each of the stream/wetland crossings. Construction-related impacts can be prevented by prohibiting the discharge of harmful wastes into or alongside floodplains, preventing placement of excavated material into floodplains, and restricting the frequent fording of streams and floodplains by equipment. Water quality impacts will be further minimized by strict adherence to MoDOT's Temporary Erosion and Sediment Control Procedures.

Following the construction phase, right of ways will also be planted using a mix of native grass and forb species that will enhance soil stabilization and provide benefit to local wildlife. The revegetation of slopes and cut areas will be accomplished in such a manner as to be sensitive to the timing of construction activities, the timing of implementing erosion control measures, and the methods by which native vegetation species are reestablished. Erosion control measures will be implemented after clearing and construction activities have been completed. A mixture of perennial rye and native grasses can be planted and mulch spread soon after completion of construction activities. Upon the establishment of perennial rye, native cool season grasses can be planted. Ultimately, in efforts to inhibit the invasion of exotic species, warm season grasses such as Canada wild rye, Virginia wild rye, little blue stem, and side oats gramma can be planted. The drilling and seeding of cool season grass species can occur between September and mid-October. Warm season grass species can be planted between mid-April and June. Forb species could include prairie dock and coreopsis species. All reasonable efforts will be made to inhibit monotypic stands of exotic species in the areas disturbed by road construction activities.

4.22.6 Air Quality

Standard specifications for all contracts awarded by MoDOT require that the contractor comply with and observe all applicable laws, ordinances, regulations, orders, and decrees. The specifications incorporate provisions for minimizing air quality impacts during construction.

Measures will be taken to reduce fugitive dust and other emissions generated during construction. Emissions from construction equipment would be controlled in accordance with emission standards prescribed under state and federal regulations. Materials resulting from clearing and grubbing, demolition, or other operations (except materials to be retained) would be removed from the project, burned, or otherwise disposed of by the contractor. Any burning, when permitted, would be conducted in accordance with applicable local laws and state regulations.

4.22.7 Noise

MoDOT has written contract specifications concerning construction noise, which would be a part of the construction contract for this project. In summary, the provisions require the contractor to limit construction noise levels to an hourly Leq of less than 80 dBA in noise-sensitive areas adjacent to the project area. Further, MoDOT reserves the right to monitor construction noise and require noise abatement in cases where the criterion is exceeded. Also, MoDOT reserves the right to restrict work that

produces objectionable noise during normal sleeping hours. Construction equipment may not be altered such that noise levels will be greater than that of the original equipment.

4.23 Monitoring Activities

4.23.1 Soil Erosion

As discussed in Section 4.22, construction of the Preferred Alternative will utilize current MoDOT standards for erosion control as detailed in MoDOT's Temporary Erosion and Sedimentation Control Program. MoDOT's erosion control efforts are regulated by the Federal CWA, the NPDES Permit, MDNR General Storm Water Permit, MoDOT's Storm Water Prevention Plan, and the USACE Nationwide and 404 permits. MDNR, USEPA, USFWS, MDC will monitor MoDOT's erosion control efforts.

In accordance with MoDOT General Storm Water Permits, land disturbance sites will be inspected on a regular schedule and within a reasonable time period (not to exceed 72 hours) following heavy rains. Regularly scheduled inspections shall be at a minimum once per week. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation, and maintenance. Locations where storm water leaves the site shall be inspected for evidence of erosion or sediment deposition. Any deficiencies noted during a weekly inspection shall be corrected within seven calendar days of that inspection. The results of the weekly inspections in a given month shall be recorded in that month's report. The permittee shall promptly notify the site contractors responsible for operation and maintenance of BMPs of deficiencies (http://www3.modot.state.mo.us/coman.nsf/c0a1b2d81034b91a862560c300134892/2095c56e2a5db5b3862567e1004f6be6/$FILE/Sec%20806%20construction%20manual%20.doc).

4.23.2 Wetlands

Monitoring of the wetland mitigation areas would be implemented upon completion of the wetland creation and restoration areas as part of the wetland permitting process. The monitoring plan would ensure that project goals and permit conditions are being met. Monitoring would also determine if the planting and hydrological components of the compensation plan are functioning as planned. Observations will be conducted to confirm that the three wetland parameters (vegetation, hydrology, and soil) have been met within the mitigation area. Monitoring of the mitigation area will be conducted by MoDOT or their selected contractor with oversight by the appropriate regulatory agencies.

It must be noted that the actual monitoring activities will be identified in the final mitigation plan. The final mitigation plan will be developed following consultation between MoDOT and the regulatory agencies.

4.23.3 Kudzu

Discouraging the spread of kudzu during construction activities will be handled as a job special provision with the contractor.

4.24 Short-Term Impacts Versus Long-Term Productivity

Short-term impacts are temporary impacts that may result from the construction of a highway. The construction of the Preferred Alternative includes potential impacts to air quality, noise levels, aesthetics, and natural resources. These impacts have been discussed in previous sections. A summarization of such impacts includes:

- Construction activities may cause minor short-term air quality impacts such as dust due to earthwork, road improvements, and smoke from the open burning of debris.
- Noise levels may increase with the use of construction equipment. If necessary, the MoDOT will monitor and apply abatement measures in noise sensitive areas.

- Short-term visual impacts due to earthmoving and grading would also be encountered during construction.
- Water quality and ecological resources would be temporarily impacted by construction causing erosion, sedimentation, turbidity, and a displacement of terrestrial and aquatic fauna. The use of control measures from MoDOT's Temporary Erosion and Sedimentation Control Program, as well as other measures (see Section 4.10) will minimize these effects.
- Resources such as fossil fuels, cement, asphalt, sand, and steel would be required for the actual construction of the roadway. Consumption of fossil fuels by motor vehicles may increase due to delays and rerouting of the traffic during construction.

As described in Section 1.0, Purpose and Need, traffic volumes on U.S. 67 from Fredericktown to Neelyville are projected to grow at an annual rate of 2.0 to 2.7 percent per year. Without improvements, the existing traffic facility in the design year (2025) would result in reduced speeds and maneuverability, higher accident probabilities, and increased congestion. The long-term benefits of the Preferred Alternative would be improved system capacity, system continuity, and travel safety. Cost savings could be realized in lower fuel consumption, travel costs, and vehicle operating expenses as compared to the No Action Alternative. The local short-term impacts of the Preferred Alternative and use of resources are deemed consistent with the maintenance and enhancement of long-term productivity for the communities within and adjacent to the study area.

4.25 Summary of Irreversible and Irretrievable Commitments

Irreversible and irretrievable commitments are those impacts due to construction of a build alternate that cannot be mitigated or replaced in the future. Implementation of the Preferred Alternative will involve a commitment of natural, physical, human, and fiscal resources.

The commitment of land for new right of way for the Preferred Alternative comprises a total of 983 ha (2,429 ac). The primary land use for the new right of way is currently undeveloped and vacant. Other land uses include land managed by MTNF, USACE, and MDC, and farmland. The commitment of land includes natural resources comprising wetlands, floodplains, and forest. Land use, for the construction of the Preferred Alternative, is considered an irreversible commitment during the time period that the land is used for a highway.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material will be expended. Additionally, large amounts of labor and natural resources will be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction will also require a substantial one-time expenditure of both state and federal funds which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, state, and region will benefit by the improved quality of the transportation system. These benefits comprise improved travel safety, system capacity, and system continuity. Reduced congestion would likely result in a savings in time, fuel consumption, and travel costs. These long-term traffic service and financial benefits are anticipated to outweigh the commitment of resources required for the Preferred Alternative.

4.26 Secondary and Cumulative Impacts

Secondary and cumulative impacts may occur as a result of the construction of the Preferred Alternative. In this context, secondary impacts are defined as those effects which would be caused by the Preferred Alternative later in time or further removed in distance but would still be reasonably foreseeable. Cumulative impacts include those that result from the Proposed Action as well as other projects that are linked in some manner (geographically, functionally, or in timing) to the Proposed Action, or those that result from development that occurs within, or affects, the same environmental setting.

4.26.1 Secondary Impacts

Secondary impacts of the Preferred Alternative include those impacts that are attributable to development which may occur near the proposed route. This potential development may occur as a result of transportation advantages provided by construction of a new highway, coupled with aggressive marketing by the appropriate communities and business organizations, development incentives, provision of services, approval of proper zoning, annexation of property currently outside municipal boundaries, and future changes in the market characteristics of the study area.

Terrain and lack of typical municipal utilities such as sewer and water will limit the intensity of development within the project corridor, particularly for industrial development in some areas along the Preferred Alternative. Expected increases in traffic volume on the new highway may create market opportunities for traffic dependent businesses such as gas stations or convenience stores, especially at interchanges. These types of businesses would involve the conversion of minimal areas of undeveloped/vacant and agricultural land.

Industrial uses are not entirely traffic dependent and, therefore, are likely not overly influenced by an increase in traffic volume along the proposed alternative, although improvements in the road facility itself will provide benefits. The work force in the project corridor is relatively small. The small work force together with a lack of an available infrastructure, may limit the probability of large industrial uses locating in the corridor.

Municipal services are available due north of Poplar Bluff in Butler County. The availability of services and infrastructure increases the potential for future, commercial, industrial, and higher density uses in this area.

Secondary impacts are, therefore, likely to be limited, in proportion to the limited development that will be induced by the construction of the proposed project. The potential development of convenience stores or gas stations would result in the conversion of some acreage of undeveloped land. Potential secondary impacts associated with such development include the conversion of land uses and existing vegetated communities and habitats that are associated with the development site, as well as undiscovered cultural resources. However, due to the relatively small acreage of these developments, only minimal impacts are anticipated. In addition, because the induced development potential is expected to be limited with only minor changes to community infrastructures (e.g., water treatment facilities) are anticipated.

4.26.2 Cumulative Impacts

Cumulative effects are those “impacts which result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions” (40 CFR 1508.7). As such, identifying and assessing the potential for cumulative impacts involves focusing on the nature of the proposed project, the organization and composition (i.e., ecological structure, diversity, and connectivity; land use) of the affected environment, those actions which have already contributed to the existing environment, and those which could in the foreseeable future. In order to provide focus and relevance to the exercise of cumulative impact assessment, it is critical to identify those resources that may be, or have been, distinctively affected, or altered, over time.

As described in Section 3.0, no formal land use plans exist within the study corridor. Community leaders for municipalities along the Preferred Alternative were contacted for information concerning planned development. The following projects have been identified that are either within or near the proposed project corridor.

The City of Fredericktown has purchased 73.25 ha (181 ac) of the northeast corner of the intersection of Routes 67 and 72 for a future industrial/commercial park. The property was formerly used for pasture. The project is scheduled for construction for the year 2001. A sewer system will be constructed for the

southeast and northeast corners of this intersection. With these improvements, induced development such as motels, gas stations, and fast food restaurants is anticipated to occur.

Black River Electric Cooperative has relocated their facility to the northwest corner of Routes 67 and 72. Approximately 40.47 ha (100 ac), formerly pasture has been purchased by Black River Electric. The facility will occupy 14.16 ha (35 ac) of this site.

The USACE is in the process of elevating those portions of Route D on USACE property above the 100-year floodplain USACE. All potential impacts have been minimized by either using existing Route D or relocating Route D immediately adjacent to the existing facility. A limited amount of wetlands will be affected by this project.

The relocation of U.S. 67 at Mill Creek is a four-lane freeway that was completed in November 2001. The new facility is 4.83 km (3.0 mi) in length and includes an interchange at Route E. Approximately 60.70 ha (150 ac) of primarily agricultural and forested land was required for right of way. Socioeconomic impacts included one residential displacement and a portion of Jim's Auto Body property was required for right of way. This business will be located in the northwest quadrant of the interchange at Route E. The terrain around the interchange lends itself to development in the southeast and southwest quadrants. This interchange would have negative impacts to businesses located on existing U.S. 67 although a business loop connecting Route 74 and existing U.S. 67 may offset the negative impacts of the relocation of Mill Creek.

A transmission line and substation were constructed from the existing Patterson substation to the new Silva substation for M&A Electric Power Cooperative, Inc. Land use impacts involved approximately 12.14 ha (30 ac) of USACE-managed public land and 20.64 ha (51 ac) of private land. Natural resource impacts included approximately 18.21 ha (45 ac) of existing grasslands and croplands and 14.57 ha (36 ac) of forest.

The relocation of U.S. 67 at Poplar Bluff is just west of the city. Completed in May 2001, this section is a four-lane freeway, 11.30 km (7.02 mi) in length, and includes interchanges at Routes PP and M. This relocation results in four road closures causing some adverse travel for those residents and businesses. Approximately 104.00 ha (257 ac) of farmland will be converted for this bypass. There are 23 residential displacements. Commercial development is likely at the interchanges and induced residential growth is anticipated with ready access to a freeway facility.

A location study has been completed to address improvements to Route 60 from Van Buren to U.S. 67 north of Poplar Bluff. The proposed facility is a four-lane freeway 50 km (31 miles) in length. Approximately 322 ha (795 ac) of agricultural land, 296 ha (732 ac) of forested land, and 34 ha (83 ac) of floodplains will be potentially impacted by the proposed project. There will be 45 residential and seven commercial displacements. Approximately 0.7 ha (1.7 ac) of wetlands will be impacted. Construction of this facility was initiated in 2000 and some sections of this facility have been completed.

Route 60, east of U.S. 67, has been upgraded from a 2-lane facility to a 4-lane expressway. Environmental impacts were minimal because all improvements were made adjacent to the existing facility.

Currently a location study is addressing improvements to Route 34 from the intersection of Routes 21 and 34 in Carter County and extending eastward 85 miles to the intersections of Routes 34 and 72 in Cape Girardeau County. The proposal for this project is to upgrade the existing two-lane facility to a "super-two with shoulders." Potential bypasses of Piedmont and Marble Hill are being considered. This project has the potential to impact a limited amount of agricultural land, stream crossings, wetlands, floodplains, and public land managed by the MDC. There may be some residential displacement due to these improvements.

The MTNF Poplar Bluff Ranger District is in the conceptual planning stages for a new work complex in the vicinity of the existing Routes 60/67 interchange. The new complex will include both office and warehouse facilities. A potential location for the new facility is on the east side of U.S. 67 on a 139-ha (320-ac) parcel of MTNF managed property.

As discussed in numerous sections throughout this document, the U.S. 67 project corridor can be largely characterized as rural, undeveloped, and predominantly consisting of forested land. A reasonably high percentage of land is in public ownership; managed by the USFS, USACE, and MDC. Given the current public land management practices and the absence of development processes throughout most of the project corridor, it is anticipated that the Proposed Action when considered with other past and foreseeable future actions, will not significantly alter the human or natural environment. The Preferred Alternative will result in the direct conversion of various natural resources and land uses.

Cumulative impacts arising from the construction and operation of the Preferred Alternative include agricultural, socioeconomic, and natural resource impacts. Agricultural production is an important land use within the region; particularly in Butler County. Cumulative impacts to agricultural land are anticipated to occur primarily near intersections with U.S. 67 and for roadways for those planned projects described in Section S.2. Considering the total amount of agricultural land within Madison, Wayne, and Butler counties (Section 4.5, Agriculture) and the lack of other development resources, cumulative impacts to agricultural land are not expected to be excessive.

Improvements to U.S. 67 and other projects will result in cumulative impacts to socioeconomic variables including residential and business displacements and induced development. Given the total length of the proposed project and the increase in right of way associated with the expansion of the facility, relatively few residential and business displacements are anticipated to occur. It is anticipated that there is available housing and land for the siting of businesses and, therefore, those cumulative impacts are not considered significant. Cumulative induced development is anticipated at those interchanges common to two or more projects (i.e., the intersection of U.S. 67 and 72) and will result in minor increases in short-term construction related employment and long-term employment in commercial, industrial, and service facilities. Overall changes in development patterns and land use are anticipated to be minor and localized, therefore the probability for extreme or dramatic changes in induced development is considered low.

The Preferred Alternative will cross a number of mapped floodplains with an estimated impact of 158.2 ha (390.9 ac). Roadway floodplain crossings are designed and constructed in compliance with applicable floodplain regulations. Areas of roadways within floodplains are anticipated to be elevated above the 100-year floodplain with minor cumulative impacts to floodplain storage and flow.

The proposed project will also impact forested land and wetland systems. As previously discussed, forested cover type is the predominant cover type within the project area. The removal of trees will reduce at least temporarily the total amount of forest cover, which could than potentially lead to the loss of cover and forage area for various wildlife species. Through the study alternate development and evaluation process, efforts were focused on minimizing fragmentation through contiguous tracts of forested parcels. Consequently, the predominance of the impacts to forest land occurs along existing edges (i.e., adjacent to existing U.S. 67 right of way), thus minimizing impacts to the wildlife habitat and values of these tracts. It is noted that research has indicated that the fragmentation and shrinking of contiguous expanses of forest adversely affect neotropical migrant bird species that rely on interior habitats. The Preferred Alternative and those project planned to occur in the foreseeable future are not anticipated to result in significant cumulative impacts to the forest resource.

It is estimated that a total of 32.4 ha (80.1 ac) of wetlands will be affected by the construction of the Preferred Alternative. Rigorous efforts were applied to avoid and minimize impacts to wetlands. The cumulative impacts to the wetland resources in the project area are not anticipated to be significant. Through the use of minimization and rectification techniques in the design and construction phases (i.e.,

proper drainage flow to maintain local hydrologic regime, erosion/sedimentation control) efforts will be made to maintain integrity and character of those wetlands proximal to the proposed project. The mitigation of those wetlands unavoidably impacted will replace wetland acreage that was directly impacted. Impacts from other planned and foreseeable projects do not appear to significantly impact the wetland resource in the study area.

5.0 Final Section 4(f) Evaluation for U.S. 67

Madison, Wayne, and Butler Counties, Missouri
MoDOT Job No. J0P0746
Old Greenville National Historic Site
Greenville Recreation Area
St. Francis River Bridge
North Greenville Recreation Area
Ozark Trail

Prepared Pursuant to 23 U.S.C. 138 and 49 U.S.C. 303

By the
United States Department of Transportation
Federal Highway Administration
and the
Missouri Department of Transportation

6/22/05
Date of Approval

For FHWA

Division Administrator
Title

5.1 Proposed Action

Missouri Department of Transportation, Job Number J0P0746, proposes to improve U.S. 67 from south of Fredericktown to a point just south of Neelyville. This project is approximately 114 km (71 mi) in length (excluding the Poplar Bluff Bypass) and involves improvements to U.S. 67 in Madison, Wayne, and Butler counties. The primary purpose and needs for the proposed project are to accommodate projected traffic demands, improve safety, reduce congestion, and correct existing roadway. Section 1.0, Purpose and Need, presents detailed information on the description and purpose and need for the proposed project.

The proposal for this project is to upgrade the existing two-lane highway to fully controlled access, four-lane, divided highway. The Preferred Alternative primarily consists of the addition of two lanes and service roads adjacent to, and within, the right of way of existing U.S. 67. Relocations having a lateral distance of more than 305 m (1,000 ft) from the existing highway are at Cherokee Pass and Route JJ in Madison County; Route EE, Greenvillle, Route A, and CR404 in Wayne County; and Route 160 and Neelyville in Butler County. Interchanges are proposed at Route C, Route JJ (Madison County), Route N, Route EE, Route K, Route 34, Greenville, Route A, CR404 and CR513, Highway 49, CR401 and Route O, Route JJ (Butler County), CR421, CR441, Route 158, and Route 142. Section 2.0 Project Alternatives presents detailed information on the Preferred Alternative.

Section 4(f) of the Department of Transportation Act (49 USC 303) protects publicly owned parks, recreation areas, wildlife refuges, waterfowl refuges, and significant historic and archeological resources. The use of Section 4(f) resources can only be approved by the Secretary of Transportation if there are no feasible and prudent alternatives that avoid the Section 4(f) resource, and all possible plans to minimize harm to the Section 4(f) resources have been incorporated into the Preferred Alternative. The Section 4(f) resources that would be impacted by the Preferred Alternative include Old Greenville National Historic Site (Old Greenville), the Greenville Recreation Area, the St. Francis River bridge, the North Greenville Recreation Area/Greenville ballpark, and the Ozark Trail.

Properties acquired or developed with funds provided by the LWCF Act of 1965 (16 USC 460-4 to 460-11) may be converted to a transportation use only if the land is replaced with property, which is reasonably equivalent in usefulness and is of at least the same fair market value. Special coordination and approval of the National Park Service (NPS) and the Department of the Interior is necessary for parks where this funding has been utilized.

Old Greenville National Historic Site (Old Greenville) was placed on the NRHP in 1990. The Preferred Alternative will require 0.81 ha (2.0 ac) of the total 55.44 ha (137 ac) that comprises Old Greenville. Several historic features associated with Old Greenville are located within the right of way of the Preferred Alternative.

Greenville Recreation Area is classified “recreation land” in the Wappapello Lake Master Plan (2000) and considered a significant recreation area (letter from the USACE, dated December 7, 2000]. The Preferred Alternative will require 0.79 ha (1.95 ac) of the total 65.56 ha (162 ac) that comprise Greenville Recreation Area.

The SHPO has concurred that the St. Francis River bridge is eligible for listing on the NRHP. The construction of the Preferred Alternative will require the removal of the St. Francis River bridge. This is considered an adverse effect when applying the requirements of Section 106 of the National Historic Preservation Act (36 CFR Part 800.5) (MDNR letter dated February 18, 2003, Exhibit 5-1).

North Greenville Recreation Area is located north of Greenville Recreation Area and is classified “recreation land” in the Wappapello Lake Master Plan (2000). In a letter dated December 7, 2000, the USACE states “North Greenville is a significant segment of the (Wappapello Lake) project.” Since the issuance of the Draft EIS and Draft Section 4(f) Evaluation, the Preferred Alternative at the North

Greenville Recreation Area was slightly modified to avoid an archaeological resource that was eligible for inclusion in the NHRP and warranted preservation in place. The Preferred Alternative will require 20.10 ha (49.7 ac) of the total 60.71 ha (150 ac) that comprise North Greenville Recreation Area.

North Greenville Recreation Area includes a 4.86-ha (12-ac) site leased to the city of Greenville for park and recreational purposes. The 4.86 ha (12-ac) park was developed with funds from the LWCF for baseball and softball sporting events. Therefore, the Greenville ballpark is both a Section 4(f) and 6(f) resource affected by the Preferred Alternative. The Preferred Alternative requires nearly all of the 4.86-ha (12-ac) Greenville Park. Section 6(f) conversion is proposed for the entire 4.86-ha (12-ac) ballpark.

The Ozark Trail crosses U.S. 67 approximately 1.6 km (1 mi) south of the St. Francis River on property managed by the USACE. The Ozark Trail is an extensive linear recreational resource that cannot be avoided by the proposed project. The crossing will be modified so users can safely traverse four lanes of traffic so that the continuity of the trail is maintained.

5.2 Previous Investigations

A records search, literature review, and field survey were conducted to identify cultural resources within the U.S. 67 study corridor. The following repositories and resources were used to establish a database of previously identified cultural resources: the Archaeological Survey of Missouri (ASM) files in Columbia; the Missouri State Historic Preservation Office in Jefferson City; the USACE, Wappapello Lake District Office; the Mark Twain National Forest (MTNF), Fredericktown District Office; MTNF Poplar Bluff District Office; the Missouri Historic Bridge Inventory Draft Report (FraserDesign 1996), MoDOT 1995 Bridge/Culvert Service Ratings; and Madison, Wayne County and Butler County Historical Societies (see Section 3.12).

In order to identify any potential historic issue or concern, a Phase I archaeological survey was conducted within the right of way for the Preferred Alternative between the fall of 1999 and the summer of 2002. An initial archaeological investigation identified several historic features within Site 23WE637, Old Greenville that had not been previously identified which could be affected by the Preferred Alternative.

During the summer of 2000, an architectural survey was completed for the Area of Potential Effect (APE) defined as 30.5 m (100 ft) beyond the right of way for the Preferred Alternative. There are no listed architectural properties within the APE. There is one eligible architectural resource adversely affected by the Preferred Alternative which is the St. Francis River bridge (see Section 4.0 of the Final EIS and SHPO correspondence). The Architectural and Bridge Resources, U.S. 67 Location Study, Butler, Madison, and Wayne Counties, Missouri (2003) contains detailed information on architectural resources.

5.3 Section 4(f) Properties

5.3.1 Old Greenville National Historic Site

The Old Greenville National Historic Site is located 1.6 km (1 mi) south of existing Greenville, and immediately adjacent to U.S. 67 (Figure 5-3). Old Greenville (then known as Greenville) was founded in 1818 on the St. Francis River at the crossing of the Natchitoches Trace, and served as a prominent political and trade center until the Civil War. During the war, both the Union and Confederate armies occupied Old Greenville and over half the town was burned. Old Greenville did not fully recover from the Civil War until the logging boom in the last two decades of the nineteenth century.

The flood control project, Wappapello Lake and Dam, positioned Old Greenville in the flood zone of the lake. Consequently, the town was relocated to higher ground (present day location.) Between 1940 and 1942, all buildings within the town were razed or moved to the new site.

Old Greenville National Historic Site was listed on the NRHP in 1990 as a site, under Criterion D because this site can yield important, historic archaeological information (Exhibit 5-2). Old Greenville is of local significance as a frontier town and County Seat important in the initial and expanding frontier settlement of the Eastern Ozarks of southeast Missouri and northeast Arkansas. Settlements, such as Old Greenville, functioned to centralize social, political, and economic activities. Old Greenville has high potential for producing data to assess these functions. The site also has high potential to yield significant comparative information on settlement system and organizational patterning in the Eastern Ozarks from 1800 to 1939. Old Greenville has high archaeological site integrity as the town does not lie under an existing town and was moved prior to the installation of underground utilities, which would have disturbed the earlier archaeological features and deposits.

Old Greenville is a 55.44 ha (137 ac) site managed by the USACE. The historic site includes village streets, building foundations, steps to the courthouse, and sidewalks associated with the original town. Memory Lane is a 1.6 km (1-mi), self-guided, walking trail through Old Greenville. Interpretive plaques identify the locations and descriptions of approximately 20 historic sites. A gazebo presents the history of Greenville including the role Greenville played as the County Seat of Wayne County.

Three cemeteries were considered integral to Old Greenville and were included in the nomination for the NRHP. Union Cemetery is located west of the campground on private property. Hickman Cemetery is located north of Old Greenville, and Wight Cemetery is located southeast of Old Greenville (Figure 5-1). Hickman and Wight cemeteries are significant to Old Greenville and separated from Old Greenville by nonsignificant areas.

Out of the 55.44 ha (137 ac) comprising this historic site, 19.0 ha (47 ac) of Old Greenville overlap with Greenville Recreation Area, which is classified as recreation land in the Wappapello Lake Master Plan (2000). The remaining 36.42 ha (90 ac) are located north of the recreation land and is classified as an "environmentally sensitive-cultural area." Old Greenville receives intensive use throughout the year. Visitors to Old Greenville routinely use the facilities in Greenville Recreation Area. Visitor counts are taken by the USACE for both Old Greenville and the Greenville Recreation Area. In 2000, there were 214,703 visitors that spent a total of 2,570,764 visitor hours at both Old Greenville and Greenville Recreation Area.

A powerline corridor, in existence since the 1950s, is located within Old Greenville and is between 27.48 m (91.59 ft) and 67.86 m (203.58 ft) from the existing U.S. 67 pavement (Figure 5-1)

The USACE has no proposed new actions for Old Greenville. However, there is a proposed replacement action to elevate the asphalt entrance road [currently 377.0 ft National Geodetic Vertical Datum (NGVD)] to the same elevation as the campground (379.5 ft NGVD) (USACE, 2000.)

5.3.2 Greenville Recreation Area

Greenville Recreation Area is adjacent to Old Greenville (Figure 5-1) and is also managed by the USACE. Greenville Recreation Area is located on the northern end of Wappapello Lake and immediately northeast of the St. Francis River. All of Greenville Recreation Area is within the 100-year floodplain. Nineteen ha (47 ac) of Greenville Recreation Area overlap with Old Greenville. Greenville Recreation Area [approximately 65.56 ha (162 ac)] is located on both sides of existing U.S. 67 and is used for camping and day-use activities. Major recreational activities include visiting Old Greenville, camping, fishing, picnicking, hiking, swimming, and canoeing. Visitors often canoe from North Greenville Recreation Area to Greenville Recreation Area (Figure 5-1) Special events, such as Old Greenville Days, Black Powder Rendezvous, and Civil War reenactments are held at this recreation area.

The campground is located northwest of U.S. 67 and within the section that overlaps with Old Greenville. This 111-site campground accommodates both trailers and tents, of which 106 sites are equipped with

electric hook-up and five walk-in sites without electricity along the shoreline. Facilities associated with the campground include four waterborne vault restrooms, a sewage treatment facility, 11 fountains/hydrants, a bulletin board, a shower house, an amphitheater, a trailer dump station, a portable fee collection booth, a park attendant site, a floating courtesy dock, and a water well.

Day-use facilities are located on both sides of U.S. 67 and include a picnic shelter, 14 picnic sites, a vault comfort station, a waterborne vault comfort station, a two-lane boat ramp with courtesy dock, four fountain hydrants, a volleyball court, a bulletin board, a playground, and two horseshoe pits.

The Wappapello Lake Master Plan (2000) classifies Greenville Recreation Area as "recreation land." To preserve and improve aesthetic integrity, Greenville Recreation Area is intensely managed by the USACE. Greenville Recreation Area is a popular and highly used area for both camping and day use. During 2000, Greenville Recreation Area and Old Greenville had a combined visitor count of 214,703 individuals and 2,570,764 visitor hours.

Proposed new actions for Greenville Recreation Area include providing walk-in access to the island adjacent the boat ramp, installing a fish cleaning station in the day-use area, placing the dump station and fish cleaning station on a septic system, installing 10 additional water fountains and disabled accessible playground in the campground, relocating the five walk-in campsites, adding 20 campsites to the campground, and widening for two-way traffic between the entrance to the middle loop and the shower house.

Proposed replacement actions include upgrading electric service, modifying 15 water fountains and 7 campsites to disabled accessible standards, and relocating the vault comfort station at the boat ramp to the Route 34 Bridge Recreation Area.

5.3.3 St. Francis River Bridge

The St. Francis River bridge was designed in 1940 by the Missouri State Highway Commission and built in 1941 at the same time that Wappapello Lake and Dam project was being constructed. The St. Francis River bridge is a steel, 8-panel, rigid-connected Warren through truss with polygonal top chord, skewed, with steel stringer approach spans. The substructure consists of concrete abutments, wingwalls and piers, and hammerhead spill-through piers at approach spans.

The bridge is a two-lane facility with no shoulders. It was built at the 395-ft elevation, which at the time, was the 100-year flood pool elevation of Wappapello Lake. By today's engineering standards, the St. Francis River bridge is functionally obsolete and cannot be used for the ultimate design facility. By today's standards, a bridge on a new freeway system must be designed with 3.1 m (10-ft) shoulders. The type of construction of the existing bridge (overhead truss) does not allow the existing bridge to be widened to accommodate shoulders.

The St. Francis River bridge is the only rigid-connected polygonal Warren through truss (skewed) in the state. This bridge is viewed by bridge historians as a prototype in Missouri State Highway bridge design. Until the St. Francis River bridge was constructed, the agency only used Warren designs for pony trusses and cantilevered through trusses. Additionally, the lack of steel materials during World War II limited the number of bridges of this type to be built during this time period (Fraserdesign 1996). The SHPO has concurred that the St. Francis River bridge is eligible for listing on the NRHP (see Exhibit 5-2).

5.3.4 North Greenville Recreation Area/Greenville Ballpark

North Greenville Recreation Area is located east of the St. Francis River and southwest of the city of Greenville (Figure 5-1). This area includes several agricultural tracts, wooded areas, and wetlands. North Greenville Recreation Area is managed by the USACE and within the 100-year floodplain. This 60.7 ha

(150-ac) site includes four hunting and fishing accesses and a 4.86-ha (12-ac) site leased to the city of Greenville. Major recreational activities to this site, excluding the 4.86 ha (12-ac) park, include fishing, hunting, hiking, sightseeing, and canoeing. Visitors often canoe from North Greenville Recreation Area to Greenville Recreation Area. The 4.86 ha (12-ac) site is leased to Greenville for park and recreational purposes. The primary purpose of the site is to provide a ballfield for baseball and softball sporting events. The ballpark is primarily used by organized little and big leaguers.

The Wappapello Lake Master Plan (2000) classifies North Greenville Recreation Area as "recreation land." During 2000, North Greenville Recreation Area registered a visitor count of 14,623 individuals and 106,818 visitor hours. In a letter dated December 7, 2000, the USACE states "North Greenville Area is a significant segment of the (Wappapello Lake) project" (Exhibit 5-1).

The LWCF Act of 1965 (16 USC 460L-4) established funds for the acquisition and development of local park and outdoor recreation projects. Section 6(f) of the LWCF Act protects properties that have been developed or enhanced with this fund. The 4.86 ha (12-ac) leased park was developed with funds from the LWCF to include a lighted ballfield, bleachers, a fountain/hydrant, a parking area, concession stand and restrooms. The Greenville ballpark qualifies as both a Section 4(f) and 6(f) resource for the U.S. 67 project.

The city of Greenville plans to construct a T-ball field, remove trees and brush in the outfield to the light poles, add an outfield fence, install a scoreboard, and create more parking spaces. There are no other proposed new actions or proposed replacement actions for North Greenville Recreation Area.

5.3.5 Ozark Trail

The Ozark Trail was established by the Ozark Trail Council in 1977 and developed in cooperation with the MDC, MDNR, MTNF, and USACE. This 804.5-km (500-mi) trail will ultimately extend from the St. Louis Metropolitan Area southwesterly through the Missouri Ozark Mountains to the Arkansas border. At the Arkansas border, the trail connects to the 321.8-km (200-mi) long Ozark Highlands Trail in Arkansas.

The Wappapello Lake Section of the Ozark Trail is 50 km (31.1 mi) in length, located on public and private lands, and considered primitive and rugged. This section of trail is open to hikers, bicyclists, and horseback riders. The Wappapello Lake Section begins at Sam A. Baker State Park on State Highway 143 and continues south through the study area and west of existing U.S. 67. Approximately 1.6 km (1 mi) south of the U.S. 67 and FF intersection, the Lake Wappapello Lake Section crosses U.S. 67 extends to Wappapello Lake and ends at Highway 172 (Figure 5-4). This portion of the trail is located on both USACE and MTNF property.

At the U.S. 67 crossing [approximately 1.6 km (1 mi)] south of the St. Francis River, trail users merely walk across the existing two-lane U.S. 67. There are numerous accesses to the Wappapello Lake Section of the Ozark Trail; however, only one access is located within the study corridor. Directly east of the U.S. 67 crossing is a parking area that provides access to the Ozark Trail and a Civil War Veteran's Grave Memorial (Civil War Grave). The memorial and this part of the Ozark Trail are located at the base of a steep bluff. The Wappapello Lake Section of the Ozark Trail continues east of existing U.S. 67 and ends at Highway 172. Primitive camping is allowed on this section of the Ozark Trail within the study area; however, this section is primarily utilized for day use (personal communication, USACE 2001).

From Highway 172, the Ozark Trail continues as the Victory Section to just north of Hendrickson Recreation Area and continues southwest to Highway V north of Ellsinore. The Victory Section is primarily located on MTNF property. The Ozark Trail is discontinuous at the Black River in Butler

County. There has never been a designated Ozark Trail connection over the Black River at U.S. 67 and the existing bridge is not pedestrian, bicycle, or equestrian friendly.

The Ozark Trail is located on public property on both sides of U.S. 67 at the point where the trail crosses U.S. 67 [approximately 1.6 km (1 mi)] south of the St. Francis River. The property at the Ozark Trail crossing is administered by the USACE, which is part of Pleasant Valley and classified as "Multiple Resource Management-Vegetative Management" in the Wappapello Lake Master Plan (2000). Trail users currently walk across the existing two-lane U.S. 67. Pleasant Valley is managed to protect and develop forest and vegetative cover, and for wetland restoration for recreation, wildlife, and scenic values.

5.4 Impacts to Section 4(f) Properties

As proposed, the Preferred Alternative will maximize the use of the existing right of way while minimizing impacts to Old Greenville, Greenville Recreation Area, floodplains, and wetlands. The Preferred Alternative is located east of the powerline corridor and will not affect the powerline corridor. The Preferred Alternative will require 0.81 ha (2.00 ac) of the total 55.44 ha (137 ac) that comprise Old Greenville National Historic Site and 0.79 ha (1.95 ac) of the total 65.56 ha (162 ac) that comprise Greenville Recreation Area. Several historic features within Old Greenville will be directly impacted by the construction of the Preferred Alternative. The Preferred Alternative will require the removal of the St. Francis River bridge.

The Preferred Alternative will impact nearly all of the 4.86-ha (12-ac) Greenville ballpark, which is a Section 4(f) and 6(f) resource affected by the Preferred Alternative. The Greenville ballpark is located within the North Greenville Recreation Area. The proposed project will require 20.10 ha (49.7 ac) of the total 60.71 ha (150 ac) that comprise the North Greenville Recreation Area.

The Preferred Alternative will affect the manner in which Ozark Trail users cross U.S. 67.

Alternatives developed to avoid and minimize impacts to Section 4(f) resources oftentimes resulted in greater impacts to wetlands and floodplains. Not all of these wetlands and floodplains were located on Section 4(f) resources; however, they were included in the analysis to determine which alternatives were feasible and prudent in accordance with FHWA guidance "Alternatives Selection Process for Projects Involving Section 4(f) of the DOT Act" (FHWA, November 15, 1989). Since the issuance of the Draft EIS, the total number of wetlands impacted by the Preferred Alternative due to the SWANCC ruling and wetland delineation efforts has been reduced. As a result, all proposed wetland impacts have been reduced accordingly.

5.4.1 Old Greenville National Historic Site

Old Greenville is a 55.44-ha (137-ac) site. The Preferred Alternative will require 0.81 ha (2.0 ac) from Old Greenville which is 0.01 percent of the total area comprising Old Greenville National Historic Site. The affected area is located between the powerline corridor and existing U.S. 67. An initial archaeological investigation discovered several historic features within the proposed right of way that had not been previously identified (see Exhibit 5-3). The following historic features would be affected by the Preferred Alternative:

- concrete foundation,
- two concrete features,
- two concrete and stone walls, and
- relic domestic well.

Physical features that contribute to the historic significance of Old Greenville will be affected by the Preferred Alternative; therefore, when applying the requirements of Section 106 of the National Historic Preservation Act (36 CFR Part 800.5), there will be an adverse affect to Old Greenville.

A concrete foundation is located 40.4 m (131 ft) northwest of U.S. 67. This foundation may be in the area of the former Greenville Roller Mill and Restaurant, which was built around 1889. The roller mill was operated by the Greenville M&M Company as a roller mill until they sold it to Robert Paullus and Henry Lee on May 8, 1915. The roller mill was powered by a steam boiler and had a capacity of 50 barrels of flour a day. Their bleached flour brand name was Silverleaf Flour and their unbleached flour brand was named Five Brothers. They also processed cornmeal and livestock feed. After the original U.S. 67 was constructed in the 1930s, the eastern portion of the roller mill building was converted into a restaurant. The United States Government bought the property in 1941 prior to the damming of the St. Francis River and creation of Wappapello Lake. The present U.S. 67 was constructed in 1942 over a portion of the Greenville Roller Mill and Restaurant. This concrete foundation may also be a possible house foundation.

Two concrete features are partially embedded in the side slope of existing U.S. 67, approximately 8.61 m (25.83 ft) from the existing pavement and were probably associated with the railroad that used to run through this area. Two parallel concrete and stone walls are located 32.7 m (107 ft) from U.S. 67 and directly north of a road depression. This feature may have been associated with a house. The well is located immediately north of the concrete and stone wall and was likely associated with a house.

Currently, direct access is provided to Old Greenville by an entranceway on the west side of U.S. 67. The Preferred Alternative will modify access to Old Greenville by providing a service road west of the southbound lanes to a proposed interchange at Route D. The USACE has proposed to elevate the asphalt entrance road (currently 377.0 ft NGVD) to the same elevation as the campground (379.5 ft NGVD). To avoid interfering with this proposed action, the service road will be constructed at 379.5 ft NGVD

5.4.2 Greenville Recreation Area

Greenville Recreation Area is a 65.56-ha (162-ac) site. The Preferred Alternative will require 0.79 ha (1.95 ac) from Greenville Recreation Area which is 0.01 percent of the total Greenville Recreation Area. Approximately 0.60 ha (1.48 ac) of Greenville Recreation Area, northwest of existing U.S. 67, will be affected. This wooded, undeveloped area is located between the powerline corridor and existing U.S. 67. No facilities north of existing U.S. 67, such as the campground and picnic area, are affected by the Preferred Alternative. Approximately 0.19 ha (0.47 ac) from the southeast section of Greenville Recreation Area will be required for right of way. This area includes wooded areas, mowed areas, and a small portion of the parking lot [28.3 m^2 (305 ft^2)]. The vault comfort station at the boat ramp would be affected by the right of way for the Preferred Alternative; however this comfort station is proposed to be relocated to the 34 Bridge Recreation Area. No other proposed actions will be affected by the Preferred Alternative. All remaining facilities southeast of U.S. 67, such as the boat ramp, courtesy dock, and picnic areas, will not be affected by the Preferred Alternative.

Currently, access to Greenville Recreation Area is via a driveway on the west side of U.S. 67. This driveway also provides access to Old Greenville. An existing road under U.S. 67 provides access to the section of the recreation area southeast of U.S. 67. With the Preferred Alternative, access to Old Greenville and Greenville Recreation Area will be provided by a service road west of the southbound lanes to the proposed interchange at Route D. The access road under U.S. 67 will not be affected by the Preferred Alternative.

5.4.3 St. Francis River Bridge

The construction of the Preferred Alternative will require the removal of the potentially eligible St. Francis River bridge. Physical destruction of the St. Francis River bridge is considered an adverse effect when applying the requirements of Section 106 of the National Historic Preservation Act (36 CFR Part 800.5) (see SHPO letter dated February 7, 2003, Exhibit 2). The treatment of the St. Francis River bridge will be handled in accordance with the Missouri Historic Bridge Preservation Plan.

5.4.4 North Greenville Recreation Area/Greenville Ballpark

North Greenville Recreation Area is a 60.71-ha (150-ac) site. The Preferred Alternative will require 20.10 ha (49.68 ac) from North Greenville Recreation Area which is 33 percent of the total North Greenville Recreation Area. The affected area includes agricultural tracts, wooded areas, wetlands, and the Greenville ballpark. The Preferred Alternative will laterally divide North Greenville Recreation Area into three parcels. Two parcels will lie east of the Preferred Alternative. One parcel is located northeast of the proposed intersection with Greenville and consists of 1.05 ha (2.59 ac). The other parcel is located southeast of the proposed intersection and consists of 4.44 ha (10.97 ac). Separated from the main tract, both parcels would be too small to function for hunting, hiking or sightseeing activities. The parcel located west of the Preferred Alternative would consist of 42.44 ha (104.87 ac). All major recreational activities, fishing, hunting, hiking, sightseeing, and canoeing could continue on this tract. The hunting and fishing accesses will not be impacted. A service road will maintain the connection to these accesses.

The only developed recreational facility at North Greenville Recreation Area is the Greenville ballpark. Of the 20.10 ha (49.68 ac) required, the Preferred Alternative requires nearly all of the 4.86 ha (12.0 ac) Greenville ballpark. This consists of a wooded area, the ballfield, and a portion of the parking lot. LWCF funds were used to develop the 4.86-ha (12-ac) parcel. The Preferred Alternative will interfere with the city of Greenville's plans to construct a T-ball field, construct an outfield fence, and add more parking spaces.

The LWCF Section 675.9.3.B states "In the case of assisted sites which are partially rather than wholly converted, the impact of the converted portion on the remainder shall be considered. If such a conversion is approved, the unconverted area must remain recreationally viable or be replaced as well." This parcel could not function as a ballpark and is recommended to be replaced as well. Consequently, Section 6(f) conversion is proposed for the entire 4.86-ha (12-ac) ballpark and replacement land will be necessary.

Currently, direct access is provided to North Greenville Recreation area by a private entranceway approximately 549 m (1,800 ft) north of Corps Road 221 and by Corps Road 21 in Greenville. With the Preferred Alternative, access will be provided by a service road connection at the proposed interchange at Corps Road 21 in Greenville.

5.4.5 Ozark Trail

At the area where the Ozark Trail crosses U.S. 67, the Preferred Alternative is proposed as a four-lane freeway with a grass median and is directly west of existing U.S. 67, and so, the Preferred Alternative will alter the manner in which Ozark Trail users cross U.S. 67. Although hikers, bicyclists, and horseback riders currently walk or ride across existing U.S. 67 in order to continue on the Ozark Trail, this would not be feasible with four lanes of traffic. Two bridges are proposed at the Pleasant Valley Creek crossing which is immediately adjacent to the Ozark Trail (Figure 5-2). The Preferred Alternative proposes that the Ozark Trail extend underneath the bridges so that trail users can safely pass underneath the proposed four-lane facility.

For safety reasons, the Ozark Trail may be temporarily closed for short periods of time. There will be no permanent taking or use of the trail.

Currently, there is direct access from U.S. 67 to the parking lot that serves both the Civil War Veteran's Grave Memorial and the Ozark Trail. The Preferred Alternative will modify access by providing a service road east of the northbound lanes, from the parking lot to an interchange at Route A (Figure 5-2).

There has never been a designated Ozark Trail connection over the Black River at U.S. 67, therefore, there are no impacts to the Victory Section of the Ozark Trail by the Preferred Alternative. However, the National Forest is currently proposing a Black River crossing to connect the Ozark Trail (Hendrickson Recreation Area EA, 1996). A connection to the Ozark Trail over the Black River is currently being considered by MDNR and MTNF. This proposed connection incorporates the old U.S. 67 steel truss bridge over the Black River and is in an early development stage ("The Ozark Trail Victory Section," Ozark Trail Association, October 25, 2003). The proposed connection would require the trail to go underneath the U.S. 67 Black River bridge.

As part of the Preferred Alternative, a two-lane companion bridge is proposed to be located to the west of the existing U.S. 67 Black River bridge. Access will be required under both bridges to allow for the trail connection. MoDOT will likely be requested to grant access rights under the bridges to make this connection.

5.5 Proposed Avoidance Alternatives of Section 4(f) Resources

5.5.1 Avoidance Alternatives

5.5.1.1 Old Greenville National Historic Site/Greenville Recreation Area

Old Greenville is immediately adjacent to and overlaps with the Greenville Recreation Area. Greenville Recreation Area is located on both sides of U.S. 67 (see Figure 5-1). Where an alternative would use land from more than one Section 4(f) resource, the analysis needs to evaluate alternatives that avoid each and all properties [Federal Highway Administration (FHWA), 1987]. The No Action alternative would avoid impacts to both of these Section 4(f) resources. A build alternate that would avoid both Section 4(f) resources would have to be located immediately west or east of these resources. An alternate to the west of Old Greenville/Greenville Recreation Area would have to be located primarily within the 100-year floodplain of the St. Francis River, require a longer bridge over the St. Francis River due to a skewed crossing, potentially affect state-listed species, impact large tracts of USACE-managed multiple resource property, impact large wetland complexes associated with the St. Francis River, result in loss of proximity to the city of Greenville and Wappapello Lake, increase number of lane miles to the state highway system, and cross steep terrain which would result in increased intensity of environmental impacts and higher costs to the proposed project. An alternate to the east of these Section 4(f) resources, would have to be located entirely within the 100-year floodplain, impact USACE-managed multiple resource property, affect large wetland complexes associated with the St. Francis River, either directly and/or indirectly impact a USACE-managed environmental sensitive area and the trail and dolomite glade located within this area, traverse steep terrain, and increase lane miles to the state highway system which would result in increased intensity of environmental impacts and higher costs to the proposed project.

Consequently, alternatives to the east and west of Old Greenville and Greenville Recreation Area were not considered practicable and were eliminated from further analysis and consideration. Subalternate 2 avoids impacts to Old Greenville but impacts Greenville Recreation Area (Figure 5-5). Because Greenville Recreation Area is located on both sides of U.S. 67, there are no design alternatives that could avoid this site entirely. Therefore only alternatives that minimize impacts to this site were developed. See Section 5.2 for details of these alternatives.

5.5.1.2 St. Francis River Bridge

By today's engineering standards, the St. Francis River bridge is functionally obsolete and cannot be updated for the ultimate design facility. To avoid all impacts, an alternative bridge would have to be constructed far enough upstream or downstream of the existing bridge so as not to interfere with the historic integrity of the bridge. Due to alignment orientation, an alternate immediately adjacent to (upstream or downstream) of the existing bridge would increase impacts to Old Greenville or Greenville Recreation Area (see Figure 5-1). Steep bluffs in both directions would dramatically increase the cost of this bridge. The No Action Alternative avoids impacts to the St. Francis River bridge.

For these reasons, alternative river crossings far enough upstream or downstream of the existing bridge that would avoid direct and indirect impacts were not considered practicable, and were eliminated from further analysis and consideration.

5.5.1.3 North Greenville Recreation Area/Greenville Ballpark

The Greenville ballpark [Section 6(f) resource] is located within the North Greenville Recreation Area (see Figure 5-1). The No Action Alternative would avoid all impacts to this area. A build alternative that would avoid the North Greenville Recreation Area would have to be located immediately west or east of this Section 4(f) property. An alternative to the west of North Greenville Recreation Area would have to be located almost entirely within the 100-year floodplain of the St. Francis River, require a longer bridge over the St. Francis River due to a skewed crossing, potentially affect state-listed species, affect large tracts of USACE-managed multiple resource property, impact riparian wetlands associated with the St. Francis River, increase the distance of the roadway to Greenville and Wappapello Lake, and increase number of lane miles to the state highway system which would result in higher costs to the proposed project. An alternative to the immediate east of North Greenville Recreation Area would result in unacceptable socioeconomic impacts to the city of Greenville (numerous business and resident displacements) and alternatives farther east would impact MTNF-managed property, decrease proximity to the city of Greenville, traverse steep terrain, and increase number of lane miles to the state highway system which would result in increased costs to the proposed project.

For these reasons, alternatives to the east and west of North Greenville Recreation Area were not considered practicable and were eliminated from further analysis and consideration. See Section 5.2 for details of these alternatives.

5.5.1.4 Ozark Trail

The Ozark Trail is an 804.5-km (500-mi) trail that extends from Sam A. Baker State Park to the Missouri/Arkansas border. Approximately 1.6 km (1 mi) south of the U.S. 67 and Route FF intersection, the Ozark Trail crosses U.S. 67 and extends to Wappapello Lake (see Figure 5-1). The No Action Alternative would maintain the current crossing of the Ozark Trail by the existing facility. In order for a build alternate to avoid impacts to the Ozark Trail, an alternate would have to be located either west of Sam A. Baker State Park or east of Wappapello Lake, which would be far beyond the defined study area. An alternate outside the study area would result in a loss of proximity to the existing highway, a much more costly alternate, and greater potential for overall environmental impacts.

For these reasons, alternates to the west of Sam A. Baker State Park and east of Wappapello Lake were not considered practicable and were eliminated from further analysis. Only one alternate (see Figure 5-2) was developed in this area which was designed to minimize overall impacts to the environment. The proposed alternate bridges Pleasant Valley Creek and the Ozark Trail; therefore, access along the Ozark Trail is maintained across proposed U.S. 67. For detailed information, see Section 5.2.

5.5.1.5 Avoidance Alternative

Since the issuance of the Draft EIS, an alternate was developed to demonstrate an avoidance of all of the impacted Section 4(f) resources (except for the Ozark Trail) (Figure 5-3). This alternate begins north of the North Greenville Recreation Area and proceeds west of the St. Francis River via a new bridge crossing of the river. It then runs southerly and longitudinally through the floodplain of the St. Francis River to a point near the parking lot for the Civil War Veteran's Grave Memorial and the trailhead for the Ozark Trail. Through the St. Francis River floodplain, this alternative would need to be constructed to elevation 405 feet to accommodate the proposed change by USACE in the 100-year flood elevation of Wappapello Lake from 120 to 123 m (395 to 405 ft). This alternative completely avoids the North Greenville Recreation Area, the existing St. Francis River Bridge, Old Greenville and the Greenville Recreation Area. An avoidance alternative wasn't developed to the east of Greenville due to the severe terrain, which would result in much higher costs. The avoidance alternative west of the Section 4(f) resources would result in the following approximate impacts and costs.

Table 5-1. Avoidance Alternative Impacts

Type of Impact	Subalternate	
	Avoidance Alternative	No Action
Length, km (mi)	6.93 (4.31)	0
Area through Old Greenville, ha (ac) [Total area = 55.44 ha (137 ac)]	0	0
Area through Greenville Recreation Area, ha (ac) [Total area = 65.56 ha (162 ac)]	0	0
Area through Greenville ballpark property leased by the USACE, ha (ac) [Total area = 4.86 ha (12 ac)]	0	0
Area through North Greenville Recreation Area, ha (ac) [Total area = 60.7 ha (150 ac)]	0	0
Would the St. Francis River Bridge be retained?	Yes	Yes
Area through wetlands, ha (ac)	11.69 (28.90)	0
Area through floodplain, ha (ac)	45.95 (113.55)	0
4(f) Land acquisition cost ($)*	0	0
Wetland mitigation cost ($)†	578,000	0
Cultural resource mitigation cost ($)**	Unknown	0
Total 4(f) land acquisition and mitigation cost ($)	578,000	0
Construction cost ($ millions)‡	28.015	0

* *4(f) land acquisition costs were estimated at $1,200 per acre.*

† *Wetland mitigation costs were estimated at $20,000 per acre. Assumed that PFO wetlands will be mitigated at a 2:1 ratio; all other wetlands assumed at a 1:1 ratio.*

** *Cultural resource costs can not be fully determined based on the level of analysis conducted in the area of the avoidance alternative.*

‡ *Cost estimates based on $6.5 million per mile.*

Source: MACTEC, 2004.

A complete avoidance alternative to the west of Old Greenville/Greenville Recreation Area and North Greenville Recreation Area/Greenville ballpark, would have to be located primarily within the 100-year floodplain of the St. Francis River, be constructed to the 405-ft elevation within the Wappapello Lake flood pool, result in two additional crossings of the Ozark Trail, require a longer bridge over the St. Francis River due to a skewed crossing, impact large tracts of USACE managed multiple resource property, impact wetland complexes associated with the St. Francis River, bypass the city of Greenville, result in loss of proximity to Wappapello Lake, increase the number of lane miles to the state highway system, cross steep terrain and result in higher costs to the project. For these reasons, a complete avoidance alternative was eliminated.

5.5.2 Alternative Development

The alternative development and evaluation processes for the U.S. 67 location study consisted of several phases that evaluated U.S. 67 from a regional to a local perspective. The first phase involved the

identification of the environmental constraints, socioeconomic effects, and cultural resources from a macroperspective and located a study corridor within which logical and reasonable alternatives could be developed. The process of the second phase reduced and modified the size of the study corridor based on field reconnaissance data. The following phase included the careful examination of the environmental constraints, socioeconomic effects, and cultural resources specific to each area, and developed study alternatives within the corridor.

Due to the sensitive issues at Old Greenville/Greenville Recreation Area, St. Francis River bridge, and the North Greenville Recreation Area (including Greenville ballpark), a final phase identified and evaluated the environmental constraints, socioeconomic effects, and cultural resources from a microperspective. The detailed examination of concerns led to the development of subalternates that would avoid and minimize impacts to Section 4(f) resources. Agency and public input were incorporated throughout the alternative and Subalternate development processes.

A corridor was initially identified within which alternatives for the proposed project were developed. As described in Section 2.0, the objectives used to initially locate the corridor included:

- maximizing the use of existing right of way;
- serving the local and through traffic; and
- minimizing environmental and human impacts including impacts to Section 4(f) resources, cultural resources, wetlands, floodplains, cemeteries, residential displacements, and business displacements.

5.5.2.1 Old Greenville/Greenville Recreation Area

As discussed in Section 2.3 of the Final EIS, one study corridor was developed and refined in the vicinity of Old Greenville and Greenville Recreation Area. As part of the location study process, with emphasis on developing reasonable, logical and practicable study alternatives, the study corridor was refined to approximately 150 m (500 ft) wide and represented the only corridor remaining in consideration within which build alternates could be developed. The expansion of the study corridor, or the addition of additional corridors to the west and east of Greenville Recreation Area were originally examined and subsequently eliminated from further consideration.

A corridor was not located west of Old Greenville/Greenville Recreation Area for the following reasons:

- severe impacts to USACE property involving land acquisitions and parcel severances;
- loss of proximity to the city of Greenville and Wappapello Lake (which the community and the USACE opposed);
- high impacts to floodplains and wetlands;
- increased impacts to the proposed 405 ft Wappapello Lake flood pool;
- steep bluffs up to 45.72 m (150 ft) high with 10 percent slope (which would result in higher construction costs and greater potential for environmental impacts);
- a longer bridge over the St. Francis River due to a skewed crossing; and
- increased number of lane miles added to the state highway system (which results in increased costs to the taxpayer for maintenance).

A corridor was not located far east of Old Greenville/Greenville Recreation Area for the following reasons:

- severe impacts to USACE property involving land acquisitions and parcel severances;
- rugged terrain including 30.48 to 45.72 m (100 to 150 ft) of relief and greater than 10 percent slopes (which would result in higher construction costs and greater potential for environmental impacts);
- high impacts to floodplains and wetlands;

- increased number of lane miles added to the state highway system (which results in increased costs to the taxpayer for maintenance); and
- an environmentally sensitive area with dolomite glade.

The above listed constraints resulted in locating the study corridor along the existing U.S. 67 right of way and in the immediate area of Old Greenville and Greenville Recreation Area.

5.5.2.2 North Greenville Recreation Area/Greenville Ballpark/Site 23WE262

A corridor was not located west of North Greenville Recreation Area for the following reasons:

- severe impacts to USACE property;
- loss of proximity to the city of Greenville and Wappapello Lake (which the community and the USACE opposed);
- increased number of lane miles added to the state highway system;
- high impacts to floodplains;
- increased impacts to the proposed 405 ft Wappapello Lake flood pool; and
- a longer bridge over the St. Francis River due to a skewed crossing.

A corridor was not located far east of North Greenville Recreation Area for the following reasons:

- increased number of lane miles added to the state highway system;
- high socioeconomic impacts to the city of Greenville;
- severe terrain; and
- impacts to MTNF-managed property.

The above listed constraints resulted in locating the study corridor slightly west of Greenville but east of the St. Francis River (Section 5.3).

5.5.2.3 Ozark Trail

Complete avoidance of the Ozark Trail is not possible because the trail runs perpendicularly across the study corridor from east of Wappapello Lake to west of Sam A. Baker State Park. No study corridors were developed in these areas for this reason.

5.5.3 Old Greenville National Historic Site/Greenville Recreation Area

An intensive effort followed the development of the study corridor, which involved the identification of all potential environmental constraints as well as those resources that afforded protection under laws, statutes, or regulations (i.e., wetlands and Section 4(f) resources). The environmental constraints identified within the corridor include:

- Old Greenville National Historic Site;
- Greenville Recreation Area;
- Wight Cemetery (which is listed on the NRHP) southeast of St. Francis River bridge;
- wetlands and floodplains east of U.S. 67 and north of St. Francis River;
- a backwater slough and associated wetland south of the St. Francis River bridge and east of existing U.S. 67; and
- steep bluffs east and west of existing U.S. 67 at the St. Francis River.

The Preferred Alternative, as presented in Section 2.0 of the Final EIS, is comprised of a series of locational alternates from the northern terminus to southern terminus of the proposed project (see Section 2.6.1 in the Final EIS). The Old Greenville Area is a subsection of what has been labeled as

Alternate L. In order to minimize impacts to Old Greenville and other environmental resources, "subalternates" were developed along Alternate L. Eight subalternates were initially developed at Old Greenville which considered the environmental constraints, the proposed change by USACE in the 100-year flood elevation of Wappapello Lake from 120 to 123 m (395 ft to 405 ft), and the capability of the subalternates to be constructed in stages. An evaluation of the eight subalternates resulted in the retention of four subalternates. The following discussion summarizes the four subalternates retained and the No Action Subalternate.

Access to Old Greenville and Greenville Recreation Area for all subalternates is proposed to be provided with an interchange at Route D and a service road.

5.5.3.1 Subalternate 1

The northbound lanes will utilize existing U.S. 67 at elevation 395 ft (Figure 5-4). The southbound lanes will be located west of the existing U.S. 67 at elevation 405 ft. The service road will be located west of the southbound lanes and will be at existing grade. A 15.8 m (52-ft) wide grass median will be located between northbound and southbound lanes.

When compared to other subalternates, Subalternate 1 has the highest impacts to Old Greenville and the lowest impacts to Greenville Recreation Area wetlands (Table 5-2). The concrete foundation, concrete features, concrete and stone walls, and relic domestic well are impacted by Subalternate 1. A powerline corridor approximately 61 m (200 ft) west of existing U.S. 67 would have to be relocated farther west to accommodate this subalternate which would increase the encroachment into Old Greenville.

Table 5-2. U.S. 67 Old Greenville/Greenville Recreation Area Impacts

Type of Impact	Subalternate				
	1	2	3	4*	No Action
Area through Old Greenville, ha (ac) [Total area = 55.44 ha (137 ac)]	3.11 (7.68)	0	0.77 (1.90)	0.81 (2.00)	0
Area through Greenville Recreation Area, ha (ac) [Total area = 65.56 ha (162 ac)]	0.29 (0.72)	1.07 (2.64)	0.73 (1.80)	0.79 (1.95)	0
Area through wetlands, ha (ac)	0.24 (0.61)	3.63 (8.99)	1.72 (4.23)	2.36 (5.82)	0
Area through floodplain, ha (ac)	2.86 (7.07)	6.58 (16.26)	2.85 (7.04)	3.62 (8.94)	0
4(f) Land acquisition cost ($)†	10,080	3,168	4,440	4,740	0
Wetland mitigation cost ($)**	191,800	544,800	263,200	350,800	0
Cultural resource mitigation cost ($)‡	150,000	0	20,000	50,000	0
Total 4(f) land acquisition and mitigation cost ($)	341,800	544,800	283,200	405,540	0
Accident cost ($ per year))***	0	0	187,200	0	0
Construction cost ($ millions)	11.90	13.02	12.50	13.39	0

* *Preferred Alternative*
† *4(f) land acquisition costs were estimated at $1,200 per acre.*
** *Wetland mitigation costs were estimated at $20,000 per acre. Assumed that PFO wetlands will be mitigated at a 2:1 ratio; all other wetlands assumed at a 1:1 ratio.*
‡ *Cultural resource mitigation costs were estimated based on proximity of the Subalternate to Historic Greenville.*
*** *The baseline of comparison for accident costs is a standard four-lane rural freeway consisting of a depressed grass median and having no guardrail. Subalternate 3 consists of a freeway section having a narrower median with a barrier wall and guardrail. Accident costs for Subalternate 3 were estimated based on a similar roadway section on I-70 at the Missouri River crossing in Cooper and Boone Counties. An accident cost of zero indicates the Subalternate consists of the standard section.*

Source: MACTEC, 2004.

5.5.3.2 Subalternate 2

The northbound and southbound lanes will be immediately east of existing U.S. 67 at elevation 405 ft (Figure 5-5). Existing U.S. 67 will become the service road. Subalternate 2 will incorporate a 52-ft grass median.

This is the only subalternate that does not impact Old Greenville (see Table 5-2). However, this has the highest impacts to Greenville Recreation Area, wetlands, and floodplains. The historic features in Old Greenville would remain intact. The powerline would not be affected.

5.5.3.3 Subalternate 3

The centerline of proposed U.S. 67 will be approximately 7.0 m (23 ft) east of the centerline of existing U.S. 67 (Figure 5-6). The northbound and south bound lanes will be separated by a 4.27 m (14-ft) paved median with a concrete median barrier and will be at elevation 405 ft. The service road will be west of the southbound lanes and east of the power lines. Guard rails will be required along the edge of shoulder due to reduced clear zones resulting from 2.5:1 side slopes.

Subalternate 3 was developed as an alternative to a standard typical section, which includes a 15.8 m (52-ft) grass median and 10-m (30-ft) clear zones at a 6:1, side slope. The standard typical section creates a large footprint, which was minimized by Subalternate 3 by reducing the width of the median to 4.27 m (14 ft) and steepening the side slopes (Table 5-2). The narrower median requires that implementation of a concrete median barrier and the steeper side slopes necessitates guardrail at the edge of the shoulder.

The concrete feature embedded in the side slope of U.S. 67 and one of the two concrete and stone walls will be impacted with this subalternate. The concrete foundation and northern concrete and stone wall will not be affected. This subalternate minimizes overall impacts to Old Greenville, Greenville Recreation Area, wetlands, and floodplains but has a higher accident cost because of the presence of the concrete median barrier and the guard rail. Based on analysis of a similar freeway section (I-70 at the Missouri River crossing in Cooper and Boone counties), a forecast of the number of accidents through this section of U.S. 67 can be made. The accident rate on this type of facility is estimated to be 47 percent higher than a statewide average for a typical rural freeway with a depressed grass median and no guard rail. This equates to an increased cost of $187,200 per year compared to the statewide average accident costs.

5.5.3.4 Subalternate 4 – Preferred Alternative

The centerline of proposed U.S. 67 will be approximately 5.8 m (19 ft) east of the centerline of existing U.S. 67 (Figure 5-7). The northbound and southbound lanes will be constructed at elevation 405 ft and will be separated by a 15.8 m (52 ft) depressed grass median. A standard 9.1 m (30 ft) clear zone will be incorporated into this Subalternate which eliminates the need for a guard rail.

Subalternate 4 is of a similar design to Subalternate 3, but does not incorporate a reduced facility (narrow median and steeper side slopes). This subalternate has slightly greater impacts to Old Greenville, Greenville Recreation Area, wetlands, and floodplains than Subalternate 3 (Table 5-2). However, the accident costs are comparable to the statewide average and are lower than Subalternate 3.

Subalternate 4 is the preferred subalternate at Old Greenville because it is the most effective subalternate at minimizing impacts to Old Greenville, impacts to the natural resources in Greenville Recreation Area, and balancing costs (including construction costs, mitigation costs, and costs associated with accidents).

5.5.3.5 No Action Subalternate

U.S. 67 is proposed as a four-lane, fully-controlled access roadway. The No Action Subalternate at Old Greenville is not viable because it would result in increased congestion, reduced travel efficiency, and higher accident rates if the existing facility remains as a two-lane roadway. The No Action Subalternate

does not meet the project Purpose and Need of reducing congestion, improving safety, and providing a continuous four-lane highway along U.S. 67 between I-55 in Jefferson County and Arkansas.

5.5.4 St. Francis River Bridge

The alternative development and evaluation process for the St. Francis River bridge was directly associated with the subalternate development for Old Greenville National Historic Site and Greenville Recreation Area. As described previously, the environmental constraints at the St. Francis River crossing constricted the corridor to a narrow, bottleneck configuration. All subalternates developed for Old Greenville were also evaluated for their effects to the St. Francis River bridge. Eight subalternates were initially developed and evaluated for impacts to Old Greenville, Greenville Recreation Area, and the St. Francis River bridge. An evaluation of the eight subalternates resulted in the retention of four Subalternates.

The description of each Subalternate can be found in Section 5.1. Subalternates 1, 2, and 4 would require the removal of the St. Francis River bridge because these subalternates require the space occupied by the existing bridge alignment (Table 5-3). Subalternate 3 would not require the removal of the bridge but the St. Francis River bridge would be within the APE. There would be an adverse impact to the historic integrity of the St. Francis River bridge viewshed and another agency would be sought for responsibility for the bridge. The St. Francis bridge is functionally obsolete, lacks shoulders, and does not meet the 405-ft elevation mandated by the USACE. The No Action Subalternate is not viable because it does not meet the project Purpose and Need of reducing congestion and improving safety

Table 5-3. U.S. Route 67 St. Francis River Bridge

Type of Impact	Subalternate				
	1	2	3	4*	No Action
Would the St. Francis River bridge be retained?	No	No	Yes	No	Yes

** Preferred Alternative.*

Source: MACTEC, 2004.

5.5.5 North Greenville Recreation Area/ Greenville Ballpark

Once the study corridor was identified, the project team focused on the environmental constraints within this area. These environmental constraints comprised:

- North Greenville Recreation Area;
- Greenville ballpark;
- Site 23WE262;
- wetlands; and
- floodplains.

The Greenville area is a subsection of Alternate L, therefore alternates developed for this section are termed "subalternates." Four subalternates were developed, which considered the environmental constraints and Section 4(f)/6(f) resources. There are no subalternates that completely avoid North Greenville Recreation Area as this subalternate would have high socioeconomic impacts to Greenville or the environment. The following discussion summarizes the four subalternates developed to avoid and minimize impacts to North Greenville Recreation Area and the No Action Subalternate.

5.5.5.1 Subalternate 1 – Preferred Alternative

This Subalternate is directed west of existing U.S. 67 approximately 533 m (1750 ft) north of Corps Road 21 in Greenville (Figure 5-8). It proceeds southeasterly through the North Greenville Recreation Area and the Greenville ballpark. Access to Greenville is provided via a diamond interchange at Corps Road 21. The subalternate then continues southeasterly up from the St. Francis River floodplain to heavily wooded and rolling terrain west of the Greenville wastewater lagoons. Subalternate 1 would be constructed at elevation 405 feet. A 15.8-m (52-ft) wide grass median (from shoulder to shoulder) would lie between northbound and southbound lanes.

Subsequent to the issuance of the Draft EIS, the Phase I archaeological survey identified an archaeological site that may be eligible for inclusion on the NRHP. A portion of this archaeological site warranted preservation in place. To avoid the part of the site that warranted preservation in place, the entire subalternate was shifted slightly north. As a result, the proposed west frontage road north of Corps Road 21 was aligned more to the north and east to tie directly with the gravel road providing access to the St. Francis River. The alignment for mainline U.S. 67 was shifted slightly to the north and east away from the floodplain of the St. Francis River, which resulted in a slight modification at the interchange at Corps Road 21 and less of an impact to the North Greenville Recreation Area property.

Subalternate 1 meets MoDOT design criteria; however, it has the highest impacts to Section 4(f) and environmental resources (Table 5-4). Subalternate 1 has the best design because it has no horizontal curves, which provides a more desirable alignment compared to other Subalternates.

Table 5-4. U.S. 67 North Greenville Recreation Area/Greenville Ballpark Impacts

	Subalternates				
Type of Impact	Greenville 1*	Greenville 2	Greenville 3	Greenville 4	No Action
Area through North Greenville Recreation Area including ballpark, ha (ac) [total area = 60.71 ha (150 ac)]	20.10 (49.68)	18.94 (46.81)	15.87 (39.21)	7.7 (19.03)	0
Area through Greenville Ballpark, ha (ac) [total area = 4.86 ha (12 ac)]	4.43 (10.93)†	1.41 (3.48)	0	0	0
Area through North Greenville Recreation Area excluding ballpark, ha (ac)	15.67 (38.75)	17.53 (43.33)	15.87 (39.21)	7.7 (19.03)	0
Total area through wetlands, ha (ac)	4.46 (11.02)	5.60 (13.78)	6.18 (15.17)	2.75 (6.78)	0
Area through floodplain, ha (ac)	25.03 (61.85)	24.52 (60.59)	24.75 (61.16)	9.59 (23.70)	0
4(f) land acquisition cost ($)**	57,960	51,984	47,052	22,836	0
Wetland mitigation cost ($)‡	1,677,200	1,590,200	1,603,000	799,200	0
Total 4(f) land acquisition/mitigation cost ($)	1,735,160	1,642,184	1,650,052	822,036	0
Construction cost ($ millions)	8.879	8.851	9.202	7.756	0

* *Preferred Alternative.*
† *Replacing Greenville ballpark is proposed with this subalternate (see Section 5.6).*
** *Section 4(f) land acquisition costs were estimated at $1,200 per acre.*
‡ *Wetland mitigation costs were estimated at $20,000 per acre. Assumed that PFO wetlands will be mitigated at a 2:1 ratio; all other wetlands assumed at a 1:1 ratio.*

Source: MACTEC, 2004.

5.5.5.2 Subalternate 2

Subalternate 2 diverges west of existing U.S. 67 at the same point as Subalternate 1. It then proceeds through the St. Francis River floodplain and across part of the property leased to the city of Greenville by the USACE (Figure 5-9). While impacting the southwestern portion of the leased property [the Section 6(f) resource], this Subalternate does not impact the playing field of the ballpark (Table 5-4). All impacts to the leased property occur to heavily wooded undeveloped land. However, this Subalternate impacts the western portion of Site 23WE262, which warrants preservation-in-place. A diamond interchange is

proposed at Corps Road 21. This serves as access to Greenville. This Subalternate then rises into rolling wooded terrain west of the Greenville wastewater lagoons. The Subalternate would be constructed at elevation 405 feet. A 15.8 m (52-ft) wide grass median (from shoulder to shoulder) would lie between northbound and southbound lanes.

Subalternate 2 avoids the playing field but will impact the southwestern edge of the 4.86 ha (12-ac) parcel. This subalternate has two 440-m (1,443.6 ft) horizontal curves and one 880-m (2,887.1-ft) curve. This is not as desirable as Subalternate 1. Impacts to Section 4(f) and environmental resources are similar to Subalternate 1.

5.5.5.3 Subalternate 3

Subalternate 3 is oriented west of existing U.S. 67 approximately 500 m (1,640 ft) north of Corps Road 21 in Greenville (Figure 5-10), and then proceeds in a more southerly direction than Subalternates 1 and 2 through the St. Francis River floodplain. It avoids the entire property leased to the city of Greenville by passing south and west of the property. It impacts the western portion of Site 23WE262 resulting in a significant adverse impact to a resource eligible for the National Register and that warrants preservation-in-place. A diamond interchange is proposed at Corps Road 21, which would serve as access to Greenville. The subalternate then turns westerly and rises out of the St. Francis River floodplain into wooded terrain south and west of the Greenville wastewater lagoons. The subalternate would be constructed at elevation 405 ft. A 515.8 m (2-ft) wide grass median (from shoulder to shoulder) would lie between northbound and southbound lanes.

When compared to Subalternates 1 and 2, Subalternate 3 avoids Greenville ballpark and minimizes impacts to North Greenville Recreation Area, wetlands, and woodlands (Table 5-4). Impacts to floodplains are similar to Subalternates 1 and 2. Although Subalternate 3 minimizes acreage of recreational area impacted, this Subalternate has a greater impact on the functionality of the recreational area because North Greenville Recreation Area is bisected by this subalternate. Dividing North Greenville Recreation Area in half by a four-lane facility will limit the hunting, hiking, and sightseeing recreational activities to a much smaller area. Additionally, Subalternate 3 has three sweeping 500 (1,640 t) curves, which is not as desirable as Subalternate 1.

5.5.5.4 Subalternate 4

Subalternate 4 diverges west of existing U.S. 67 at Corps Road 21 in Greenville immediately south of the property leased to the city of Greenville, and then proceeds southerly between the ballpark property and the wastewater lagoons avoiding the ballpark property and Site 23WE262 entirely (Figure 5-11). A diamond interchange is proposed in this area, which serves as access to Corps Road 21 and Greenville. Access to Greenville is via Poplar Street. South of the proposed interchange, the subalternate proceeds westerly and rises out of the floodplain and into heavily wooded terrain south and west of the Greenville wastewater lagoons. The Subalternate would be constructed at elevation 405 feet. A 15.8 m (52-ft) wide grass median (from shoulder to shoulder) would lie between northbound and southbound lanes.

Subalternate 4 avoids Greenville ballpark and has the lowest impacts to North Greenville Recreation Area and environmental resources (Table 5-4). Also, this subalternate has one 500-m (1,640 ft) curve and one 875-m (2,870-ft) curve and impacts two businesses. This is slightly more desirable than Subalternates 2 and 3 but not as desirable as Subalternate 1.

5.5.5.5 No Action Subalternate

U.S. 67 is proposed as a four-lane, fully-controlled access roadway. The No Action Subalternate at the North Greenville Recreation Area/Greenville ballpark is not viable because it would result in increased congestion, reduced travel efficiency, and higher accident rates if the existing facility remains as a two-

lane roadway. The No Action Subalternate does not meet the project Purpose and Need of reducing congestion and improving safety.

5.5.6 Ozark Trail

There is no alternate that avoids the Ozark Trail. Attempts to avoid the Ozark Trail would not be viable, as it would require the location of an alternate east of Wappapello Lake or west of Sam A. Baker State Park. This would place the alternate outside of the defined study area, which would result in a loss of proximity to the existing highway, a much more costly alternate with greater environmental impacts. Consequently, one alternate was developed at this area that would minimize impacts to the environment.

The Preferred Alternative is proposed as a four-lane freeway with a grass median and is directly west of existing U.S. 67. Two bridges are proposed at the Pleasant Valley Creek crossing, which is immediately adjacent to the Ozark Trail. Each bridge is two lanes wide with shoulders on each side of the lanes. The span of each bridge is approximately 150 m (500 ft) long.

The Preferred Alternate will provide access by a service road east of the northbound lanes, from the parking lot to an interchange at Route A (see Figure 5-2).

The No Action Alternate is not viable because it would result in increased congestion, reduced travel efficiency, and higher accident rates if the existing facility remains as a two-lane roadway. The No Action Alternate does not meet the project Purpose and Need of reducing congestion and improving safety.

5.6 Measures to Minimize Harm to the Section 4(f) Resource

The procedures to determine the level of documentation and mitigation for each resource (St. Francis River bridge, Old Greenville, archaeological sites that require further testing, and Phase I surveys where right of entry was not received) are set forth in the MOA (Exhibit 5-4).

FHWA proposes that monetary compensation be provided to the USACE for all property acquired for the Preferred Alternative. Property acquisition will be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and amendments. The fair market value of the property will determine the amount of the monetary compensation.

The USACE has requested from previously identified in holdings to replace USACE property required for the Preferred Alternative. Monetary compensation provided to the USACE for property acquired for the Preferred Alternative could be used to purchase some of these in holdings.

Greenville ballpark is on USACE property (North Greenville Recreation Area) leased to the city of Greenville and is both a Section 4(f) and 6(f) resource for the proposed project. If land suitable for a ballpark can be leased from the USACE, the FHWA proposes replacement land for the USACE. If not, FHWA proposes replacement land for the city of Greenville and the USACE. MoDOT will submit a Section 6(f) land conversion approval when the project is submitted for design approval. The FHWA proposes the following measures to minimize harm to the Greenville ballpark include:

- Replacement property for the USACE for the entire 4.86-ha (12.0-ac) parcel (as discussed in the previous paragraph).
- If suitable land is not available from the USACE, replacement property of equivalent usefulness and location that must be equal to or greater than fair market value for the entire 4.8-ha (12.0-ac) parcel for the city of Greenville. Coordination with the city of Greenville is ongoing to identify an appropriate location.
- Monetary compensation for the city of Greenville to develop the replacement property for facilities similar to the existing ballpark.

Measures to minimize harm to the Ozark Trail include:

- Detouring trail users around the construction area;
- Timing trail closures (if any) to occur during periods of off-peak use (to the practical extent); and
- Using public outreach to provide advance notification of trail closure dates (if any) as well as appropriate informative signing on the trail and at nearby trailheads.

There is no feasible and prudent alternative to using such land and the project includes all possible planning to minimize harm to the land resulting from its use.

5.7 Coordination

The USACE manages the Old Greenville National Historic Site, Greenville Recreation Area, North Greenville Recreation Area, and the Ozark Trail for the Wappapello Lake section, and is a cooperating agency for the proposed U.S. 67 project. Seven meetings have occurred with the USACE throughout the proposed project. Three of these meetings focused on Section 4(f) issues including Old Greenville. Two of these meetings occurred in Old Greenville with local residents; one meeting was established to specifically discuss and inspect the historic features within the proposed right of way. The USACE considers Old Greenville a sensitive resource and has expressed that Old Greenville should be avoided to the greatest extent possible.

MoDOT has coordinated with State Historic Preservation Officer (SHPO), FHWA, and agencies having jurisdiction over the Section 4(f) property. The procedures to determine the level of documentation and mitigation for each resource (St. Francis River bridge, Old Greenville, archaeological sites that require further testing, and Phase I surveys where right of entry was not received) are set forth in the Programmatic Agreement (Exhibit 4). The FHWA, SHPO, USACE, USFS, MoDOT, and the Advisory Council are the anticipated parties to the MOA.

The public has been kept abreast of project developments throughout the planning phases by use of newsletters and questionnaires. Three public meetings have occurred to update the public on the project progress and to request public input as well as numerous small group meetings with elected officials and business owners.

The community of Greenville was concerned by the possibility of a bypass and potential impacts to businesses. Residents requested access be close to town in order to enhance visibility of Greenville and also stressed the importance of keeping the community intact. Three meetings have occurred with the Greenville Council. Council members, including the Mayor of Greenville, have supported replacing the Greenville ballpark.

A meeting was held during the spring 2001 at the Wappapello Lake. Representatives from the USACE and Missouri SHPO discussed potential mitigation plans for Old Greenville.

Members of the Wayne County Historical Society and interested citizens were invited to the USACE field meeting in Greenville on May 9, 2000. They inspected the historic features within a proposed right of way and agreed that there does not appear to be any great significance to these features. They emphasized that the sensitive issues for Old Greenville are west of the powerline corridor. Prior to the initiation of the archaeological investigations, neither the USACE nor local residents were aware of the features described in Section 4.1.

In September 2003, a meeting was held in Jefferson City between FHWA, MoDOT, USACE and the consultant team to discuss the Section 4(f) resources at the North Greenville Recreation Area. The purpose of the meeting was to address: (1) a Section 4(f) resource that had been identified since the issuance of the Draft EIS (an archeological site that warranted preservation in place) and avoidance and minimization measures to the site; and (2) the other Section 4(f) resources in the area. At this meeting,

FHWA agreed to allow a slight shift in the alignment of the Preferred Alternative (Subalternate 1) to provide an avoidance of the archaeological site. Subalternate 1 has been previously described in Section 5.5.5.1.

Also in September 2003, a meeting was held between study team members and representatives from the city of Greenville to discuss a possible recreation area south of the ball park and on the west side of present U.S. 67. This property is also located adjacent to the proposed interchange at Greenville. The plan, as presented, was in a very preliminary developmental stage and consisted of the following: a pavilion, a playground, sand volleyball courts, and a walking trail. The city had already met informally on this plan with the USACE and MoDOT. Consideration is ongoing and the USACE property will not likely be leased to the city until the Preferred Alternative is finalized.

Section 9.0, Coordination, in the Final EIS contains more information on agency coordination and public involvement regarding Old Greenville and the proposed project. A letter dated August 16, 2001 (Appendix C), to DOI provided Section 4(f)/6(f) comments. These comments and responses are included in the Appendix H.

5.8 Conclusion

In conclusion, there are no prudent and feasible alternatives that would avoid impacts to Old Greenville, Greenville Recreation Area, St. Francis River bridge, North Greenville Recreation Area, Greenville ballpark, and the Ozark Trail. The No Action alternative would result in increased congestion, reduced travel efficiency, and higher accident rates and would not be a viable option.

The total-avoidance alternative results in relatively higher environmental and social impacts as well as higher costs. It would result in a completely new crossing (on new location) of the St. Francis River and its adjoining floodplain (which falls within the USACE's 100-year flood pool for Wappapello Lake). Likewise, a total-avoidance alternative loses its attractiveness to the traffic to and from Greenville. One of the primary concerns of the residents of Greenville, as expressed throughout all of the public meetings, was for the alignment of new U.S. 67 not be located too far from the city limits in order to allow for new development to come to the area.

The Preferred Alternative includes all possible planning to minimize harm to Old Greenville, Greenville Recreation Area, St. Francis River bridge, North Greenville Recreation Area, Greenville ballpark, and the Ozark Trail The Preferred Alternative provides a feasible and prudent alternative, which also minimizes harm to the Section 4(f) resources through mitigation. The procedures to determine the level of documentation and mitigation for each resource are set forth in the MOA.

Based upon the above considerations, there is no feasible and prudent alternative to the use of land from Old Greenville/Greenville Recreation Area, the St. Francis River Bridge, North Greenville Recreation Area/ Greenville ballpark, and the Ozark Trail and the proposed action includes all possible planning to minimize harm to these properties resulting from such use.

Exhibit 5-1 – Old Greenville NRHP Registration Form

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations of eligibility for individual properties or districts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, styles, materials, and areas of significance, enter only the categories and subcategories listed in the instructions. For additional space use continuation sheets (Form 10-900a). Type all entries.

1. Name of Property

historic name Old Greenville
other names/site number 23WE637

2. Location

street & number U.S. Army Corps of Engineers ☐ not for publication
city, town Greenville ☒ vicinity
state Missouri code MO county Wayne code 223 zip code 63944

3. Classification

Ownership of Property	Category of Property	Number of Resources within Property	
		Contributing	Noncontributing
☒ private	☐ building(s)		buildings
☐ public-local	☐ district		sites
☐ public-State	☒ site	1	sites
☒ public-Federal	☐ structure	1	3 structures
	☐ object		objects
			Total

Name of related multiple property listing:

Number of contributing resources previously listed in the National Register 0

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. ☐ See continuation sheet.

Signature of certifying official — Date 24 Oct 89
U.S. Army Corps of Engineers, St. Louis District
State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. ☒ See continuation sheet.

Signature of commenting or other official — Date 28 Dec. 89
G. Tracy Mehan III, Director
Department of Natural Resources and State Historic Preservation Officer
State or Federal agency and bureau

5. National Park Service Certification

I, hereby, certify that this property is:

☐ entered in the National Register. ☐ See continuation sheet.
☐ determined eligible for the National Register. ☐ See continuation sheet.
☐ determined not eligible for the National Register.
☐ removed from the National Register.
☐ other. (explain:)

Signature of the Keeper — Date of Action

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Section number 4 Page 1 Old Greenville

Old Greenville (Site 23WE637), vicinity of Greenville, Missouri is eligible for listing on the National Register of Historic Places; however, we do not feel that the nomination itself meets the stringent documentation requirements as outlined in National Register Bulletin #16. Despite a number of concerns relating to documentation requirements, the nomination is extremely well researched and written and is eminently eligible for National Register listing. Documentation concerns are as follows:

* Resource count is incorrect. Courthouse mound is a part of the town site, not a structure. Due to the distance separating the Wight Cemetery from the remainder of the nominated property, the nomination should probably be considered a non-contiguous district with two sites (the main town site and the Wight Cemetery).

* Confusion regarding period of significance. The period of significance listed at the top of the item 8 states 1800-1939 yet text states Greenville was settled in 1801.

* No explanation or justification regarding choice of 1939 as ending date for period of significance.

* U.S.G.S. map does not meet National Register documentation requirements (use of India ink rather than pencil and adhesives).

* UTM's for point G are incorrect.

* Lack of an adequate boundary justification.

* Photographs are not properly labeled and do not appear to meet National Register requirements.

* Minor typographical errors on page 7.2, second paragraph, third line, "that which"; page 8.2, third paragraph, eighth line, "This community, call both Bettis Ferry..."

Exhibit 5-1 – Old Greenville NRHP Registration Form

6. Function or Use

Historic Functions (enter categories from instructions)
DOMESTIC/Multiple dwelling,
COMMERCE/TRADE/business
GOVERNMENT/Courthouse
FUNERARY/Cemetery

Current Functions (enter categories from instructions)
RECREATION AND CULTURE/Outdoor Recreation

7. Description

Architectural Classification (enter categories from instructions)
N/A

Materials (enter categories from instructions)
foundation N/A
walls
roof
other

Describe present and historic physical appearance.

Summary

Old Greenville is an historic archaeological site located 2 miles south of present Greenville in Wayne County, Missouri (Map 1). The site contains intact archaeological cultural resources of the early settlement (ca. 1801 to 1818) and county seat of Wayne County (ca. 1819-1939), including a section of the Natchitoches Trace, courthouse mound, numerous building foundations and associated features and three cemeteries (Map 2). Because the original town of Greenville was moved ca. 1942 by the U.S. Army Corps of Engineers prior to the impoundment of Lake Wappapello, the earlier cultural deposits have not been disturbed by any underground utilities (except in the campground which covers less than 5% of the site). Western portions of the site adjacent to the St. Francis River now are used for the Corps' Old Greenville Recreation Area. No standing buildings from the pre-1939 site occupation remain today.

Resource Count

Contributing Resources: There are two contributing resources including: An historic archaeological site with one contributing structure (courthouse mound) (Map 2).

Noncontributing Resources: There are three noncontributing resources (structures): A campground consisting of 26 camp pads, a vault toilet and well, all of which are considered as a single structure for expediency's sake, and two other structures (picnic shelter and vault toilet) located southeast of the campground (Map 2).

Environmental Description

The historic archaeological site of Old Greenville, encompassing the original early 1800's town as well as later additions, is located on the Eastern Ozark Escarpment. The site is situated on the eastern bank of the St. Francis River at the upper end of the stream embayment. Just below the town, the St. Francis River flows out of the Ozark Highland and into the Mississippi Alluvial Valley. The ruins of the town occupy the natural levee (gravely soil) and backswamp (fine silty loam and clay) of the St. Francis, a triangular flood plain surrounded on all sides by high hills. The oldest section of the town lies adjacent to the river on slightly higher ground than the later additions, which lie in a forested area to the north and east. Most of the site is relatively undisturbed. At least half of the old town area is overgrown with dense flood plain undergrowth; the northern and eastern parts of later nineteenth and twentieth century expansion are also wooded. The former business district located around the courthouse locus and northwest is now a campground.

☒ See continuation sheet

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Present Description

Greenville was platted around the courthouse square in 1818 when the town became the county seat (Map 3). This original town layout is visible today, although the initially-platted parallelogram shaped blocks were subsequently squared to match those of later additions. The earliest section of town is now in part covered by campground, but the central driveway follows portions of four of the originally platted streets around the courthouse square. Throughout the site, many of the building foundations and sidewalks are still visible (Maps 4 and 5); the courthouse mound is intact; and several features such as stone-lined cisterns and wells dating to the period of early settlement are present. Bettis Street, one of the originally platted streets, which probably represents the old Natchitoches Trace where it crossed the St. Francis River at the ferry, is a prominent feature yet today.

Three cemeteries are located within the site: The earliest, the Union cemetery, located beside the St. Francis River just north of the originally platted town; the Wight cemetery located across the river just southeast of the town proper; and the Eickman cemetery located at the northeast corner of town.

Past Description

As first platted, Greenville consisted of five streets and 19 blocks with 68 lots (Map 3). According to legend, the streets were laid out following corn rows, resulting in parallelogram shaped blocks (Cramer 1972:77). The 1820's town consisted of the courthouse, a few stores and taverns, and five or six houses, plus a ferry and waterpowered grist mill located across the river on a creek. The town reached its maximum size during the lumber boom (1890's); by 1900 the population was 1051 (Map 6). By 1940, shortly prior to abandonment the town population had shrunk to 572. The town's configuration at the time of abandonment is shown in Maps 2 and 7.

Recordation

Archaeological testing was conducted in 1978 in the old town area by Dr. James E. Price and Ms. Cynthia R. Price under an Antiquities Permit (No. 78-MO-028) issued by the Department of the Interior to the University of Missouri, Columbia. The archaeological field work included mapping a portion of the old town south of the courthouse mound and designated three collection areas (A, B, C), In Area A (Map 4) a total surface collection of all observed coarse and refined earthenware, tobacco pipe fragments, metal and other cultural material (except twentieth century glass) was made from previously disturbed areas. Two 5 foot square test units were excavated in Lot 45 adjacent to a sidewalk. Both test units revealed disturbed historic midden to a depth of .55 foot. Excavations were not continued into the intact midden. Test Unit 1 revealed sandstone footings running under the sidewalk; more stones of the footing were visible on the surface to the east (Map 5). Two assemblages, one ca. 1820-1840 and the

Exhibit 5-1 – Old Greenville NRHP Registration Form

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other ca. 1870-early 1900's (Fig. 1) were identified but were mixed, rather than stratigraphically separate. The later assemblage is related to a commercial structure, probably a tavern based on the high frequency of liquor bottles. The function of the earlier assemblage remains unclear, but might be a tavern also, based on the high frequency of annular mugs.

South of Area A, in Area B a northeast-southwest trending gulley was recorded (Map 4). This gulley corresponds to Bettis Street on the original plat, and may represent a section of the Natchitoches Trace (Old Military Road) that which may have led to Bettis Ferry on the St. Francis River. Bettis Street was apparently abandoned sometime in the nineteenth century after severe down cutting and was partially filled with late nineteenth or early twentieth century refuse.

Further south in the vicinity of lots 49 and 50 (Area C) several surface features including a set of concrete steps, building rubble and a stone lined well adjacent to Third Street were recorded. A surface collection of a few early nineteenth century earthenware sherds was made.

During the summer of 1985, a subsequent survey area northwest and southeast of the Old Greenville site was conducted by American Resource Group, Ltd., Carbondale, Illinois (Sirico 1985). This survey included a small area within Old Greenville northeast of the Union Cemetery. The report notes the presence of a few foundation stones, well, old road (low, linear rise) and artifacts (broken glass, ceramics, brick, metal) (Sirico 1985:29).

In addition, in 1982 the Army Corps of Engineers, Memphis District conducted monitoring during construction of the campground; no cultural resources were observed. In 1985, the Army Corps of Engineers, St. Louis District conducted a survey and shovel testing at the proposed picnic shelter and vault toilet location just southeast of the main campground. These investigations revealed a sparse scatter of late nineteenth-early twentieth century ceramics and glass which were confined to the plowzone (ca. 30-35 cm BS). At the same time, the St. Louis District conducted a cursory survey of the wooded area east of the original section of town. Numerous house foundations, sidewalks, cisterns, trash piles and other remains were noted.

Site Integrity

Old Greenville has high archaeological site integrity. The town was moved in 1942 (preceding the impoundment of Lake Wappapello) before any major underground utility lines (water, sewer, gas) were built which could have disturbed the earlier archaeological features and deposits. Fortuitously, the earlier alternatives to these "modern conveniences", such as wells, cisterns and privies, remain as subsurfaces archaeological features. (It is expected based on research at historic archaeological townsites elsewhere, that the number and types of such features far exceeds those recorded during testing.) When the town was moved (and some buildings apparently were

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physically moved [Cramer 1972:594]), various building foundations, the courthouse mound, sidewalks and streets were left in place and most remain today. No development has taken place at the site except the Old Greenville Recreation Area. This campground, located primarily north of the courthouse mound was constructed to avoid disturbing the archaeological resources. The campground driveways follow the earlier platted streets. The entrance road follows the original Timmons Street. The camp pads were built overlying the old sidewalks which remain intact beneath the pads. The only subsurface excavations involve restrooms (vault toilets), well house, electric and water lines; these disturb less than 1% of the older portion of the site. (No features were noted during the survey for the campground or during construction.)

The Old Greenville site has been flooded seven times since Lake Wappapello was impounded. Flooding has resulted in a few inches of silt deposition at the site. No scouring has occurred except along the edge of the Union cemetery. Therefore, effects of flooding to the site have been minimal.

The southeastern portion of the site has been plowed to a depth of 30-35 cm.

Data Limitations

Unfortunately the quality and quantity of archival resources for Old Greenville do not match it's high archaeological integrity. Most primary documentation was destroyed in the courthouse fires of 1854 and 1892 (Price and Price 1979:11-12).

Exhibit 5-1 – Old Greenville NRHP Registration Form

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties:
☐ nationally ☐ statewide ☒ locally

Applicable National Register Criteria ☐A ☐B ☐C ☒D

Criteria Considerations (Exceptions) ☐A ☐B ☐C ☒D ☐E ☐F ☐G

Areas of Significance (enter categories from instructions)	Period of Significance	Significant Dates
ARCHEOLOGY-HISTORIC-NON-ABORIGINAL	1800-1939	N/A

Cultural Affiliation
N/A

Significant Person
N/A

Architect/Builder
N/A

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.

Summary

The Old Greenville historic archaeological site (23WE637), Wayne County, Missouri, is of local significance as a frontier town and county seat important in the initial and expounding frontier settlement of the Eastern Ozarks of southeast Missouri and northeast Arkansas. The site can contribute information important to historic archaeology and therefore meets Criterion D. The community was initially settled in 1801 at the Natchitoches Trace ford on the St. Francis River, making it one of the earliest American settlements in the region. Given this location on a major road, the growing town became a stopping point for numerous early nineteenth century travelers, such as Schoolcraft in 1819, Long Expedition in 1820, Featherstonhaugh in 1834, and Engelmann in 1839. During the Territorial Period, Old Greenville became one of the earliest county seats in the Eastern Ozarks, beginning about 1818 when Wayne County was established as a large strip covering much of southern Missouri. The frontier town was a commercial as well as political center. Beginning about 1806 (then as Bettis Ferry) and lasting until the mid-nineteenth century the town served as a trader center for much of the Eastern Ozarks, linking the interior with market centers along the Mississippi River (St. Louis, Cape Girardeau, Ste. Genevieve, New Madrid). It was also a secondary center during the late nineteenth-early twentieth century regional lumber boom, which was a period of rapid economic expansion and influx of people, goals and ideas. The Old Greenville historic archaeological site has high integrity for a county seat since it does not underlie an existing town. Because the town was relocated about 1942 preceding impoundment of Lake Wappapello, no modern underground utilities or other construction (except a campground) disturb the archaeological remains. The site thus has high potential to produce important information concerning a frontier town and county seat which functioned as both a political and economic center. The site can thus contribute to an understanding of the settlement and socioeconomic systems of the Eastern Ozarks.

Historic Context - Initial and Expanding Frontier Settlement in the Eastern Ozarks

Old Greenville has high potential to yield significant comparative information on settlement system and organizational patterning in the Eastern Ozarks from the period of Initial American Settlement (ca. 1800) into the early twentieth century. Programs of ongoing research on frontier settlement in the area have been instituted by several researchers in Missouri and Arkansas. Much of the research has addressed questions of cultural adaption during the time of initial and expanding frontier settlement. An

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investigation of particular frontiers which focuses on the specific adaptive responses of the population to specific cultural and natural environmental variables will be necessary to an understanding of culture process in frontiers in general. The work of K. Lewis (1984) in developing and testing models of frontier culture change particularly demonstrated the utility of such research. Essential to an understanding of frontier settlement is information on the kinds of settlements and the nature of the cultural systems and socio-political networks in the frontier area. In order to understand the nature of the settlement at particular locales and the function they served in various cultural networks, we need specific data on individual sites. These data will come only from a combination of documentary and archaeological research, and the research must be focused on both the site as an individual and on the regional systems of which it was a part.

For example, the potential of early town sites including county seats with respect to intra-site research has been addressed by Smith (1973), Dollar (1977), Stewart-Abernathy (1980), and C. Price (1984). The archaeological and historical data were used to assess site planning at the different town sites; to define specific functional loci in the town; and to look at social stratification within the town. The potential for inter-site comparisons with respect to county seats and their role in the community settlement system in this area is discussed by C. Price (1984, 1985):

> "Generally, the settlement hierarchy of the Eastern Ozarks counties included one county seat settlement, one or more hamlets, and scattered domestic habitations (as farmsteads or hunter cabins) and specialized activity loci. The county seat town which corresponds to the frontier town in the functional models of Lewis (1984:22-23) was central to the county organization. These settlements served to centralize social, political, and economic activities. They are usually the largest settlements in the county or community and are expected to manifest their centralizing function in the number and range of structures present. The majority of structures should reflect the performance of activities such as: Small scale manufacturing and maintenance; transfer and storage of goods and commodities; and political and social activities associated with the periodic gatherings of persons for collective purposes such as trials, markets, and tavern socializing. Below the courthouse town in the settlement hierarchy are nucleated settlements or small hamlets ..... Specialized activity centers, as mills, secondary trading establishments, and extractive and manufacturing loci, and individual households, such as cabins or farmsteads, which are the lowest level of settlement, were dispersed throughout the countryside." (C. Price 1985:4-5).

Exhibit 5-1 – Old Greenville NRHP Registration Form

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Different organizational responses in the Eastern Ozarks, as indicated by differences in the early settlement patterns and the differences in activities carried out at various county seat towns in the area, have been described by C. Price (1985). These early county seats in the Eastern Ozarks include Davidsonville, Lawrence County, Arkansas (ca. 1815-1830); Doniphan, Ripley County, Missouri (ca. 1840-present); Old Van Buren, first county seat of Ripley County (ca. 1834-1860) and later Carter County (ca. 1860-present), Missouri; Old Eminence, Shannon County, Missouri (ca. 1840-1860's) and Old Greenville, Wayne County, Missouri. In the upper Current drainage, a true frontier town did not develop until after the Civil War. The centralizing functions served by such towns - political, economic, and social - were each served by individual settlements. Elsewhere, as in Wayne County, it appears that a single central place, as Old Greenville, served those functions. The site has high potential for producing data to assess the functional nature of the settlement - which it served only as a political center and as a center for commercial and social activities as well. These data, then, will be of comparative significance in regional frontier studies, in understanding the reasons for the different organizational and settlement systems.

The Old Greenville historic archaeological site has a particularly high data producing potential since it does not lie under an existing town as do other multi-function county seats such as Doniphan and Van Buren.

Research Topics and Related Data Categories

1. Exploration and Settlement.

In 1801, Isaac Kelley, along with other members of his family, moved from Jackson, Missouri, to the St. Francis River where the town of Greenville was later founded. They built cabins and occupied the land under a permit from the Spanish Government (Cramer 1972:45, 67; Survey Plat, Land Title, and Patent Certificate for Spanish Land Grant No. 727, 1819). Other settlers, including Dr. Elijah Bettis and his family, settled on the grant; and a small community grew up which included a mill, plantation complex, and the ferry where the Natchitoches Trace crossed the St. Francis River (Cramer 1972: 66-67). This community, call both Bettis Ferry and Cedar Cabin was on the post rider route from Jackson, near Cape Girardeau in Missouri, to the Lawrence County, Arkansas county seat at Davidsonville (Cramer 1972:77). When Wayne County, Missouri, was established in 1818 the commissioners chose Bettis Ferry as the county seat (Territorial Laws (Missouri) 1804-1822:354; Cramer 1972:76). In 1819 the naturalist Henry Schoolcraft noted in his journal that Bettis Ferry consisted of 10 or 15 houses, the ferry and a grist mill (Park 1955:165). Interestingly, the following year the Stephen H. Long Expedition to the Rocky Mountains passed through the area and one expedition member (Bell 1957:October 4th entry) stated that the town consisted of five or six houses and a post office (Bell 1957:October 4th entry).

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A down cut section of the original Natchitoches Trace is visible near the St. Francis River (Map 4) (Price and Price 1979:21). This road segment was later incorporated into the town plat as Bettis Street, suggesting that this road ran to the Bettis Ferry (Price and Price 1979:21). The initial settlement likely was located in this vicinity. (Limited testing in the general vicinity yielded ceramics of a slightly later period: ca. 1820-1840.)

The vicinity of initial settlement, as evidenced by the old road bed, is expected to yield various types of archaeological data: 1) initial placement of structures prior to platting, 2) function, type and size of structures and 3) the range and types of artifacts (domestic, architectural, other) present. Such information will be important not only in describing the nature of early settlement here, but also in comparing it with other early settlements in the Eastern Ozarks.

2. Politics/Government.

The newly designated county seat, renamed Greenville to commemorate General Anthony Wayne's Treaty of Greenville, served a much larger area than at present. As originally created, Wayne County was a "vast parallelogram stretching across southern Missouri" (Cramer 1972:76). Greenville was located in eastern Wayne County near the center of population, rather than near the county's geographic center (Cramer 1972:78-79; Price and Price 1979:12).

The town was platted in 1818 or 1819 and included 68 lots and a public square (Plat of Greenville, Hovis and Wilkinson, 1901). Initially the town size remained limited as was typical of many Eastern Ozark frontier towns (Price and Price 1979:12). Like other early county seats, Greenville at first contained the courthouse (first of log and rebuilt of brick in 1849), a few stores and taverns and 5 or 6 houses. Descriptions of the early town and/or its role in the local political, social, and economic networks can be found in the journals of a number of early travelers through the area (Bell 1957: October 4th Entry; Featherstonhaugh 1968:80-81; Bek 1929:525-526; see also Goodspeed 1888:458 and Cramer 1972:585).

For example, the English gentleman Featherstonhaugh (1968:80-81) described the town in 1834 as follows:

> ...Greenville, a poor wretched collection of four or five wooden cabins, where the miserable inhabitants die by inches of chills and fevers ...Others were roistering about at that indispensable rendezvous of every settlement, a dirty looking store, where all the vagabonds congregate together to discuss politics and whiskey. The settlement, however, is beautifully situated on a rich bottom of land on the east bank of the St. Francis...

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Much of the town layout as originally platted is still visible (Map 1). The courthouse square containing the steps, retaining wall and mounded remains of at least the last courthouse is prominent (Map 2). In addition, many of the streets in use when Greenville was abandoned, were originally platted streets or extensions of these. Many of these streets are extant, so lots appearing on various historic maps can be identified on the ground. Stone building foundations and later cement foundations have been noted (Price and Price 1979:24-26; Sirico 1985:29).

Old Greenville can yield important information on the town plan and functions of an Eastern Ozarks county seat. The site can provide locational data on governmental buildings specifically the courthouse and jail. Excavation of these locations can provide information on construction (probably successive constructions) and associated artifact assemblages. Residential and commercial sections can be distinguished through combined documentary research (principally maps) and field investigation. By determining lot size, house placement, possibly number and types of outbuildings and associated domestic artifact assemblages it will be possible to investigate differences in social status within the town. It also likely will be possible to discern changes in particular areas of town during Greenville's 140 year history, particularly by contrasting the pre-Civil War period with the later lumber boom.

3. Commerce.

As Greenville grew it served not only as a political center, but as a trade center for a territory reaching 100 miles to the south and west (Price and Price 1979:12).' A number of stores opened during the early nineteenth century served by Elijah Bettis (early 1800's), Van Horne and Wheeler in 1824, William Creath by 1827, Lysander Flinn by 1837 and Zenas Smith before 1840 (Goodspeed 1888:458; Cramer 1972:585; Price and Price 1979:12-13). These businesses hauled goods over land from Ste. Genevieve and Cape Girardeau (Price and Price 1979:12). An early (1839) traveler along the Eastern Ozark border, George Engelmann indicated that a store keeper in Arkansas obtained part of his supplies from Greenville located 100 miles to the northeast (Price and Price 1979:12).

After a post-Civil War economic decline, Greenville experienced a secondary economic boom. During the 1890's the railroad (Williamsville, Greenville, and Northeastern Railroad) reached Greenville and the Holladay-Klotz lumber mill began operation in the town (Map 6). The mill was a part of the widespread industry that boomed in the Eastern Ozarks during the last two decades of the nineteenth century and the first two decades of the twentieth century. During this time, Greenville grew rapidly and the town reached its greatest size with more than 125 flourishing businesses (Cramer 1972:300). Following the collapse of the lumber industry, the town declined slightly in prosperity and importance as a regional center. The number of businesses diminished (Cramer 1972:591). In 1938, work began on the Wappapello Dam and Reservoir. The old town was in the projected flood pool. It was abandoned in 1942, and the county seat town was moved about two miles north of the old settlement.

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Limited testing at Old Greenville uncovered part of a building which was apparently a tavern (Price and Price 1979:30). Numerous Anheuser-Busch lead seals used on wood crates for beer bottles during the late nineteenth century were recovered as were a high frequency of annular decorated mugs (mid nineteenth century) which are uncommon in domestic assemblages. Various common domestic artifacts (such as table utensils, cooking vessels), personal adornment (buttons, beads, buckles) and firearms were lacking (Price and Price 1979:29).

Excavation of lots surrounding the town square can yield information on other businesses present at Old Greenville. The early travelers' accounts and later histories suggest that a wide range of goods moved through the town. Many of these goods are expected to be represented in the archaeological record. In some cases changes in types, quality and quantity of goods through time may be discernible also.

Unfortunately the Holladay-Klotz lumber mill building complex was destroyed during construction of U.S. Highway 67 during the 1930's. However, the areas of the Holladay-Klotz Land and Lumber Company's addition built to accommodate the mill workers, the company store and the Holladay's estate "Pine Place" remain (Map 6). These areas can potentially provide information on the social and domestic aspects of life in a mill town including types and construction techniques of workers houses, domestic artifact assemblages, a partial inventory of goods available at the company store, and construction techniques of the company owner's (Hiram N. Holladay) house and the associate artifact assemblage.

The lumber boom brought readily available commercial goods and ideas from outside the region into Old Greenville. The cash economy which came with the boom may have increased the buying power of the local residents. Historic documents relating to social and economic change are few. Comparison of material goods from deposits preceding the boom period and during the boom should reflect any economic changes, such as increased access to outside goods (Sirico 1985:Appendix D.) Assemblages from the initially settled portion of Old Greenville and the newer Holladay-Klotz mill addition should also indicate economic stratification within the town.

Exclusion

Three cemeteries (Union, Wight, Hickman) at Old Greenville are considered significant because they are associated with the early settlement here and because they contain important information concerning mortuary practices, social status and demography. According to local residents the earliest graves at each cemetery are now unmarked. (Unmarked graves outnumber marked ones by about 3:1 at each cemetery). Given the cemetery locations (Map 1) within the town (Union) or on its edge (Wight, Hickman), some unmarked graves undoubtedly contain the remains of Old Greenville's earliest residents.

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These cemeteries can provide important information on burial practices (location and groupings of graves, use of commercial markers, field stones, limestone slab covers, impermanent markers, or no markers). Outside influences, possibly most pronounced during the lumber boom, may be demonstrated by the use and quantities of commercial grave markers. Social status is evidenced by presence, types and elaboration of markers, by family plot fencing, etc. Changing attitudes toward death should be indicated by funary art on markers and possibly grave placement. Temporal variation in burial practices and variation among the three cemeteries also should be evident. In addition, demographic information can be derived from family names, birth and death dates, and causes of death. This primary information is particularly important given the destruction of historic documents during a series of courthouse fires.

The Union cemetery, located at the northwest corner of the originally platted town, was the principal town cemetery. The earliest marked grave is dated 1851. Of 69 marked graves, about 44% predate 1900. Only one grave (dated 1970) post dates 1939. Some of the earliest graves have eroded into the river, a process which began in the early twentieth century (Cramer 1972:393).

The Wight cemetery is located on the south side of the St. Francis. The earliest marked grave is dated 1862, but seven unmarked limestone slab covered graves are thought by local residents to be those of the Thomas Wight, Sr. family and probably date to the 1840's or earlier. Of the 18 marked graves, about half predate 1900. Only two graves post date 1939; the most recent grave is dated 1979.

The Hickman cemetery is located at the northeast corner of the town. It probably began as a family cemetery (although no tombstones are marked Hickman) which later was used by others. The earliest marked stone is dated 1871. Of 94 marked graves, 21% predate 1900. About 12% of the marked graves post date 1939, the most recent grave is dated 1987.

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Section number 9 Page 1

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Flanders, Robert
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Goodspeed Publishing Company
1888 History of Southeast Missouri. The Goodspeed Publishing Company, Chicago.

Hovis, H.A. and H.C. Wilkinson
1901 Plat of Greenville, Wayne County, Missouri, Drawn by Order of the City Board. Filed for record, November 11, 1901. Copy on file with the U.S. Army Corps of Engineers, St. Louis District.

Lewis, Kenneth E.
1984 The American Frontier, an archaeological study of settlement pattern and process. Academic Press.

Park, Hugh (Editor)
1955 Schoolcraft in the Ozarks. Reprint of Journal of a Tour into the Interior of Missouri and Arkansas in 1818 and 1819, by Henry R. Schoolcraft. Press-Argus Printers, Van Buren, Arkansas.

Price, Cynthia R.
1984 Excavations at the Historic Sites. In Archaeological Investigations in the Ozark National Scenic Riverways, 1983-1984, James E. Price, Cynthia R. Price, Roger Saucier, Paul Delcourt, Hazel Delcourt, Newman Smith. Submitted to the National Park Service, Midwest Archaeological Center, Lincoln.
1985 Frontier settlement in the Current River drainage: Variation in organizational patterning. Paper presented at the meetings of the Southern Anthropological Society, April, 1985.

Price, James E. and Cynthia R. Price
1979 Greenville on the St. Francis, report on a brief literature search and archaeological testing program at the town of Old Greenville, Wayne County, Missouri. Submitted to the Department of Interior, National Park Service. Southwest Missouri State University.

Sirico, Michael W.
1985 Phase I and Phase II archaeological investigations at the Old Greenville Recreation Area, Wappapello Lake, Missouri. St. Louis District Cultural Resource Management Report Number 26.

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Smith, Samuel D.
1973 Prospectus for historic site archaeology in northeast Arkansas. The Craighead County Historical Quarterly XI (2).

Stewart-Abernathy, Leslie C.
1980 The seat of justice: 1815-1830, an archaeological reconnaissance of Davidsonville, 1979. Arkansas Archeological Survey Research Report, No. 21. Fayetteville.

Survey Plat (1819), Land Title (1823), Land Patent (1841) for Spanish Grant No. 727. On file with the Missouri State Archives Jefferson City, Missouri.

Territorial Laws of Missouri 1804-1822.

United States War Department
The War of the Rebellion: A compilation of the official records of the Union and Confederate Armies. 70 volumes, 128 books. 1880-1902. Government Printing Office, Washington, D.C.

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Section number 10 Page 1

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
E	15	726870	4109460	F	15	726410	4108570
G	15	726215	4100868 5	H	15	726020	4108545
I	15	726278	4108200	J	15	726260	4108170
K	15	726300	4108150	L	15	726308	4108180
M	15	726540	4109840	N	15	726640	4109840
O	15	726540	4109780				

Boundary Justification

includes the town grid and the Hickman cemetery. The northeast boundary runs from the Hickman cemetery to Highway 67. The Wight cemetery, an integral part of the town, is located south of the St. Francis River on the bank opposite the town.

Section Photographs Page 1

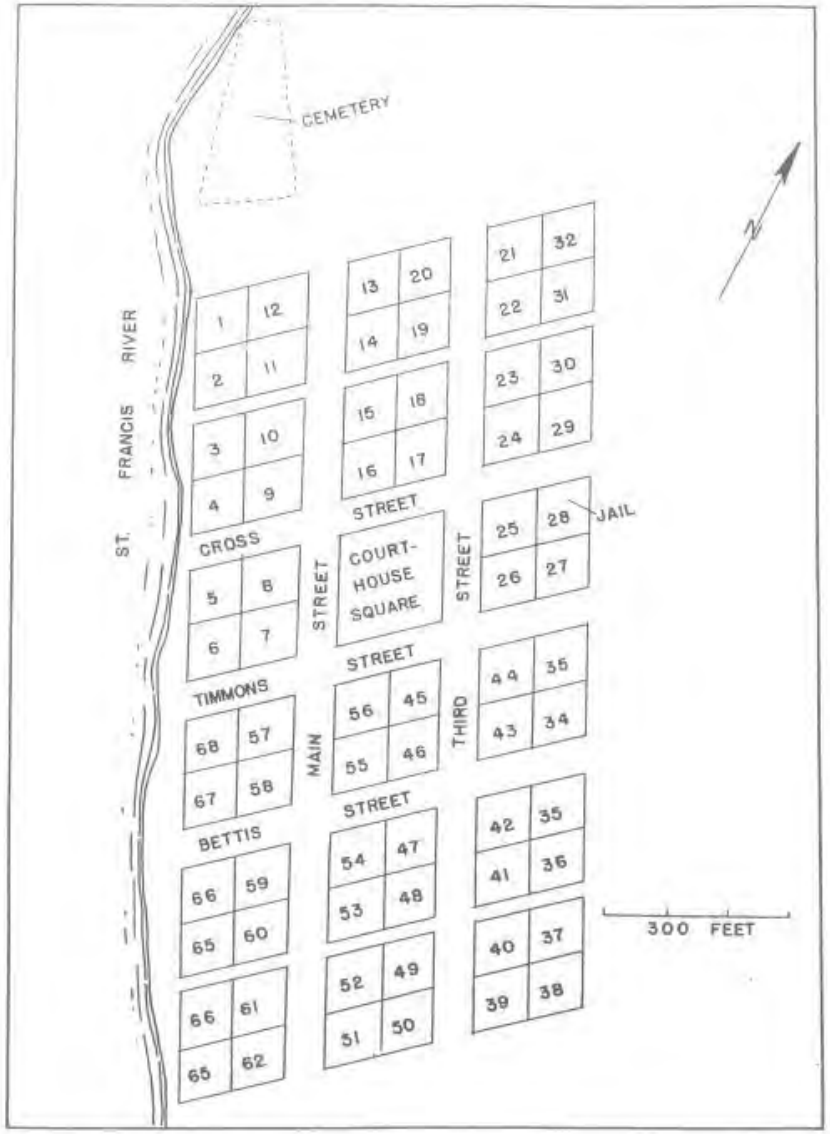
Old Greenville Site.
Wayne County, Missouri
Date: 1985
Negatives: U.S. Army Corps of Engineers, St. Louis District
Photographer: Dr. James E. Price (University of Missouri - Columbia)

1. Original Courthouse Mound, view facing northwest.
2. Concrete Foundations, view unknown.
3. Old Greenville Campground, view facing northwest.
4. Union Cemetery, view facing west.

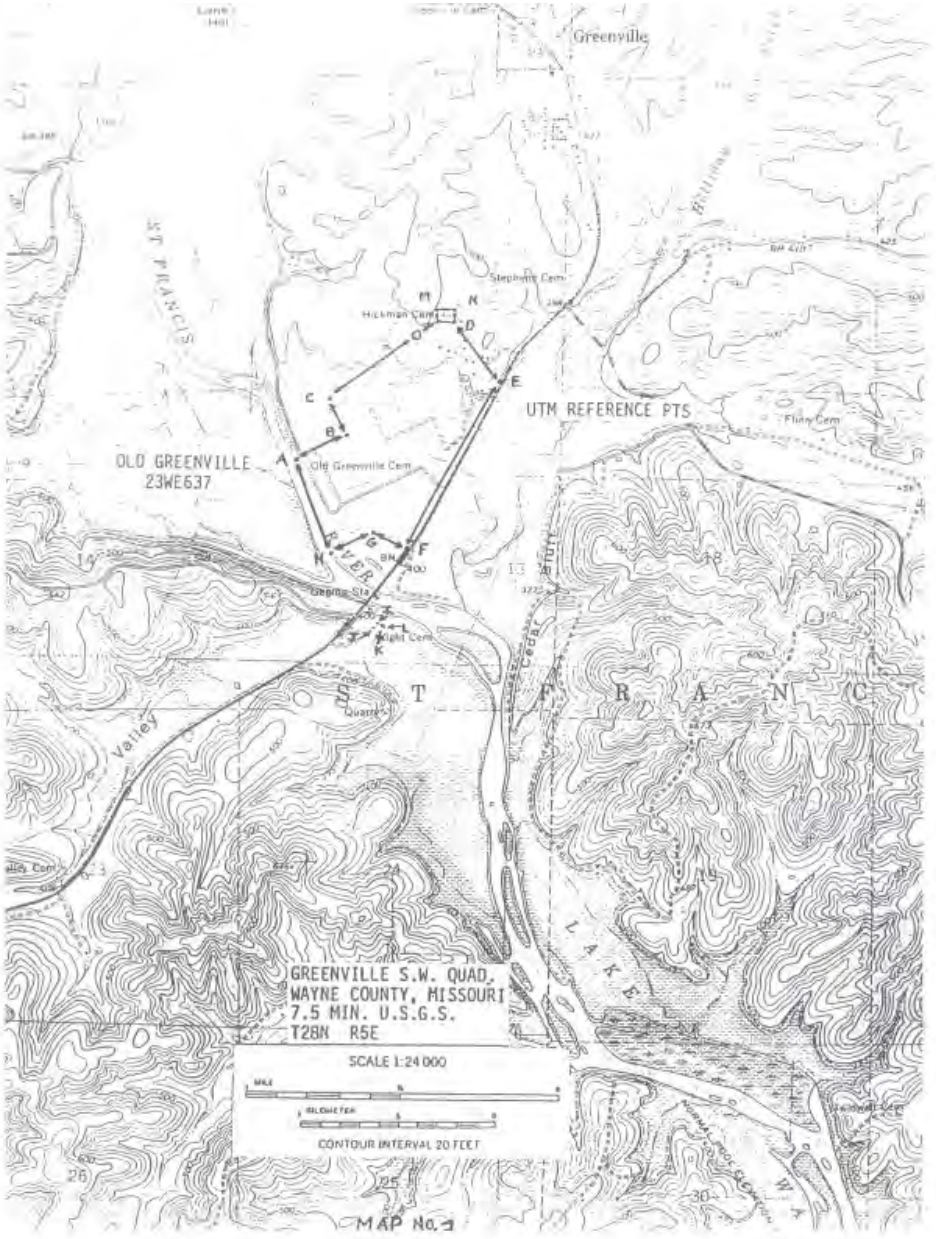
Photographer: Diane Stratton (U.S. Army Corps of Engineers, St. Louis District)
Date: 1989

5. Wight Cemetery, view facing north.
6. Hickman Cemetery, view facing west.
7. Hickman Cemetery, view facing east.

Exhibit 5-1 – Old Greenville NRHP Registration Form



Map 3 Plat of the original town of Old Greenville.
(From Price and Price 1979: Figure 5.)



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United States Department of the Interior
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National Register of Historic Places Continuation Sheet

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Section number ____ Page ____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 90000005 Date Listed: 2/17/90

25 Old Greenville (23WE637) Wayne Missouri
Property Name County State

Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Signature of the Keeper 2/17/90 Date of Action

Amended Items in Nomination:
Item 10. Geographic Data.
The correct UTM for coordinate G is 4108685

Verified by phone with:
Suzzanne E. Harris
St. Louis district, Corps of Engineers

DISTRIBUTION:
National Register property file
Nominating Authority (without nomination attachment)

9. Major Bibliographical References

Bek, William G., translator and editor
1929 George Engelmann, man of science, parts I-III. Missouri Historical Review XXIII (2-4).

Bell, John R.
1957 The journal of Capt. John R. Bell, official journalist for the Stephen H. Long expedition to the Rocky Mountains, 1820. The Far West and the Rockies Historical Series 1820-1875, Vol. 6, edited by Harlan M. Fuller and Leroy R. Hafen. The Arthur H. Clark Co., California. Reprint of the 1820 edition.

Cramer, Rose Fulton
1972 Wayne County Missouri. Ramfre Press, Cape Girardeau.

Dollar, Clyde
1977 An archaeological assessment of historic Davidsonville, Arkansas. Arkansas Archaeological Survey, Research Report No. 17, Fayetteville.

[x] See continuation sheet

Previous documentation on file (NPS): N/A
[ ] preliminary determination of individual listing (36 CFR 67) has been requested
[ ] previously listed in the National Register
[ ] previously determined eligible by the National Register
[ ] designated a National Historic Landmark
[ ] recorded by Historic American Buildings Survey #
[ ] recorded by Historic American Engineering Record #

Primary location of additional data:
[ ] State historic preservation office
[ ] Other State agency
[x] Federal agency
[ ] Local government
[ ] University
[ ] Other
Specify repository: U.S. Army Corps of Engineers St. Louis District

10. Geographical Data

Acreage of property 181

UTM References

	Zone	Easting	Northing
A	15	725810	4109040
B	15	726075	4109180
C	15	725890	4108360
D	15	726640	4107550

[x] See continuation sheet

Verbal Boundary Description
The boundary the Old Greenville site is as shown on the accompanying U.S.G.S. Greenville SW Quadrangle (1966) 7.5 minute series (Map 1). It includes the Greenville town grid at the time of abandonment, ca. 1942 (Map 1).

[ ] See continuation sheet

Boundary Justification
The boundary was determined by a combination of cultural and natural features plus archaeological investigations (surface observations, backhoe trenches, aerial photos). The southeastern boundary is U.S. Highway 67. The southwest boundary is the St. Francis River but excludes a low area to the south along the river and an area to the north where neither maps nor field investigations indicate any remains of the town. The northwest boundary

[x] See continuation sheet

11. Form Prepared By

name/title Suzanne E. Harris, Archaeologist
organization St. Louis District, Corps of Engineers date 18 September 1989
street & number 210 Tucker Blvd., North telephone (314) 263-5317
city or town St. Louis state Missouri zip code 63101-1986

Exhibit 5-2 – USACE Correspondence

STATE OF MISSOURI Bob Holden, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.state.mo.us

September 15, 2003

Ms. Diane Heckemeyer
State Design Engineer, Missouri Department of Transportation
601 West Main Street / P.O. Box 270
Jefferson City, MO 65102

Re: **SHPO Project Number 014-WE-03** - Job No. J0P0746, proposed Rt. 67 improvements in Butler, Wayne and Madison Counties, Missouri (FHWA)

Dear Ms. Heckemeyer:

Thank you for submitting additional information about the above-referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of cultural resources.

After reviewing the additional information provided we concur that the bridges (B95, B103, and B106) are not eligible for listing in the National Register of Historic Places. We also concur that there will be **no adverse effect** to structures 78 and 517 because the road is being relocated. In addition, we concur that property 134 is not eligible.

Please be advised that, if the project area is increased, cultural materials are encountered during construction or adjacent areas that may contain significant cultural resources may be adversely impacted, appropriate information must be provided to this office for further review and comment.

If you have any questions please write or call Brant Vollman at (573) 526-1680 or State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102. Please be sure to include the **SHPO Project Number (014-WE-03)** on all future correspondence relating to this project. If the information is provided via telephone call, please follow up in writing for our files.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Mark A. Miles
Director and Deputy State
Historic Preservation Officer

MAM: bv

c: Mr. Don Neumann
Dr. Bob Reeder
Ms. Kathy Harvey
Ms. Jane Beetem

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STATE OF MISSOURI Bob Holden, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.state.mo.us

July 22, 2003

Ms. Diane Heckemeyer
State Design Engineer, Missouri Department of Transportation
601 West Main Street / P.O. Box 270
Jefferson City, MO 65102

Re: **SHPO Project Number 014-WE-03** - Job No. J0P0746 Rt. 67 in Wayne County, Missouri (FHWA)

Dear Ms. Heckemeyer:

Thank you for submitting information about the above-referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which require identification and evaluation of cultural resources.

After reviewing the information provided we find the report to be adequate. It is our opinion that sites 23MO... 161, 166, 159, 167, 162; 23WE... 262, 575, 637, 293, 761; 23BU... 297, 392, 179, 399, and 77are eligible for listing, listed in the National Register of Historic Places or need to under go further testing to determine if they are eligible for listing in the National Register of Historic Places.

We concur that the following sites are either not eligible for listing in the National Register of Historic Places or the portions of the site that will be impacted does not appear to retain any integrity: 23MO... 158, 40, 170, 116, 160, 169, 165; 23WE... 764, 767, 766, 760, 762, 768, 694, 763, 778, 776, 777, 774, 773, 765; 23BU... 391, 403, 393, 299, 401, 402, 400, 398, 394.

In addition, we have noted that there are several portions of the project area which have not been surveyed. Until those areas have been surveyed and the work on the sites listed above that need to under go further testing has been completed we will reserve our final comment.

If you have any questions please write or call Brant Vollman at (573) 526-1680 or State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102. Please be sure to include the **SHPO Project Number (014-WE-03)** on all future correspondence relating to this project. If the information is provided via telephone call, please follow up in writing for our files.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Mark A. Miles
Director and Deputy State
Historic Preservation Officer

MAM: bv

c: Mr. Don Neumann
Dr. Bob Reeder
Ms. Kathy Harvey
Ms. Jane Beetem
American Resources Group

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Exhibit 5-2 – USACE Correspondence

STATE OF MISSOURI Bob Holden, Governor ▪ Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.state.mo.us

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February 7, 2003

Ms. Diane Heckemeyer
State Design Engineer
Missouri Department of Transportation
P.O. Box 270
Jefferson City, Missouri 65102

SHPO Log No. 2008-0

RE: Project number: Job No. J0P0746-04 – Rt. 67, Butler, Madison, and Wayne Counties, Missouri (FHWA)

Dear Ms. Heckemeyer:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

After reviewing the "Architectural, Bridge, and Culvert Resources" report by White & Borgognoni Architects, P.C., we find it to be adequate. Based on information provided in Appendix B (Surveyed Properties Inside the Project Area of Potential Effect), it is our opinion that Building Numbers 78, 134, and 317 are **eligible** for listing on the National Register of Historic Places. In addition, we concur that the St. Francis River Bridge is **eligible** for listing in the National Register of Historic Places. Additionally, it is also our opinion that the remaining buildings included in Appendix B, including Number 43, are **not eligible** for listing in the National Register of Historic Places.

Based on the information provided in Appendix C (Surveyed Properties Outside the Project Area of Potential Effect), we concur that Numbers 22, 38, 39, and 62 are **eligible** for listing in the National Register of Historic Places. Additionally, we concur that the remaining buildings included in Appendix C, including Number 42, are **not eligible** for listing in the National Register of Historic Places.

In accordance with the Advisory Council on Historic Preservation's regulation Protection of Historic Properties (36 CFR Part 800), Section 800.5, it is our opinion that the proposed project will have an **adverse effect** on buildings 78, 134, and 317, and the St. Francis River Bridge. Furthermore, it is our opinion that the proposed project will have **no adverse effect** on buildings 22, 42, 38, 39, and 62.

Integrity and excellence in all we do

We would like additional information on Bridge Number 103, Number 106, and Number 95. Is Bridge Number 103 a skewed bridge? How do Bridge Number 106 and Number 95 compare to the list of T-Beam bridges compiled by MODOT staff member Randy Dowdy? They are both very intact and seemingly little damaged bridges built by the highway department in 1922. This kind of bridge was once very common, however they are becoming more rare. Any additional information about these bridges would be helpful in forming our comments on the remaining bridges.

We look forward to the submission of the archaeology report and additional information about Bridge Numbers 103, 106, and 95. Once we receive all of the information about this project we can finish the review and comment process on this project. We look forward to the preparation of a Memorandum of Agreement (MOA) that outlines the steps needed to mitigate any adverse effect.

If you have any questions please write Missouri Department of Natural Resources, State Historic Preservation Office, Attn: Review and Compliance, P.O. Box 176, Jefferson City, Missouri 65102, or call Alison Dubbert at (573) 751-7958. If the information is provided via telephone call, please follow up in writing for our files.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

LaVerne Brondel
Deputy State Historic Preservation Officer

LB:ad

c: Don Neumann
Kathy Harvey
Bob Reeder

Exhibit 5-2 – USACE Correspondence

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
WAPPAPELLO LAKE PROJECT OFFICE
HC2, BOX 2349
WAPPAPELLO, MISSOURI 63966-9503

REPLY TO ATTENTION OF
Wappapello Lake
Project Office

December 7, 2000

RECEIVED
DEC 14 2000

Mr. Kris Erickson
Ecology Manager
Environmental Science and Engineering, Incorporated
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

Dear Mr. Erickson:

This letter is concerning a Determination of Significance regarding the North Greenville Recreation Area of Wappapello Lake Project needed for the Draft U.S. 67 Expansion EIS. It is our opinion the North Greenville Area is a significant segment of the project.

The North Greenville Area contains agricultural farmland, forested wetlands, and upland sites supporting a variety of wildlife and plant species. The river access is located on a portion of the project where the St. Francis River ends and Wappapello Lake begins. This serves as a mid-point take out/put in area for project visitors. Under the Traditional Access Plan developed for Wappapello Lake, this access was retained and left open for public access to the St. Francis River as result of local input.

We appreciate the opportunity to provide information to you regarding the impacts this project will have on Wappapello Lake. If you have any questions or require any further information, please contact Natural Resources Specialist James Gracey at (573) 222-8562.

Sincerely,

Gary G. Stilts
Operations Manager

Enclosure

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

Results of Archaeological Investigations at Old Greenville (23WE637) -- (Revisit)
Site Type: Old Greenville
Occupations: Early nineteenth to mid-twentieth century
Legal Location: NW¼, NW¼, NE¼, Section 13, T28N, R5E
UTM: Zone 15, 726690E 4109230N
Approximate Site Area: Undetermined—only a small portion of the site extended into the project area
Landform: Floodplain terrace (T-0)
Elevation: 380 ft. AMSL
Soils: Needleye-Capatina-Clarksville-Doniphan series
Nearest Water Source: Unnamed intermittent stream

Site Conditions: At the time of this investigation, the portion of the site within the proposed U.S. 67 right of way was located in short weeds and grass (0 percent visibility). The site has been extensively disturbed in the past by the construction of existing U.S. 67.

Description: Site 23WE637, Old Greenville, was the subject of a archaeological testing program by Price and Price (1979). Ceramics from various loci within the site were used as the primary dating factor and the results were used as a model for socioeconomic systems in the Ozark area. In 1982 the Army Corps of Engineers, St. Louis District monitored construction of a campground within Old Greenville; no cultural material was located. Again in 1985, the Corps surveyed a portion of the site where a new picnic shelter was to be constructed. Nineteenth-century glass and ceramics were recovered from shovel tests. Concurrently, the Corps surveyed a parcel in a wooded area in the eastern portion of the site and observed foundations, cisterns, and other remains. In 1985, areas northwest and southeast of Old Greenville were surveyed. Foundation stones, a well, an old road (a portion of the Natchitoches Trace), and historic artifacts were reported (Sirico 1985). In 1990, Old Greenville was listed on the NRHP. No standing structures remain from the original town, but the site contains intact archaeological cultural resources of the early settlement (ca. 1801–1818) and county seat of Wayne County (ca. 1819–1939), including a section of the Natchitoches Trace, courthouse mound, numerous building foundations and associated features, and three cemeteries.

Only a very small portion of Old Greenville extends into the current project area (see Figures 1 and 2). During this investigation, a concrete foundation, a concrete and stone wall, and a well were noted within the proposed right of way for the U.S. 67 improvements (see Figure 2). In addition, two other wells and three concrete culverts were noted immediately northwest and adjacent to the proposed right of way. Historical records indicate that these features may be related to the Old Greenville Roller Mill and Restaurant, a railroad track that was partially covered by construction of U.S. 67, and possible house sites.

Old Greenville Roller Mill and Restaurant: The building housing the roller mill and restaurant was built around 1889. It was operated by the Greenville M&M Company as a roller mill until they sold it to Robert Paullus and Henry Lee on May 8, 1915. The roller mill was powered by a steam boiler and had a capacity of 50 barrels of flour a day. Their bleached flour brand name was Silverleaf Flour and their unbleached flour brand was named Five Brothers. They also processed cornmeal and livestock feed. Henry Lee died in 1933. His son-in-law, Frank Settle, took over the management of the roller mill at that time. Some of the employees at the mill between 1915 and 1941 were Jim Fox, Robert Paullus, and Paul Stokely. Most of these men owned residences near the roller mill. Between 1892 and 1918 the roller mill was located off the Williamsville, Greenville, and Northeastern Railroad. A railroad station was located within a half mile south of the mill (later remodeled into Ed and Edna's Restaurant). After the original U.S. 67 was laid out in the 1930s, the eastern portion of the roller mill building was converted into a restaurant. It was operated by Josephine Lee and Blanch Settles—a mother and daughter team. Next door to the roller mill and restaurant, the family built a Shell service station as well. It was known as the Lee Service Station and was operated by C. M. "Percy" Lee (Figure 5-15). The government bought the property in 1941 prior to the damming of the St. Francois River and the creation of Wappapello Lake. The present U.S. 67 was constructed in 1942 over a portion of the Greenville Roller Mill and Restaurant and

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

Ed and Edna's Restaurant (Cramer 1972:362; Wappapello Lake Management Office n.d.; Wayne County Historical Society n.d.).

Collection Procedures: Given poor surface visibility (0 percent) on the site, shovel probes were excavated systematically around exposed surface features on the site. A total of 42 shovel probes was excavated on the site, 12 of which produced historic artifacts. All of the cultural materials were found near the surface in soil that had been disturbed.

Artifacts: A total of 44 historic artifacts was collected from 12 positive shovel probes during this investigation of 23WE694. The artifacts from this investigation fall into four functional categories: Kitchen, Architecture, Personal, and 'Other'. Artifacts from the Kitchen category included whiteware (n=5), porcelain (n=2), stoneware (n=2), glass (n=15), and one tin can fragment. Artifacts collected in the Architecture category included two wire nails, one flat glass fragment, and one brick fragment (not collected). The Personal category was made up of one glass bottle fragment; while the 'Other' category consisted of a black screwcap and an unidentified metal fragment. Diagnostic artifacts recovered during this investigation indicate a wide range of possible occupation for this portion of the site (1815–1950), with a mid date of 1896 and a mean date of 1887. These artifact dates fit well with the historical records which indicate that the roller mill/restaurant was in operation from ca. 1889 to the 1940s (Cramer 1972:362; Wappapello Lake Management Office n.d.; Wayne County Historical Society n.d.).

Recommendations: Based upon historical records, it appears that the portion of site 23WE637 investigated during this survey consists of the remains of an historic roller mill/restaurant occupied from ca. 1889 to 1941. While this type of site (a late nineteenth- to mid-twentieth-century industrial site) would not ordinarily be considered significant or eligible for the NRHP, this industrial site must be considered as a part of Old Greenville as a whole. In recent years, Old Greenville has been the focus of strong conservation efforts by local groups and the Corps of Engineers, which have included the construction of an interpretive center and museum. Given strong local interest in the history of Old Greenville, it is recommended that the portions of site 23WE637 which are located within the proposed right of way be avoided and protected from earthmoving activities. If this strategy of avoidance and protection are unfeasible, then this portion of site 23WE637 should be subjected to additional archaeological and historical investigations.

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

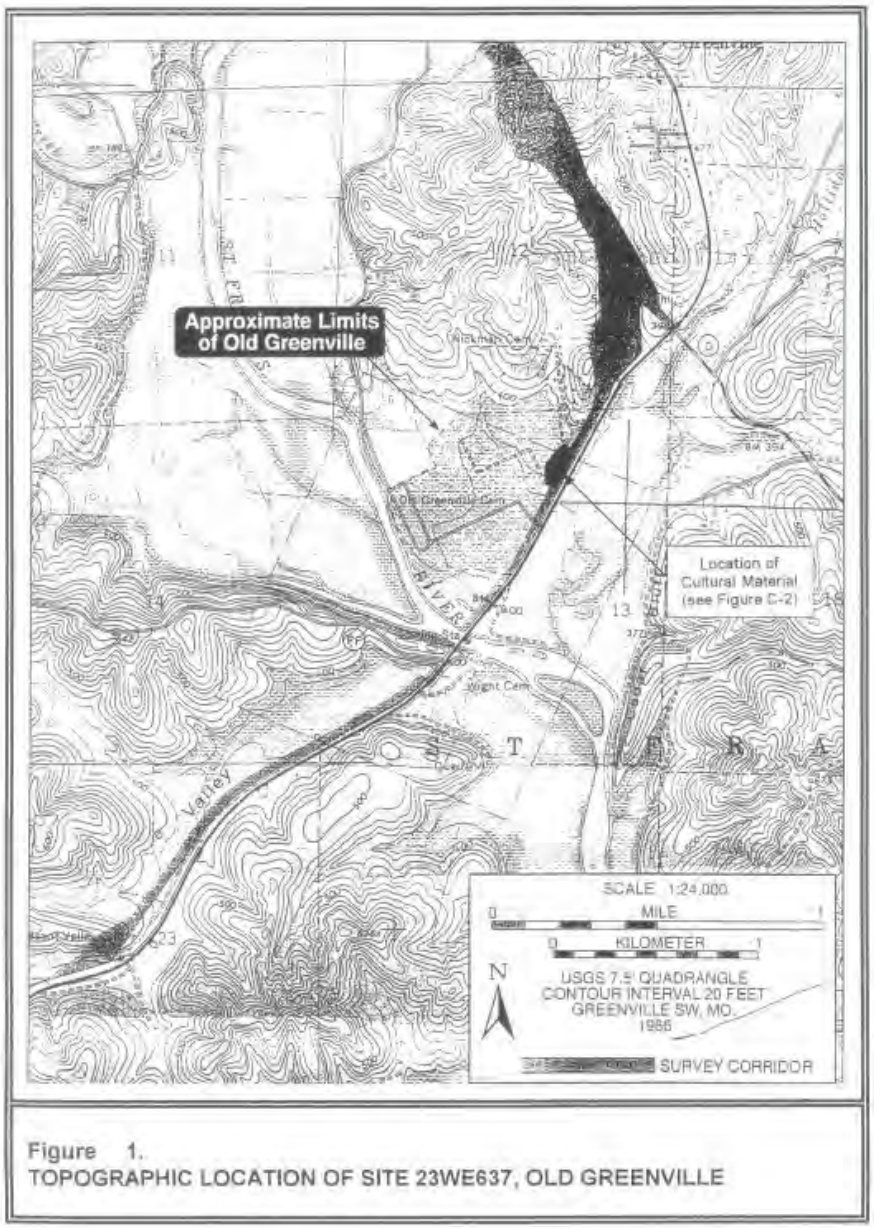

Figure 1.
TOPOGRAPHIC LOCATION OF SITE 23WE637, OLD GREENVILLE

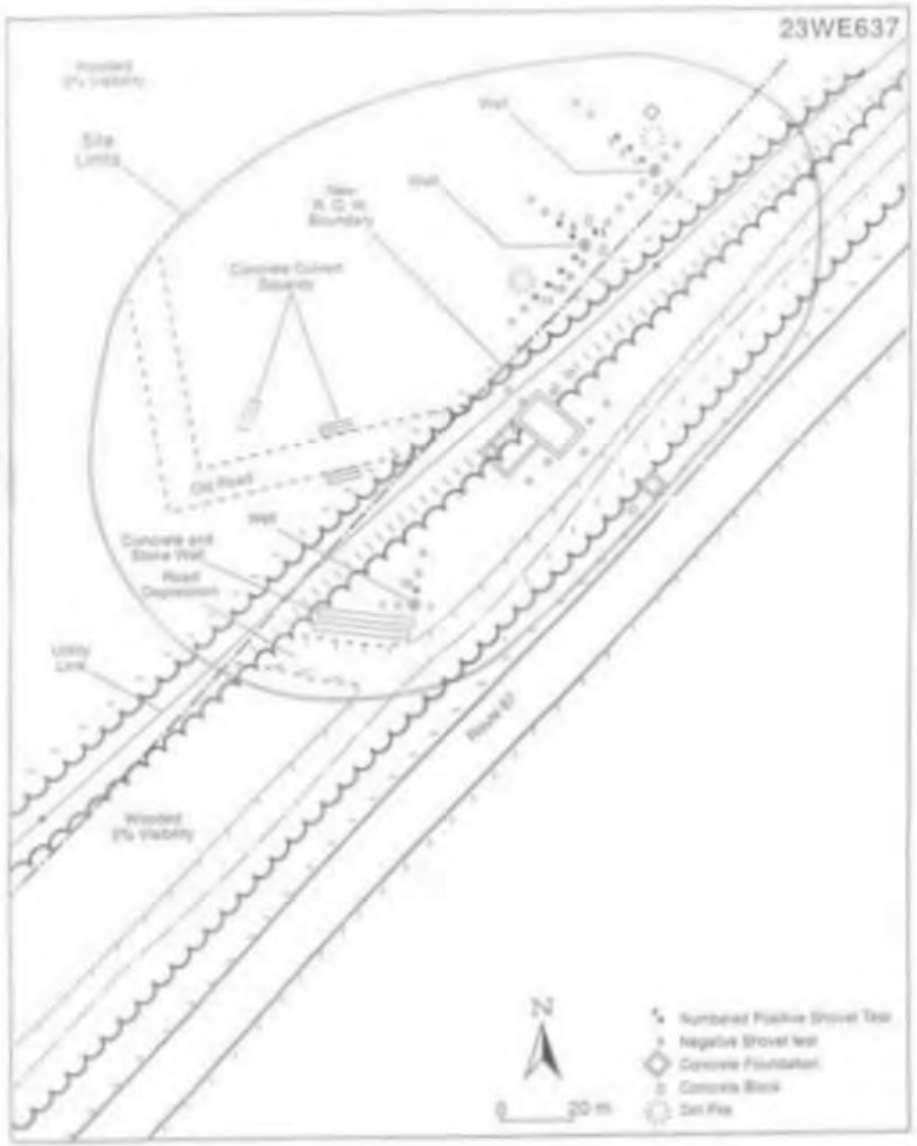

Figure 2
SITE MAP, 23WE637 (REVISIT)

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

Relic Well

Southwest Concrete and Stone Wall

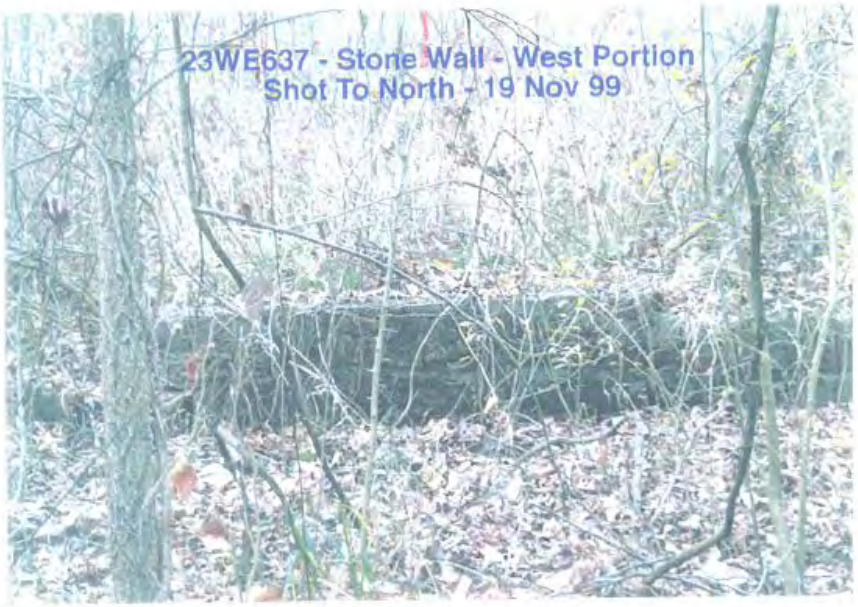

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

Northeast Concrete and Stone Wall

Concrete Foundation

Exhibit 5-3 – Results of Archaeological Investigations and Photographs of Old Greenville

Second Concrete Feature at base of Route 67

Concrete Feature at base of Route 67

MEMORANDUM OF AGREEMENT
AMONG
THE FEDERAL HIGHWAY ADMINISTRATION,
THE U. S. ARMY CORPS OF ENGINEERS ST. LOUIS DISTRICT,
THE U. S. FOREST SERVICE – MARK TWAIN NATIONAL FOREST,
THE MISSOURI DEPARTMENT OF TRANSPORTATION AND
THE MISSOURI STATE HISTORIC PRESERVATION OFFICE,
REGARDING
MISSOURI DEPARTMENT OF TRANSPORTATION
PROJECT NUMBER J0P0746,
FOUR-LANE IMPROVEMENT TO U.S. ROUTE 67
FROM FREDERICKTOWN TO NEELYVILLE (ROUTE 67 CORRIDOR STUDY)
MADISON, WAYNE, AND BUTLER COUNTIES, MISSOURI

Whereas, the Federal Highway Administration (FHWA) has determined that improvements to U. S. Route 67 to provide a four-lane highway facility from south of Fredericktown to a point south of Neelyville [114 km (71 mi) in length] within Butler, Wayne, and Madison Counties (the undertaking) are necessary to serve the transportation needs of the region and to improve traffic flow and safety; and

Whereas, the FHWA has established the area of potential effect (APE) for archaeological resources, as defined in 36 CFR § 800.16(d), to be the limits of the preferred alternate alignment as illustrated in the September 30, 2004 *Revised Draft Environmental Impact Statement ROUTE 67 CORRIDOR, Madison, Wayne, and Butler Counties, Missouri, Fredericktown to Neelyville* (DEIS); and the area of potential effect for architectural properties to be approximately 100 feet beyond the right of way for the preferred alternative; and

Whereas, the FHWA has determined that construction of the Route 67 undertaking (MoDOT Job Number J0P0746) as described in the September 30, 2004 DEIS may affect historic properties, including the St. Francis River Bridge (Bridge J-0021R), archaeological sites on federal land listed on the National Register of Historic Places (NRHP) (23WE637 Roller Mill at Old Greenville Site); archaeological sites on federal land (23BU297, 23WE293, 23WE262, 23WE494, 23WE575, 23WE761 23MO166) that are or may be considered eligible for the NRHP and archaeological sites on private land (23BU179, 23BU392, 23BU399, 23MO159, 23MO161, 23MO162, 23MO167) that may be eligible for the NRHP; and that the undertaking also has the potential to affect other as yet unidentified NRHP eligible archaeological sites; and

Whereas, the FHWA has consulted with the Missouri State Historic Preservation Office (SHPO), the U. S. Army Corps of Engineers St. Louis District (USACE), and the U. S. Forest Service Mark Twain National Forest (USFS-MTNF), in accordance with Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f, and its implementing regulations (36 CFR Part 800, *esp.* 36 CFR §800.6(b)) to resolve the adverse effects of the undertaking on historic properties; and

Whereas, the consulting parties agree that the full impacts of the Route 67 undertaking on archaeological resources cannot be determined until the final design has been completed; and

Whereas, Section 106 of the NHPA (16 U.S.C.§ 470 *et seq.*) provides definitions and procedures for consultation between federal agencies and Native American tribes with respect to federal undertakings; and that pursuant to NHPA Section 101(d)(6)(B) [16 U.S.C. § 470a(d)(6)(B)] and 36 CFR § 800.2(c)(2)(ii)(A), the FHWA has initiated consultation with Indian Tribes, including the Cherokee Nation of Oklahoma, United Keetoowah Band of Cherokee Indians in Oklahoma, Shawnee Tribe of Indians of Oklahoma, Delaware Nation of Oklahoma, Delaware Tribe of Indians of Oklahoma Choctaw Nation of Oklahoma, Quapaw Tribe of Indians of Oklahoma, Peoria Tribe of Indians of Oklahoma, Osage Tribe of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Absentee-Shawnee Tribe of Indians of Oklahoma and Miami Tribe of Oklahoma (the Tribes), that may have historic ties to the project area or may attach traditional religious or cultural significance to archaeological sites in the project area; and

Whereas, based on currently available information, construction of the undertaking within the preferred alternate will not affect any locations known to include Native American burials, funerary objects, sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001 *et seq.*); and

Whereas, pursuant to 36 CFR § 800.6(2), the Missouri Department of Transportation (MoDOT), the USACE and the USFS-MTNF have participated in the consultation and have been invited to sign this Memorandum of Agreement (MOA); and

Whereas, FHWA, in accordance with 36 CFR § 800.2(d)(3), has used the agency's procedures for public involvement under the National Environmental Policy Act to inform the public of this undertaking and solicit their views on historic properties and has distributed the draft Environmental Impact Statement to appropriate state and federal agencies and the public; and

Now, therefore, the FHWA, the USACE, the USFS-MTNF and MoDOT shall ensure that the following terms and conditions will be implemented in a timely manner and with adequate resources in compliance with the NHPA of 1966 (16 U.S.C. §§ 470 *et seq.*).

STIPULATIONS

This MOA sets forth the process by which the FHWA, the USACE, and the USFS-MTNF, with the assistance of MoDOT, will meet their responsibilities under Section 106 of the NHPA with respect to construction of a four-lane highway facility for U.S. Route 67 in Madison, Wayne and Butler Counties Missouri, from south of Fredericktown to a point just south of Neelyville. For purposes of this MOA, the definitions of terms appearing in 36 CFR § 800.16(a) - (y), inclusive, shall be employed whenever applicable. The FHWA, USACE and USFS-MTNF, with assistance from MoDOT will ensure that the following stipulations are carried out prior to taking any action that could adversely affect NRHP-eligible sites or properties:

I. To resolve adverse effects to the NRHP-eligible St. Francis River Bridge (Bridge No. J-0021R) resulting from the undertaking, the following measures will be carried out:

A. MoDOT shall in consultation with the SHPO implement the Missouri Historic Bridge Preservation Plan (Bridge Plan). If the St. Francois River Bridge cannot be preserved in place, appropriate mitigation measures and documentation consistent with the Bridge Plan, will be completed prior to demolition or removal Bridge No. J0021R.

B. MoDOT will provide copies of the mitigation measures to the SHPO and allow the SHPO a thirty-day comment period. If the SHPO has comments, they shall be satisfactorily addressed prior to initiation of any activities related to the undertaking that might result in impacts to the St. Francis River Bridge.

II. Prior to construction of improvements related to the undertaking, the following measures will be carried out to resolve adverse effects to the affected portions of NRHP-listed site 23WE637 (Roller Mill at Old Greenville):

A. MoDOT shall consult with the SHPO and the USACE and determine the appropriate mitigation measures and levels of documentation.

B. MoDOT shall complete the mitigation measures and allow the SHPO and USACE a thirty-day comment period. If the SHPO or USACE has comments, MoDOT shall satisfactorily address those comments prior to initiation of any activities related to the undertaking that might result in impacts to the Roller Mill at Old Greenville (affected portion of site 23WE637).

III. Prior to construction of improvements related to the undertaking that might affect the NRHP eligible site of the Greenville Civilian Conservation Corps Camp (23WE761) the following process will be implemented:

A. MoDOT shall in consultation with the USFS-MTNF establish mutually agreeable boundaries for the Greenville Civilian Conservation Corps Camp site (23WE761).

B. MoDOT shall, in consultation with the USFS-MTNF, make a reasonable and good faith effort to avoid or minimize impacts to the site in the planning and design of the undertaking.

C. MoDOT shall in consultation with the USFS-MTNF and SHPO determine measures and levels of documentation appropriate to mitigate impacts to the site that cannot be avoided.

D. MoDOT shall complete the agreed upon mitigation measures and provide the USFS-MTNF and SHPO with documentation, allowing the SHPO and USFS-MTNF a 30-day comment period. If the SHPO or USFS-MTNF has comments, MoDOT shall satisfactorily address those comments prior to initiation of any activities related to the undertaking that might result in impacts to the Greenville Civilian Conservation Corps Camp site.

IV. Prior to construction of improvements related to the undertaking, the following measures will be carried out in consultation with the SHPO, USACE (for sites on USACE property), USFS-MTNF (for sites on USFS property) and appropriate Indian Tribes to evaluate the effects of the proposed undertaking on all other NRHP eligible archaeological sites and to resolve adverse effects that cannot be avoided.

A. Archaeological testing (Phase II investigations to evaluate integrity and significance) will be conducted to assess the NRHP eligibility of 13 sites (23BU179, 23BU297, 23MO159, 23MO161, 23MO166, 23WE262, 23WE575, 23BU399; the pre-historic components of sites 23BU392 23MO162, 23MO167, and 23WE293; and the historic component of site 23BU297) located within the APE. Evaluative testing will also be conducted at the recorded location of site 23WE494. Archaeological investigations of sites on federal land will be conducted in compliance with the Archaeological Resources Protection Act (ARPA) and the Native American Graves Protection and Repatriation Act (NAGPRA). The USACE and USFS-MTNF shall, with assistance from FHWA and MoDOT, assume the responsibility for compliance with NAGPRA and ARPA for activities related to this undertaking on their property.

B. The FHWA shall ensure that a reasonable and good faith effort is made to identify and evaluate archaeological sites that may be present within those portions of the APE that have not previously been surveyed (currently totaling 107 acres). Identification efforts will be conducted in a manner consistent with SHPO guidance and the *Secretary of the Interior's Standards and Guidelines for Identification* [48 Fed. Reg. 44716 – 44739 (September 29, 1983)]. MoDOT, in consultation with the SHPO, the USACE for areas on their property and the USFS-MTNF for areas on their property, will also assess the potential for deeply buried archaeological sites within the APE and will design and implement a program to identify buried sites in high probability areas. The FHWA shall evaluate sites identified through these processes in accordance with 36 CFR § 800.4(c). If sites are identified that may be eligible for the NRHP, the FHWA shall apply the criteria of adverse effect in consultation with the SHPO, USACE for sites on USACE property, and USFS-MTNF for sites on USFS-MTNF property, taking into consideration any views concerning such effects that have been provided by Tribes, other consulting parties and the public.

C. The results of the Phase II archaeological investigation of sites and portions of sites located within the APE (including sites 23BU179, 23BU297, 23MO159, 23MO161, 23MO166, 23WE262, 23WE575 and 23BU399; the prehistoric components of sites 23BU392 23MO162, 23MO167, and 23WE293; and the historic component of site 23BU297), as well as reports resulting from testing undertaken to evaluate the recorded location of site 23WE494 and to identify deeply buried sites and historic properties in areas not previously surveyed, will be submitted to the SHPO for review and to the USACE for review of sites 23WE293, 23WE262, 23WE494, 23WE575 on USACE property and to the USFS-MTNF for review for sites 23BU297 and 23MO166 on USFS property. Consulting Tribes will be provided results related to Native American archaeological sites recommended for additional data recovery excavation.

D. The FHWA shall consult with the SHPO, the Tribes, other consulting parties, the USACE (for sites on USACE property), and the USFS (for sites on USFS property) to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects to NRHP-eligible archaeological sites.

E. Where adverse effects cannot be avoided, the FHWA shall consult with the SHPO, the Tribes (for sites to which they may attach religious or cultural significance), USACE (for sites on USACE property), USFS-MTNF (for sites on USFS-MTNF property) and other consulting parties to resolve the adverse effects, consistent with guidance provided in 36 CFR § 800.6, through the implementation of Archaeological Data Recovery Plan(s) developed in accordance with the Advisory Council on Historic Preservation's (Council) "*Recommended Approach for Consultation on the Recovery of Significant Information from Archaeological Sites*" (64 FR 27085-87 published in the *Federal Register* on May 18, 1999) Council's *Handbook on Treatment of Archaeological Properties* and the *Secretary of the Interior's Standards for Archaeological Documentation*; and

F. The FHWA shall ensure that reports on archaeological testing and data recovery investigations carried out pursuant to this agreement are provided to the SHPO, the Tribes (for sites to which they may attach religious or cultural significance), USACE (for sites on USACE property), and the USFS-MTNF (for sites on USFS-MTNF property).

G. The FHWA shall ensure that all materials and records resulting from archaeological investigations conducted under terms of this MOA are curated by a qualified institution in accordance with 36 CFR Part 79. Materials and records related to resources located on USACE property will be curated with the University of Missouri-Columbia (UMC) in accordance with a contract between the St. Louis District and UMC.

V The signatories recognize that Native American skeletal remains, associated or unassociated funerary objects, sacred objects, and objects of cultural patrimony (Cultural Items) that may be discovered or excavated during archaeological survey, testing, or data recovery excavations on federal land are subject to NAGPRA. The land managing federal agency (USACE on USACE property and USFS-MTNF on USFS property) shall, with assistance from FHWA and MoDOT, assume responsibility for compliance with NAGPRA related to this undertaking.

VI. The FHWA recognizes that any human remains (other than from a crime scene) that may be discovered or excavated during archaeological survey, testing, or data recovery excavations on non-federal land are subject to the Missouri Unmarked Human Burial Sites Act §§ 194.400-194.410, RSMo. The FHWA in consultation with the SHPO shall monitor the excavation and handling of any such human remains to ensure that they are treated in accordance with the SHPO's instructions and in accordance with procedures agreed to among FHWA, MoDOT and SHPO and that the remains are transferred to SHPO custody within twelve (12) months after MoDOT or any other persons or entities complete any analysis of the remains and objects authorized by the SHPO, pursuant to §§194.400-194.400, RSMo.

VII. Signatories shall ensure that all determinations, findings, or agreements made pursuant to this MOA are supported by sufficient documentation to enable any reviewing party to understand their basis.

VIII. If any signatory proposes that this agreement be amended, the FHWA shall consult with the other parties to this agreement. Said amendment shall be in writing, governed in accordance with 36 CFR 800.5(e), and executed by all parties to this MOA.

IX. If any signatory determines the terms of the MOA cannot be carried out, the signatories shall consult to seek amendment. If the MOA is not amended, any signatory may terminate it. If the MOA is terminated, the FHWA shall execute a new MOA or request the comments of the Council.

X. The signatories shall resolve disputes regarding the completion of the terms of this agreement. If the signatories cannot agree regarding a dispute, any one of the signatories may request the participation of the Council to assist in resolving the dispute.

XI. The term of this agreement shall be five years from the date of final execution unless the parties agree there is a need to extend the term. Six months before the date on which the agreement will expire, the FHWA shall notify the other parties of the impending expiration of the agreement. If the parties so choose, the agreement shall be extended for five additional years. If the parties do not agree, this MOA shall be null and void and the FHWA shall comply with 36 CFR Part 800 with regard to all remaining actions under this agreement.

Execution of this MOA by FHWA, USACE, USFS-MTNF, MoDOT and the SHPO and implementation of its terms are evidence that the FHWA has complied with NHPA Section 106 and has afforded the Council an opportunity to comment on the undertaking and its effects on historic properties and that the FHWA has taken into account the effects of the undertaking on historic properties.

Federal Highway Administration:

By: _____ **Date:** 5/17/05

Missouri State Historic Preservation Officer:

By: _____ **Date:** MAY 16 2005

U.S. Army Corps of Engineers

By: _____ **Date:** MAY 27 2005

U.S. Forest Service

By: _____ **Date:** 6/14/05

Missouri Department Of Transportation:

By: _____ **Date:** 05-12-05

REVIEWED AND APPROVED BY:
_____ 6-8-05
MICHAEL R. HARPER DATE
AGREEMENTS COORDINATOR/
CONTRACTING OFFICER

6.0 List of Preparers

Name	Qualifications	Primary Responsibilities
Federal Highway Administration Reviewers/Preparers		
Peggy Casey	BS Civil Engineering; 28 years of professional experience with FHWA	Environmental Coordinator Engineer
Don Neumann	BS Civil Engineering, 33 years experience with FHWA	Programs Engineer
Missouri Department of Transportation		
Matt Burcham	BS Agriculture; 12 years experience with MoDOT, State Office	Environmental Document Reviewer
Karen Daniels	Master of Heritage Preservation, BS Historic Preservation; 3 years experience with MoDOT, Central Office	Architectural Historian
Bill Graham	BS Environmental Science; 25 years experience with MoDOT, Central Office	Senior Environmental Specialist (Public Lands)
Kathy Harvey	BS Civil Engineering; 14 years experience with MoDOT	Preliminary Plan Coordinator
Mark Kross	MA Social Sciences, BA Interdisciplinary Archaeology; 25 years of experience with MoDOT, State Office	Environmental Process and Policy Assistant
Andy Meyer	BS Civil Engineering; 11 years experience with MoDOT	District Design Engineer
Alan Leary	MS Biology, BS Wildlife Management; 2 years experience with MoDOT, Central Office	Intermediate Environmental Specialist (Sensitive Species and Wildlife)
Bob Reeder	PhD Anthropology, MA Anthropology, BS Biology; 13 years experience with MoDOT, State Office	Cultural Resources Coordinator
Bill Robison	BS Civil Engineering; 13 years of experience with MoDOT, District 9	District Project Manager
Rusty Weisman	MA Anthropology, BA Anthropology; 5 years experience with MoDOT, Central Office	Archaeologist
MACTEC		
Stephen Coates	BS Civil Engineering; 16 years of experience in the field of roadway and site design and transportation planning.	Location Study Manager
Kathy Conley	BS Biology; 10 years experience in ecology, GIS and impact analysis	GIS Specialist

Name	Qualifications	Primary Responsibilities
Chris Dawdy	BS Geography; 19 years experience in ambient air monitoring, air quality, regulatory compliance, and permitting.	Air Quality
Christine DuMey	BS Biology; 5 years experience with ecology and GIS	GIS Technician
Lois DuMey	MS Environmental Science; 7 years experience in NEPA, 4(f) evaluations, EIS and EA documentation, and document review.	Environmental Lead
Scott George	BS Geology; 23 years experience in environmental investigations including wetland delineation and geological assessments.	Wetlands, Streams, Water Quality, Geology, and Hydrogeology
Linda Stites Hart	BS Business/Biology; 20 years of experience as a manager with professional responsibility in technical writing, editing, and document production for environmental documents.	Technical Editor and Document Coordinator
Richard Hart	AAS Drafting and Design; 10 years experience in civil engineering and land development applications.	CAD Manager/System Administrator
Virginia Hayes	MLA Landscape Architecture; 26 years experience in landscape planning and environmental impact analysis for transportation.	Aesthetics
Wayne Ingram	BS Civil Engineering; 24 years experience in water resources engineering and surface water hydrology.	Floodplains
Brian Mueller	BS Fisheries/Limnology; 16 years experience in fisheries, GIS, and impact analysis.	GIS Coordinator
Raymond Steege	MBA Business Administration, BS Civil Engineering; 23 years experience managing engineering investigations, flood plain studies, hydrologic analyses, roadway design, and commercial development.	Project Manager
Jeff Strickland	BA Communications; 19 years of professional experience in communications with responsibility for managing public participation programs and coordinating stakeholder involvement activities for major transportation studies.	Public Involvement Coordinator

Name	Qualifications	Primary Responsibilities
Christopher Tedder	BS Geology; 15 years of professional experience in the geotechnical evaluation of surface and subsurface conditions and in conducting environmental sampling and site evaluations.	Mines, Minerals/Hazardous Waste
McClane Environmental Services, Inc.		
Brent McClane	MS Environmental Studies, BS Biology, 13 years experience in fisheries, unionid and aquatic biology	Unionids
Zambrana		
Connie Heitz	BS, MPA, Public Affairs; 16 years of experience in conducting land use planning and socioeconomic analysis.	Social/Land Use
American Resources Group		
Gabrielle Aberle	BFA Filmmaking/Animation, 5 years experience in identification, classification, and investigation of cultural resources.	Supervising Archaeologist, Survey and Report Preparation
Cynthia Baer	MS History, BS Anthropology; 5 years experience in identification, classification and investigation of cultural resources.	Historian-Survey and Report Preparation
Cally Lence	BA History, 5 years experience in identification, classification, and investigation of cultural resources.	Historian – Survey and Report Preparation
Mike McNerney	M.A. Anthropology, B.S. Business Administration; 32 years of experience in identification, classification and investigation of cultural resources.	Project Administration
White and Borgognoni		
Gail White	MS Historic Architecture, BS Architecture; 31 years experience in historic architectural surveys and evaluations, historic preservation, and rehabilitation planning.	Architectural Historian-Survey and Report Preparation

7.0 Agencies, Organizations, and Persons Receiving the FEIS

Federal

U.S. Environmental Protection Agency
Attn: Office of Federal Activities
NEPA Compliance Division, EIS Filing Section
Areil Rios Building (South Oval Lobby)
Mail Code 2252-A, Room 7241
1200 Pennsylvania Avenue, NW
Washington, DC 20044

Dr. Willie R. Taylor, Director
Department of Interior
Environmental Office of Policy and Compliance
Main Interior Building, MS 2340
1845 C Street N.W.
Washington, DC 20240

Mr. Joe Cothern, NEPA Program Manager
Environmental Review Branch
U.S. Environmental Protection Agency
901 North 5th Street, ENSV-I0
Kansas City, Kansas 66101

Mr. Nick Chevances
Environmental Review
Great Plains Support Office
National Park Service
1709 Jackson Street
Omaha, Nebraska 68102-2571

Mr. Mike Weber, District Ranger
Mark Twain National Forest
U.S. Forest Service
Highway 8 West
Potosi, Missouri 63664

Mr. Danny McClendon
ATTN: Rob Gramke, Project Manager
Regulatory Branch DA
St. Louis District, USACE
ATTN: CEMVS-CO-F
1222 Spruce Street
St. Louis, Missouri 63102-2833

Mr. Ronnie Raum
Mark Twain National Forest
U.S. Forest Service
401 Fairgrounds Road
Rolla, Missouri 65401

Mr. Ken Sessa
Regional Environmental Specialist
Federal Emergency Management Agency,
Region VII
2323 Grand Boulevard, Suite 900
Kansas City, Missouri 64108-2670

Mr. Henry Hickerson, District Ranger
Mark Twain National Forest
U.S. Forest Service
1420 Maud Street
Poplar Bluff, Missouri 63901

Mr. Gary Stilts
U.S. Army Corps of Engineers
Wappapello Lake Project Office
HC 2 Box 2349
Wappapello, Missouri 63966-9603

Mr. Charles Scott
Field Supervisor
U.S. Fish and Wildlife Service
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-0057

Mr. Raymond Homer
Environmental Coordinator
USDA, Rural Development
601 Business Loop 70 West
Parkade Center, Suite 235
Columbia, Missouri 65203

Ms. Sandy Freeman, Environmental Officer
U.S. Dept. Of Housing and Urban Development
St. Louis Office, Region VII
Robert A. Young Federal Office Building
1222 Spruce Street
St. Louis, Missouri 63103-2836

Mr. Paul Mohr, Field Environmental Officer
U.S. Dept. Of Housing and Urban Development
Kansas City Field Office, Region VII
400 State Avenue
Kansas City, Kansas 66101

The Honorable Christopher S. Bond
Federal Building, Room 140
339 Broadway
Cape Girardeau, MO 63701

The Honorable Jim Talent
The Federal Building
339 Broadway, Room 136
Cape Girardeau, MO 63701

Representative JoAnn Emerson, District 8
The Federal Building, 339 Broadway
Cape Girardeau, Missouri 63701-7376

State

Mr. Dennis Potter, Soil Scientist, Liaison
Natural Resources Conservation Service
Parkade Center, Suite 250
601 Business Loop 70 West
Columbia, Missouri 65203

Mr. Dan Witter, Section Chief
Policy and Coordination
Missouri Department of Conservation
Policy and Coordination, P.O. Box 180
2901 West Truman Boulevard
Jefferson City, Missouri 65102-0180

Ms. Jane Beetem, Transportation Coordinator
Missouri Department of Natural Resources
205 Jefferson Street
Jefferson City, Missouri 65102

Mr. George Reidel
Floodplain Management Manager
State Emergency Management Agency
P.O. Box 116
Jefferson City, Missouri 65102

Ms. Erica Dobreff
Missouri Housing and Development Commission
3435 Broadway
Kansas City, Missouri 64111

Governor Matt Blunt
Office of the Governor
Missouri Capitol Building, Room 216
Jefferson City, Missouri 65101

The Honorable Rod Jetton
Missouri House of Representatives
District 156, Room 308
201 West Capitol Avenue
Jefferson City, Missouri 65101

The Honorable Steven Tilley
Missouri House of Representatives, District 106
Room 201A
201 West Capitol Avenue
Jefferson City, Missouri 65101

Mr. Honorable Irene Murray
Missouri State Senate, District 25
State Capitol Building, Room 331
Jefferson City, Missouri 65101

The Honorable Andrew Green
Missouri State Senate, District 27
State Capitol Building, Room 323
Jefferson City, Missouri 65101

The Honorable Gayle Kingery
Missouri House of Representatives, District 154
Room 114B
201 West Capitol Avenue
Jefferson City, Missouri 65101

Missouri Federal Assistance Clearing House
Office of Administration
P.O. Box 809, Truman Building, Room 840
Jefferson City, Missouri 65102

Local

The Honorable Joe Humphrey
Presiding Commissioner
Butler County Commission
County Courthouse
10 North Main
Poplar Bluff, Missouri 63901

The Honorable Robert Mooney
Presiding Commissioner
Madison County Courthouse
One Courthouse Square
Fredericktown, Missouri 63645

The Honorable Brian Polk
Presiding Commissioner
Wayne County Commission
County Courthouse
109 Walnut Street
Greenville, Missouri 63944

Dr. Phillip Wulfert
Mayor, City of Fredericktown
124 West Main Street
Fredericktown, Missouri 63645

Mr. Lloyd Matthews
Mayor, City of Poplar Bluff
101 Oak Street
Poplar Bluff, Missouri 63901

Gaylon Watson
Mayor, City of Piedmont
127 North Main
Piedmont, Missouri 63957

Carroll Rainwater
Mayor, City of Greenville
City of Greenville
P.O. Box 248, 108 Walnut Street
Greenville, Missouri 63944

James Yandell
Mayor
City of Neelyville
P.O. Box 36
Neelyville, Missouri 63954

Mr. Ken Parrett, President
Poplar Bluff Area Chamber of Commerce
1111 West Pine Street
Poplar Bluff, Missouri 63902

Ms. Terry Sikes, Executive Secretary
Fredericktown Chamber of Commerce
120 South Mine La Motte Street
Fredericktown, Missouri 63645

Ms. Linda Barfield, Librarian
Piedmont Public Library
118 West Green Street
Piedmont, Missouri 63957-1326

Ozark Regional Library
115 South Main Street
Fredericktown, Missouri 63645

Poplar Bluff Public Library
318 North Main Street
Poplar Bluff, MO 63901

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9.0 Coordination

9.1 Public Involvement

Engaging the affected communities and soliciting their input was a key component to the location study process for U.S. 67. A Public Involvement Plan dated February 1998 was prepared for the project which outlined the proposed methods of communication and use of outreach tools. A wide variety of methods and techniques were used to solicit input and to inform the public of the project including public meetings, small group meetings, workshops with business owners, community and special interest groups, newsletters, questionnaires, and news articles.

Throughout the course of the location study planning process, interaction with the public indicated concerns within the various communities throughout the U.S. 67 corridor. The Public Involvement Plan was formulated to meet the specific needs of each community by tailoring outreach methods, meeting styles and locations, and frequency of interaction. The goal was to personalize all communication to the uniqueness of the affected areas.

9.1.1 Public Questionnaire

A public opinion survey was developed for the project at the beginning of the study. This questionnaire (Appendix G) was used to solicit input from the citizens located in the project corridor to see what they believe are the important issues to consider during the study. Surveys were distributed in January 1998 throughout the corridor at 45 locations including retail outlets, libraries, post offices, and city halls. Approximately 200 surveys were returned.

Problems/issues identified by the public included truck traffic, safety, and traffic congestion. Those issues the public believed that needed to be considered during the location study included accidents/safety, traffic, and business and industrial development. Information from these questionnaires was used to build the project mailing list and to address community concerns at future meetings.

9.1.2 Public Meetings

An integral component of public communication included holding public meetings throughout the duration of the project. The public meetings were held at key project milestones, and focused on sharing information and decision making processes between the study team and the public.

Public meetings offered the affected communities a chance to discuss the components of the location study with MoDOT, as well as voice their opinions. The general format for each meeting was an open house with numerous graphic stations that represented components of the location study (i.e., environmental constraints, location alternatives, aerial photographs). Comment forms were provided at each meeting for the public to send in their questions or concerns.

Notification of the meetings was accomplished through press releases that were sent to the local media, and postcard notification to those citizen included on the project mailing list. The project mail list was developed through public opinion surveys, public meetings, and letters or phone calls received by the study team. Three sets of public meetings have taken place to date.

9.1.2.1 First Public Meeting

The first set of public meetings occurred in Fredericktown (Madison County), Greenville (Wayne County), and Poplar Bluff (Butler County). The purpose of these meetings was to introduce the planning study and gather initial feedback from the affected communities. There were no alignments presented.

Blank aerials and environmental constraints of the counties were shown. Meeting participants were encouraged to draw their ideas for potential locations of the proposed four-lane roadway.

The meetings were announced to the public in several ways including the issuance of two press releases to the local media, the placement of display boards in the project corridor with the questionnaire, delivery of meeting announcement flyers to local businesses, meetings with elected officials and the study team 2 weeks prior to the public meeting, and roadside flashing message boards were used in Wayne and Butler counties. The following are specifics of each open house.

Madison County

The meeting was held on February 10, 1998 at the Fredericktown High School cafeteria from 4:00 p.m. until 8:00 p.m. Approximately 35 people attended the meeting. Questions/comments included:

- A bypass of Cherokee Pass is needed, but it should be visible to existing businesses.
- A separate meeting should be held with the Cherokee Pass business owners so they can discuss their specific issues.
- Mention was made of a potential new area attraction or development north of Millcreek that may have influence on future traffic volumes.
- Several people requested information on the recently completed U.S. 67 Millcreek bypass project.
- Comments were made regarding the condition of the existing road and the need for shoulders.

Butler County

This meeting was held on February 11, 1998 at the Poplar Bluff 5th and 6th Grade Center. Approximately 49 people attended the meeting. Questions/comments included:

- Several residents from the Neelyville area voiced concern about the condition of existing U.S. 67 in south Butler County. They were very interested in getting the shoulders paved in their area.
- Potential sensitive archaeological sites located along Route 142 west were discussed.
- Business owners located near the Missouri/Arkansas state line were concerned about impacts to their operations.
- Business owners located along the existing four-lane expressway north of Poplar Bluff were concerned about changes in access. A separate meeting with this group was suggested.
- Farmers and business owners were concerned about a fully access controlled roadway and their ability to move across the roadway.
- Several questions were raised about the construction schedule of the Poplar Bluff bypass.

Wayne County

This meeting was held on February 12, 1998 at the Greenville Elementary School Cafeteria. Approximately 68 people attended the meeting. Questions and comments included:

- Some citizens felt the new U.S. 67 should go through Greenville for economic purposes, while others did not want to see any of the existing business or homes taken for the new roadway.
- Ideas for locating the roadway included using old U.S. 67 as an outer road or one pair of the four-lane roadway, splitting the pairs of lanes so one set would go through town, and bypassing Greenville on the east side would be difficult because of the homes and terrain.
- Interchanges for Greenville should be located at Route E, south of town and also at the north end of town, if the road bypasses the community.

- Many people were concerned about the possibility of MoDOT "destroying" the community similar to what residents felt the USACE did when the town was relocated in the 1940s.

Action Items

Based on feedback from the first set of meetings, several action items were noted for future public involvement, including:

- Separate meetings would be held with affected interests including Cherokee Pass, Poplar Bluff North, and Neelyville.
- Meetings in Madison County would be held closer to Cherokee Pass, not in Fredericktown, since they are not part of the study area.
- Information regarding scheduled or projected maintenance of the existing U.S. 67 needs to be disseminated to the public.
- Aerial maps were reviewed to incorporate information given to the study team from members of the public including cemetery locations, springs, wells, hazardous waste areas, and potential archeological sites.

9.1.2.2 Second Public Meeting

The second set of public meetings was held in November 1998 to discuss preliminary corridors that had been developed for consideration in locating the proposed four-lane roadway. These preliminary corridors were shown on aerial and environmental constraint maps as 304.8 m (1,000-ft) wide bands. The purpose of the wide corridors was to gather input on general impressions of where the new road could be located, not on actual alignments or specific impacted properties. For instance, there were four corridors shown in Cherokee Pass, one west of town, one through town, and two east of town. It was the intention of the study team determined, in general, which side of the town would be most favorable to the community for locating the roadway. Aerial photos were available with each possible corridor shown.

Meeting notification included press releases, postcard mailings to those on the project mail list, flyers were distributed to elected officials, and several workshops held in the corridor (small group meeting section). Details of each meeting follow.

Madison County

This meeting was held on November 4, 1998 at the Pinecrest Camp Dining Hall on Route C, just west of Cherokee Pass. This was a new location, in response to public feedback from the first meeting. Approximately 43 people attended the meeting. Comments/questions included the following:

- Several business owners of Cherokee Pass expressed their desire to have the new U.S. 67 located directly through town so the businesses would be bought out and given a chance to relocate.
- Others expressed interest in the western alignment because it had less disruption to the homes and businesses of Cherokee Pass.
- The timing of the improvements and the purchase of right of way were asked
- Several springs, cemeteries, and natural areas were pointed out on the maps.

Butler County

This meeting was held on November 5, 1998 at the 5th and 6th Grade School in Poplar Bluff. Approximately 46 people attended this meeting. Comments/questions included:

- Several business owners along the existing four-lane expressway indicated a preference for the interchange option located at Township Line Road, since it impacted less business and operations.

- It was noted that the area south of Poplar Bluff at the Routes 160/158 intersection with U.S. 67 should be examined at a separate meeting and more details in exhibits should be made.
- Concern about the impact to property located near Township Line Road was mentioned in regards to the potential for placement of an interchange.
- Several small cemeteries and an old school house were drawn on the aerial maps by meeting participants.
- The western alignment in Neelyville was located near the Corkwood Conservation Area. Corkwood is a state listed endangered species.

Wayne County

This meeting was held on November 9, 1998 at the Greenville High School. Approximately 45 people attended this meeting. Comments/questions included:

- The western corridor near Greenville was mentioned as the most practical, and the upgrade to existing was thought of as too destructive to the town.
- The corridor to the west of Silva including the interchange with Route 34 was mentioned as preferable because it would have less impact to existing homes and would go through a vacant industrial facility.
- A representative from Bethel Baptist Church was concerned about impacts to the church.
- In areas where the existing roadway will be used, many people wanted to know which side of the road the new lanes would be built.
- Residents of Coldwater were concerned about access to their community and where an interchange would be placed.

Action Items

- Exhibits and handouts for Butler County should have large-scale maps of the Routes 160/158 area. A separate meeting with property owners in this area may be appropriate.
- Access at Greenville needs to be examined closely to accommodate both the community and access to Wappapello Lake.
- Additional discussion with the business owners in north Poplar Bluff should be scheduled.
- Review alignment west of Neelyville to attempt to evaluate potential impacts to the Corkwood Conservation Area.
- Add information on cemeteries and natural areas to the environmental base map.

9.1.2.3 Third Public Meeting

The third set of public meetings was held in June and July 1999. The purpose of these meetings was to discuss the final study alternates. Information available included aerial photos of study alternates, proposed locations for interchanges and services roads at major intersections, and environmental constraints. A questionnaire was distributed at the meeting asking participants which option they preferred for various segments of the roadway.

The meeting was advertised by press releases sent to local media, a postcard sent to the project mail list, and elected officials notified of the meetings. Details of each meeting follow.

Butler County

This meeting was held on June 28, 1999 at the Hillview Elementary School cafeteria. The location change was in response to suggestions made at the previous public meeting for a location that would be more

accessible to people in south Butler County. Approximately 106 people attended the meeting. Questions/comments are as follows:

- The interchange as presented at Township Line Road appears to take a lot of property, and should be examined again to see if it could minimize property impacts.
- Concern was expressed about the impact to businesses at the Routes 160/158 intersection.
- South of the Routes 160/158 interchange, the proposed alignment is on the east side of the existing highway and impacts a number of homes and properties. On the west side is a junkyard. Further examination of moving the alignment to the west is needed.
- The western alignment in the Neelyville area was preferred, as it would not disrupt the community as much.
- Concern was expressed about adverse travel with a freeway condition.

Wayne County

This meeting was held on June 29, 1999 at the Greenville High School. Approximately 61 people attended the open house. Questions/comments are as follows:

- The alignment in Greenville was viewed as a good location by most meeting attendees.
- Access into Greenville was a main concern. The proposed interchanges showed a split in access on the north and south sides of town. Several people wanted full access at both locations.
- A majority of respondents indicated that the alignment to the east of Silva near Route 34 was preferable.

Madison County

This meeting was held on July 1, 1999 at the Pinecrest Camp Dining Hall, just west of Cherokee Pass. Approximately 58 people attended the open house. Questions/comments are as follows:

- A majority of respondents indicated the western alignment of Cherokee Pass was favorable because it had less impact on the businesses and homes of the area.
- The interchange at Route JJ should be examined again to see if it could minimize impact to pastureland and a graveyard.
- Property owners were concerned about impact to their land.

Action Items

- Review alignment south of Route 160/158 to see if the proposed alignment could be moved to the west side of the existing roadway and impact a junkyard instead of residences.
- Review interchange design in Greenville to see if full access can be provided into and out of the community.
- Review interchange at Route JJ in Wayne County.

9.1.2.4 Public Hearing

A set of public hearings were held on July 10, 11, and 16, 2001 for the location study and Draft EIS for U.S. 67 in Madison, Wayne, and Butler counties. These meetings were held in Greenville, Poplar Bluff, and Fredericktown from 4:00 p.m. to 7:00 p.m. The purpose of these meetings was to present the developed alternatives and the recommended Preferred Alternative and solicit comments and input from the public.

The set of public hearings were held in an open house format. No formal presentations were made. The following information was made available to the public:

- A video presentation describing the project goals along with interviews with the District Engineer and local residents;

- A handout package containing information about the project and the alternatives studied in each county and a comment form;
- Aerial maps of the entire 114 km (71 mi) corridor showing the recommended alternative as well as other alternatives studied;
- Maps of the county showing access points and enlargements of proposed interchanges.
- Large scale aerials of specific communities (Greenville, Cherokee Pass, Neelyville);
- Existing and projected traffic volumes;
- Environmental resources;
- Copies of the Draft EIS and plan/profile technical report; and
- MoDOT right of way pamphlets.

A court reporter was available to take oral comments from meeting participants. Written comment forms were available in the handout and at tables in the hearing room.

Meeting Participation

Representatives from MoDOT and their consultant, USFS (Poplar Bluff and Fredericktown meetings) and USACE (Greenville meeting) were available to discuss issues and answer questions from the public. The hearings were well attended by the public (82 in Greenville, 150 in Poplar Bluff, and 96 in Fredericktown).

Public Comments

A majority of the comments received at the hearings were related to requests for maps of the proposed alignment from property owners. Other comments received included concern with:

- The interchange layout at Route 34 and U.S. 67 in Wayne County. Some prefer Alternate K over the recommended Alternate J because they felt that the proposed interchange layout was too complicated and would not facilitate traffic as well.
- Potential impacts to Geronimo Springs in Madison County.
- Potential impacts to specific property owners.
- The timing of the improvements and how this affects a property owner's ability to sell and/or improve their property.
- The new route being too far from the existing town of Greenville for motorists to see what services may be available.
- The interchange at Route D, south of Greenville, and the desire to make it a full interchange.
- Potential loss of business from a relocation of the existing roadway or access change to existing businesses.

9.1.2.5 Small Group Meetings

The long linear nature of the U.S. 67 corridor and the small population centers along the existing roadway influenced the communication methods for public outreach. An attempt was made at forming a Citizens Advisory Group of people within each county to discuss issues pertinent to each county. This group was formed from respondents to the initial questionnaire that identified themselves as interested in participating in a citizen advisory committee. These groups met once with a very poor turnout, and it was decided after discussion with the groups that it would be more effective to meet with specific small groups, rather than on a county-wide basis. After the first set of public meetings and communication with the affected interests, it was determined that a more effective method of interaction with the public would be in small groups in a workshop or round table discussion format. The intent of these meetings was to exchange information and have an in-depth discussion within a small group meeting format that focused on particular issues that were pertinent to the meeting attendees. These small group meetings were held periodically to coincide with major milestones of the location study.

Cherokee Pass

- April 2, 1998 – Initial meeting to discuss planning process
- May 28, 1998 – Madison County Advisory Group first meeting
- October 27, 1998 – Workshop to discuss preliminary corridors
- April 1, 1999 – Workshop to discuss refined alternatives, and cost estimates for each alignment
- March 14, 2000 – Discussion on status of project and recommended alignment

Significant issues that were discussed at these meetings included:

- Potential economic impact to business owners if the town would be bypassed. This issue was a prominent point for most of the community. There was a contingent of business owners that pressed the state to consider an alignment that went straight through town and bought out many of the existing businesses. The reasoning for this was that they felt it would be more advantageous for the state to purchase their businesses and they would rebuild in a different location. This option was explored as a final study alternate. However, there was also a contingent that advocated preserving Cherokee Pass by not impacting the businesses and locating the new four-lane roadway as close as possible to town.
- Potential environmental constraints were shown to the study team including a hazardous waste area, water wells, ponds, and cemeteries.

Poplar Bluff North Business Owners

- April 1, 1998 – Initial meeting to discuss planning process and type of access changes for the area
- June 2, 1998 – Butler County Advisory Group first meeting
- October 26, 1998 – Workshop to discuss options for locating interchanges, and median closures
- April 1999 – Workshop to discuss modifications to alternative interchange locations
- January 26, 2000 – Discussion of recommended access plans

Significant issues discussed at these meetings included:

- The location of an interchange closest to the Route 60-east interchange was important to the business owners. The first median crossover north of this interchange was heavily used for access to the existing businesses. Several options were examined including an interchange as close to the existing cloverleaf as possible.
- Connections via service roads and overpasses were a focus. Circulation of traffic to maximize access to the business was discussed as well as adverse travel and its impact to businesses.
- Many business owners favored an interchange at Township Line Road.
- Many business owners potentially impacted believed that they were more significant employment base or tax generator than the businesses not impacted.

Greenville

- May 26, 1998 – Wayne County Advisory Group first meeting
- October 26, 1998 – Workshop to discuss preliminary corridors

Significant issues addressed at these meetings included:

- The importance of having limited impact on the town was discussed. The history of the town being moved from its original location by the USACE and the importance of keeping the community intact was an issue.
- Access to the community was important for economic reasons and visibility.

Due to low interest and turnout at previous workshops in Greenville, the study team decided to focus on providing information to elected officials and holding public information meetings in Greenville.

Neelyville

- October 27, 1998 – Workshop to discuss preliminary corridors
- January 25, 2000 – Discussion of recommended option in the Neelyville area
- January 25, 2000 – Discussion of recommended option in the Route 160/158 area

Significant issues discussed at these meetings included:

- The condition of the existing roadway and the desire to have the shoulders paved.
- The difficulty of locating the new roadway on the west side of the existing road because of the stand of corkwood trees (a protected species).
- The ability of agricultural equipment to move across the freeway.
- Circulation of traffic between Neelyville and Poplar Bluff.

Elected Officials

The elected officials in the project area have had several opportunities to become involved in the planning process for U.S. 67. Maintaining close and frequent communication regarding the study process was an important component to the public involvement plan. The study team held an initial project kick-off meeting with elected officials in Madison, Wayne and Butler counties. After this kick-off meeting, the approach used to engage these groups was for the study team to attend regularly scheduled city council or county commissioner meetings and present the status of the project, findings to date, and upcoming events. This concept worked extremely well as it afforded greater participation by the elected officials and it did not create additional meetings for these groups to attend. The study team was able to engage each member of the City Council or County Commission instead of a single delegate from these organizations. Meetings have included:

- January 28, 1998 – Madison County kickoff meeting
- January 28, 1998 – Wayne County kickoff meeting
- January 29, 1998 – Butler County kickoff meeting
- September 29, 1998 – State Senators and Legislators
- October 5, 1998 – City of Greenville
- October 12, 1998 – City of Fredericktown
- October 13, 1998 – Wayne County Commissioners
- October 19, 1998 – Madison County Commissioners
- October 19, 1998 – Butler County Commissioners
- October 19, 1998 – City of Poplar Bluff
- December 8, 1998 – City of Neelyville
- March 22, 1999 – City of Fredericktown
- March 29, 1999 – Madison County Commissioners
- May 3, 1999 – City of Greenville
- March 7, 2000 – City of Greenville
- August 13, 2003 – City of Greenville

The study team met with the city of Greenville to discuss the city's intent to lease additional property from the USACE for recreational purposes. The mayor of Greenville had contacted the USACE, Wappapello Lake office for additional property adjacent to and south of the existing ball field that would include a walking trail and sand volleyball court. This property is also located adjacent to the proposed interchange at Greenville. The coordination is ongoing and the property will not likely be leased to the city until the Preferred Alternative is finalized.

9.1.3 Project Newsletters

Two project newsletters (Appendix G) were produced and distributed to the project mail list. The first was published in March 1999 and the second in April 2000. There were approximately 600 people on the mail list. The newsletters contained information about the progress of the study, upcoming meetings, results of previous public meetings, and upcoming project activities such as field surveys or the availability of project information.

9.1.4 Other Public Outreach

The project study team made available a project specific toll-free phone number (1-800-947-8313) for interested citizens to call and ask questions or provide comments. MoDOT's toll free number was also distributed, 1-888-ASK-MoDOT (1-888-275-6636). Written correspondence was also received from property owners. All communication was documented in the Public Involvement Log. Maps of various alternatives in specific areas were mailed to numerous citizens throughout the corridor on an ongoing basis, as requested. Many citizens wanted to study the proposed alternatives and others were absentee landowners often out of state who wanted to understand the potential impact to their property.

Maps of the alternatives were also placed at public access areas such as libraries, city halls, and county courthouses.

9.2 Agency Coordination

Coordination with representative resource and regulatory agencies has been on-going throughout the location study process. Coordination and communication has consisted of both written correspondence, individual agency meetings, and agency scoping meetings. Written correspondence from agencies is provided in Appendix C, including letters from USACE-St. Louis District and MTNF representatives accepting their roles as cooperating agencies. Agency comments on the Draft EIS and response to those comments are included in Appendix H.

9.2.1 Agency Coordination Meetings

The agency coordination meetings were established to allow for focused discussion with the resource and regulatory agencies over the course of the scoping, location study, and environmental resource discovery processes. These meetings were often conducted in a small group setting with individual agency personnel to enhance focus of discussion relative to particular concerns and specific resource and management issues. To date, these efforts have also included field visits with the USACE to allow for familiarity with the project corridor wetland and aquatic resources. Agency comments on the Draft EIS and response to those comments are included in Appendix H.

9.2.1.1 Mark Twain National Forest

There were five meetings with MTNF to identify and address potential issues and concerns for the proposed project regarding property managed by the Potosi and Poplar Bluff Ranger Districts. The first meeting occurred on April 8, 1998 at the Fredericktown office and included both the Potosi and Poplar Bluff Ranger Districts. This meeting discussed the needs for a new facility, objectives of the proposed project, potential MTNF environmental constraints, and MTNF expectations.

A second meeting with MTNF occurred on September 8, 1999 with both Potosi and Poplar Bluff Ranger Districts. This meeting specifically discussed the MTNF issues and concerns including proposed right of way, access issues, MTNF operational and management needs, and the Ozark Trail crossing at the Black River.

The third meeting on September 22, 1999 with the Potosi Ranger District described the corridor development process and study alternatives in Madison County. Additional issues discussed included Section 9 sensitive species, flora/faunal studies conducted on MTNF managed property, and right of way impacts to areas managed for timber.

The fourth meeting with MTNF occurred on May 2, 2001 with the Potosi District office to discuss the potential effects to USFS property. Additional issues included the continued access to a MTNF heritage site, the review of the Phase I Archaeological Resources report, the applicability of the Ozark-Ouachita Highlands Assessment for information on regional socioeconomics, the inclusion of the R9 survey in the Final EIS, and that the acreage of potential impacts for Potosi District be separated from the Poplar Bluff District in the Final EIS.

The fifth meeting occurred on May 7, 2001 with Poplar Bluff District office to discuss the potential effects to USFS property. Additional issues included several MTNF properties acquired with Land and Water Conservation Act funds, the review of the Phase I Archaeological Resources report, and road construction activities with regards to kudzu.

9.2.1.2 U.S. Environmental Protection Agency

Meetings were conducted with USEPA to discuss project efforts relative to development of the project Purpose and Need, the study alternative process, and project corridor environmental resource issues. The study team also wanted to gain input and feedback from the agency on potential issues of concern.

9.2.1.3 U.S. Army Corps of Engineers

There were a number of meetings which identified and addressed potential issues and concerns for the proposed project regarding property managed by the USACE. The first meeting was held on April 1, 1998 at Wappapello Lake to discuss U.S. 67 project needs, cooperating agency status, and identify potential USACE concerns.

A second meeting was held on January 13, 1999 to provide the current status of the location study and address specific USACE concerns. These concerns included access issues and mitigation of potential impacts to land managed by the USACE.

A third meeting occurred in the U.S. 67 study area with representatives fro the USACE on April 13, 1999 to discuss jurisdictional wetland issues specific to the proposed project.

A fourth meeting occurred on September 8, 1999 to specifically address the proposed right of way and access issues relative to USACE property, USACE operational and management needs, and comments from the USACE regarding the proposed project.

A fifth meeting was held on August 9, 2002 to address wetland issues, wetland tasks, and permitting requirements necessary to complete the proposed project.

In addition to the meetings discussed above, a number of meetings occurred with Wappapello Lake personnel relative to the alternative development and evaluation issues in the North Greenville Recreation Area and in the vicinity of Historic Greenville and the Greenville Recreation Area. An in-depth presentation is provided in the Final Section 4(f) Evaluation (see Section 5.0).

There were also field reconnaissance efforts with USACE staff in order to familiarize the agency with project corridor wetland and aquatic resources, and to discuss jurisdictional issues.

9.2.1.4 U.S. Fish and Wildlife Service

On March 31, 1998, a meeting was held at the USFWS office in Columbia, Missouri to discuss the proposed project, project needs and direction, and potential USFWS concerns and expectations. There were also a number of conversations with USFWS on various planning and threatened and endangered species issues. The agency was vital to the process of scoping the unionid surveys within the project corridor (Sections 3.12 and 4-12.3).

To address USFWS concerns regarding the Draft EIS (letter dated August 16, 2004), a meeting was held at the USFWS office in Columbia, Missouri on April 30, 2002, to review the study corridor and alternative development, to identify the Preferred Alternative and environmental consequences associated with the Preferred Alternative and to discuss USFWS concerns regarding the proposed project and Draft EIS. In addition, the meeting summarized the field work and resources used to identify high quality habitats and extensive efforts made throughout the alternative development to avoid and minimize impacts to the high quality habitats.

Specific USFWS concerns included Section 4(f) resources, dye tracer studies, and federally listed mussels and the Hine's emerald dragonfly.

The USFWS maintained that areas enhanced with Pittman-Robertson funds qualify as Section 4(f) resources. The FHWA has since determined that areas enhanced with Pittman-Robertson funds do not qualify as Section 4(f) resources. The USFWS recommended dye tracer studies be conducted at springs and fens to delineate recharge zones. These studies will not likely change the alignment of the Preferred Alternative. Storm water management should be addressed during the design phase.

Since project construction may not begin for several years, designs for the Preferred Alternative have not been completed, and that the circumstances could change during this time period (i.e., species could move in or out of the area), MoDOT will survey and re-locate listed mussel species within the vicinity of the Black River Bridge and survey for the Hine's emerald dragonfly prior to construction. For more detailed information, see Appendix H, Agency Comments on the Draft EIS and Responses.

9.2.1.5 Missouri Department of Conservation and Missouri Department of Natural Resources

A meeting was held on March 31, 1998 at the MDC office in Jefferson City, Missouri to present the U.S. 67 project to these agencies and identify any MDC or MDNR concerns.

9.2.2 Agency Scoping Meetings

The first meeting was held on December 15, 1997. The overall purpose of the meeting was to introduce the U.S. 67 improvements project and the project team to those federal agencies that would most likely play a significant role in the planning and environmental documentation processes. More specifically, the objective of the meeting was to discuss specific issues that would ultimately affect the alternative development and coordination process, data acquisition, the scope of analyses for the environmental impact statement, and project schedule. The second agency coordination meeting was held on September 3, 1998 and discussed the study area, project objectives, overall study approach and requested comments on the draft Purpose and Need Statement. The project team described the existing environment and requested input from the agencies on potential impacts of the proposed project.

A third agency scoping meeting was held on June 15, 1999. The purpose of this meeting was to describe project development, specific areas of environmental concern, the public involvement program, and the corridor development process. The corridor development process took place in five stages: logical termini and independent utility, study area, 1,000-foot bands, study corridor, and project corridor (Section 2.0). Input was solicited regarding the corridor development process as well as any agency concern.

Those agencies that were not able to attend the scoping meetings were provided with information from the meetings and were encouraged to comment on the Proposed Action. Agency input has resulted in a more thorough understanding of the existing environment and the potential impacts the proposed project would have on the environment. Concerns identified by agencies through the project included potential 4(f) issues, cultural landscapes, mitigation measured for USACE and MTNF properties, significant wetlands such as seeps and fens, and access issues.

9.2.3 Native American Tribal Coordination

On October 10, 2003, copies of the Draft EIS were sent to the following Indian Tribes:

- United Keetoowah Band of Cherokee Indians in Oklahoma
- Shawnee Tribe of Oklahoma
- Absentee-Shawnee Tribe of Indians of Oklahoma
- Delaware Nation of Oklahoma
- Choctaw Nation of Oklahoma
- Quapaw Tribe of Indians of Oklahoma
- Osage Tribe of Oklahoma
- Eastern Shawnee Tribe of Oklahoma
- Miami Tribe of Oklahoma
- Delaware Tribe of Indians of Oklahoma

These tribes have historic connections to the area or may attach traditional religious or cultural significance to archaeological sites in the project area. Along with the Draft EIS, these Indian Tribes were also provided with a summary description of the known archaeological resources in the study area.

The Delaware Tribe of Indians of Oklahoma submitted a December 12, 2003, letter of response stating that they had no objections to the proposed construction. The Delaware commented that if any human remains are inadvertently uncovered during construction they should be notified immediately.

10.0 Index