

I-55/Crump Blvd. Interchange Final EIS

**Final Environmental Impact Statement for
Interstate 55 Interchange at EH Crump Boulevard
and South Riverside Drive
in Memphis, Shelby County, Tennessee**



**INTERSTATE 55 INTERCHANGE
AT E.H. CRUMP BOULEVARD AND
SOUTH RIVERSIDE DRIVE**

Memphis, Shelby County, Tennessee

Final Environmental Impact Statement

Submitted Pursuant to the National Environmental Policy Act of 1969
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U.S. Department of Transportation, Federal Highway Administration and
Tennessee Department of Transportation, Environmental Division

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Federal Highway Administration - Tennessee Division
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EXECUTIVE SUMMARY

ES.1 Project Background/Purpose and Need

The Tennessee Department of Transportation (TDOT) proposes to improve the Interstate 55 (I-55) Interchange at E.H. Crump Boulevard (State Route 15/US-64) and South Riverside Drive, henceforth I-55 Interchange, within the western edge of the City of Memphis in Shelby County. Interstate 55 is one of the major north-south transportation corridors of the United States. The existing I-55 Interchange is utilized by high volumes of a combination of local commuters and through-traffic, including an abundance of commercial truck traffic.

This project is needed because the design of the existing I-55 Interchange is no longer capable of handling the current and projected traffic volumes in the area. This has resulted in poor levels-of-service (LOS) resulting in traffic congestion and safety issues. These issues are primarily due to the design of the existing cloverleaf interchange, which forces I-55 traffic to utilize single-lane, low-speed ramps and conduct multiple weaving maneuvers in order to continue through the area. Figure 1-2 located in the main body of this document shows the layout of the existing interchange.

The purpose of the proposed project is to improve the I-55 Interchange by replacing the existing cloverleaf interchange with a new interchange configuration that reduces crashes, relieves congestion, and provides route continuity of I-55. This will be accomplished by constructing new through lanes for mainline I-55 traffic that will eliminate the need for interstate traffic to utilize single-lane, low-speed ramps in order to continue on mainline I-55. A new multi-lane roundabout interchange will be constructed to replace the existing cloverleaf interchange and provide improved access to and from I-55 and existing local roadways.

The new I-55 through lanes and roundabout will provide substantial improvements to LOS and travel times compared to the existing interchange configuration. The Preferred Alternative will result in an improvement from the LOS F conditions on existing I-55 in the study area to substantially better LOS C conditions in 2012 and LOS D and E in the design year of 2032. The design year LOS D and LOS E estimates for the Preferred Alternative could likely be improved even more with additional lanes added to the I-55 mainline at some point in the future. Regardless, the network will still function much better than the current LOS F conditions that will only continue to worsen by 2032 without improvements to the interchange. The new roundabout interchange at South Riverside Drive and E.H. Crump Boulevard will function at an equivalent LOS A in 2012 and LOS B (AM) and LOS C (PM) in 2032.

Average travel speeds through the interchange will increase from 21 mph (AM) and 22 mph (PM) in 2012 under the existing conditions, to 46 mph (AM and PM) under the Preferred Alternative. In 2032, the average speeds will increase from 18 mph (AM) and 16 mph (PM) to 42 mph (AM) and 36 mph (PM). These increases in average speeds will substantially improve travel times and reflect the more free flowing, less congested conditions anticipated with the proposed improvements.

A *Draft Environmental Impact Statement* (DEIS) prepared for the project was approved by the FHWA on March 25, 2009. The DEIS discussed details of the project including: the purpose and need for the project; alternatives considered; environmental impacts; potential mitigation measures; and a summary of public involvement efforts that occurred during development of the DEIS. The DEIS is available on the project website at: <http://www.tdot.state.tn.us/i55/documents.htm>.

A Public Hearing was held on July 7, 2009 following publication of the DEIS. An additional Public Meeting was held in June 2010 to provide updated information regarding the alternatives for the project. Summaries of public involvement efforts that occurred since publication of the DEIS are contained in Section 4 of this *Final Environmental Impact Statement* (FEIS).

This FEIS summarizes all changes and/or updates that have occurred since the DEIS was published in 2009, including discussion of two new alternatives developed after the July 2009 Public Hearing. The new alternatives were developed in response to public input and new guidance from the Federal Highway Administration (FHWA) regarding potential design options available for the project. Detailed information regarding TDOT's selection of a Preferred Alternative for the project, reasons for its selection, and a comparison of the impacts associated with each of the potential alternatives is contained in the FEIS. Finally, the FEIS discusses the proposed mitigation or impact minimization efforts to be included with implementation of the project as proposed under the Preferred Alternative.

ES.2 Project Alternatives Evaluated in the Environmental Impact Statement

Three alternatives were considered in the DEIS, including the No-Build Alternative and two Build Alternatives (Alternative A and Alternative B). These alternatives are described in more detail in Section 2 of this FEIS. In addition, two additional alternatives that were modifications of Alternatives A and B (Alternative Z and Alternative Z-1) were developed following the DEIS Public Hearing. Both of the new alternatives incorporate a roundabout interchange to provide improved local access and eliminate the existing loop ramps. The footprint of both of these alternatives falls within the same study area as Alternatives A and B. A revised *Interchange Modification Study* (IMOD) was approved for the project in 2010. The IMOD was prepared to ensure that the new proposed design options were feasible and would meet the project purpose and need. Figures 2-1 through 2-4 in Section 2 of this document show the conceptual layout of each of the Build Alternatives for the I-55 Interchange.

No-Build Alternative

The No-Build Alternative, as implied, denotes that only minor changes, such as minor safety enhancements and routine maintenance, would be made to the existing interchange. No improvements or substantial alterations would be made to the existing interchange configuration, and no new structures would be added to the existing infrastructure.

Build Alternatives

Alternative A

Alternative A is described in more detail in Section 2 of this FEIS. This alternative would provide improved conditions for I-55 mainline traffic by eliminating the need for interstate traffic to use one-lane ramps. Alternative A would provide access to and from the French Fort Neighborhood via an off-ramp from southbound I-55 to a connector road between West Illinois Avenue and E.H. Crump Boulevard.

Specifically, Alternative A consists of proposed modifications to the I-55 Interchange that include:

- Construction of new I-55 mainline through lanes located west of the existing I-55, which would result in displacement of eight residences and two businesses. These new lanes would be elevated to provide grade separation of I-55 and local access ramps and connector roads;
- Removal of the loop ramp in the southwest quadrant of the existing cloverleaf interchange;
- Construction of an off-ramp connecting southbound I-55 to Illinois Avenue in the French Fort Neighborhood;
- Construction of a connector road providing access from Illinois Avenue west of I-55 to E.H. Crump Boulevard east of I-55. This connector would include two signals and would be utilized as the primary access for southbound I-55 traffic needing to continue onto eastbound E.H. Crump Boulevard and for local traffic to travel to and from downtown Memphis.

- The ramps connecting westbound I-55 to Metal Museum Drive would be removed thereby eliminating access from I-55 directly to Metal Museum Drive.
- The remaining loop ramps of the existing cloverleaf interchange would continue to be used as the primary connections between E.H. Crump Boulevard, South Riverside Drive, and I-55.

Alternative B

Alternative B is described in more detail in Section 2 of this FEIS. Alternative B maintains the basic design of Alternative A, but it incorporates modifications to address concerns over continuity for southbound I-55 motorists wishing to access E.H. Crump Boulevard immediately after crossing the Mississippi River. Southbound I-55 motorists would be provided continuous access to E.H. Crump Boulevard via an outside auxiliary road that would cross under the four-lane mainline structure. Unlike Alternative A, this alternative maintains the continuity of E.H. Crump Boulevard by eliminating the two at-grade signalized intersections required on the connector road for Alternative A. This would provide more direct access to E.H. Crump Boulevard and South Riverside Drive for traffic coming from southbound I-55. However, this option does not include direct access to the residential and commercial properties on Illinois Avenue from southbound I-55 or from areas east of I-55. Alternative B would provide direct access from Metal Museum Drive to eastbound E.H. Crump Boulevard via an added lane that connects to the outside auxiliary lane from southbound I-55. Access to the areas west of I-55 from westbound E.H. Crump Boulevard would be provided by the existing ramp at Metal Museum Drive. Like Alternative A this design would require relocation of eight residences and two businesses.

Alternative Z

Alternative Z was developed following the National Environmental Policy Act (NEPA) Public Hearing in response to public input and desires to have a facility that does not force through traffic to enter the French Fort Neighborhood, provides secondary access in and out of the French Fort Neighborhood area, and removes the clover leaf ramps associated with the existing interchange. Alternative Z accomplishes all of this by adding a roundabout in the area that currently contains the cloverleaf ramps. The roundabout would provide much improved access to and from E.H. Crump Boulevard and South Riverside Drive. A secondary connector road that attaches the roundabout to the eastern end of Illinois Avenue in the French Fort Neighborhood would provide improved access to and from the French Fort Neighborhood for residents and local business traffic. The proposed roundabout associated with Alternative Z would be capable of handling the traffic volumes expected through the design year of the project and would operate at acceptable LOS throughout that time.

The I-55 through traffic lanes under Alternative Z would follow the same alignment as those under Alternative A and Alternative B and would therefore affect existing residences and businesses. The ramp connecting southbound I-55 to the new roundabout serving E.H. Crump Boulevard and South Riverside Drive would travel under the I-55 through traffic lanes, as would the new Illinois Avenue connector road and the ramp connecting the roundabout and Illinois Avenue slip ramp to travel to southbound I-55 toward Mississippi.

This alternative provides better access to and from the French Fort Neighborhood than Alternative A, but with less direct impact in terms of numbers of vehicles being forced to enter the neighborhood to connect to E.H. Crump Boulevard.

This design would require relocation of eight residences and two businesses.

Alternative Z-1 (Preferred Alternative)

Similar to Alternative Z, Alternative Z-1 was developed in response to comments received from the NEPA Public Hearing. However, Alternative Z-1 provides additional changes based on updated design information and FHWA guidance that allows the I-55 through traffic lanes to be shifted

slightly eastward to fully avoid the residences and businesses in the French Fort Neighborhood area that would otherwise be displaced under the other three build alternatives. However, one previously unaffected business (Hershey Foods, Inc.) would be partially impacted by Alternative Z-1 due to the need to remove a portion of one of their parking lots to provide additional right-of-way (ROW) for the I-55 through traffic lanes. New options to construct the I-55 through traffic lanes at-grade, or potentially below grade, will be considered during the final design phase of the project. Based on additional noise studies, this will allow for further reduction in noise impacts and visual impacts.

Alternative Z-1 would provide the same general roundabout layout as Alternative Z, with slight variation in the layout of the ramps and connector roads to accommodate the shifting of the I-55 through lanes. Alternative Z-1 would provide similar access to and from the French Fort Neighborhood from I-55, E.H. Crump Boulevard, and South Riverside Drive, and would not require through traffic to enter into the neighborhood. This alternative would shift the I-55 through traffic lanes slightly eastward near the adjacent Hershey Foods, Inc. facilities located just east of the existing I-55 traffic lanes. Coordination with Hershey Foods, Inc. has ensured that this will not adversely impact their operations.

Alternative Z-1 has been selected by TDOT as the Preferred Alternative primarily because there would be no residential or business displacements and there was much support from local residents, business owners, and officials. This alternative would also substantially improve LOS, safety, and travel times helping it meet the stated purpose of the project. The City of Memphis and State Representative Barbara Cooper stated their support for Alternative Z-1. Section 2.3 of this FEIS discusses the reasons for selection of Alternative Z-1 as the Preferred Alternative in more detail.

Alternatives Previously Considered and Eliminated from Further Consideration

Several other potential alternatives, including Alternatives C through G, were considered for this project, but were eliminated from further consideration due either to design limitations, which would have resulted in reduced design speeds and lower levels of service (LOS), or due to the severe economic impacts they would have incurred. Some of the eliminated alternatives would not have met the stated Purpose and Need of the project due to the poor LOS they would have provided. The eliminated alternatives are described in more detail in Section 2.3 of the DEIS.

ES.3 Summary of Environmental Consequences

Direct, indirect, and cumulative impacts anticipated to occur with implementation of the No-Build Alternative, Alternative A, or Alternative B are discussed in Section 3 of the DEIS. Section 3 of this FEIS contains updated information, including environmental consequences anticipated to occur with Alternative Z and Alternative Z-1. The following contains a basic summary of the environmental consequences expected for Alternative Z-1 (Preferred Alternative). Table ES.1 contains summary data for this project including basic design information, costs, and environmental consequences for all four of the proposed Build Alternatives for this project.

Alternative Z-1 (Preferred Alternative)

Construction of Alternative Z-1 (Preferred Alternative) will meet the project purpose by providing a new interchange configuration including new I-55 traffic lanes and a roundabout interchange. This alternative, along with Alternative Z, also provides the best LOS and average travel speeds through the design year of 2032. These improvements will provide: long-term beneficial impacts to I-55 traffic flows and route continuity; improved connections between I-55 and local roadways; and improved access between the French Fort Neighborhood area and areas east of I-55 including downtown Memphis. All of these benefits will be accomplished with only minor environmental impacts and will not require any residential or business displacements. In addition, noise impacts will be reduced when compared to the existing conditions due to the shifting of I-55 slightly eastward and away from some of the existing French Fort Neighborhood residences. Additional noise benefits will

occur if the I-55 through lanes are constructed below grade, an option that will be considered in the design phase. The proposed improvements under Alternative Z-1 are expected to provide beneficial aesthetic impacts by replacing the cloverleaf ramps with a roundabout that will provide additional open space and a more modern appearance.

The primary impact associated with Alternative Z-1 (Preferred Alternative) is the acquisition of a small portion of a parking lot owned by Hershey Foods, Inc. However, TDOT has coordinated with Hershey Foods, Inc. and presented a potential mitigation plan that will replace all parking spaces lost through restriping the remaining parking lot and possible use of adjacent vacant property. Hershey Foods, Inc. accepted TDOT's mitigation proposal and supports the decision to construct Alternative Z-1. Alternative Z-1 would eliminate direct access to Metal Museum Drive; however, the new access provided to Alston Avenue will provide needed connections to the Metal Museum area. Because most of the improvements under Alternative Z-1 will occur in previously disturbed areas and within the existing ROW, the potential for impacts to cultural resources is considered minimal. The State Historic Preservation Office (SHPO) has agreed that no further testing will be required at this time. However, should remains, artifacts, or other archaeological material be uncovered during construction, all construction in the area of the find will cease and the Tennessee Division of Archaeology and the recognized Native American tribes will be contacted immediately. Due to the area being in previously disturbed and developed areas, there will be only minor short-term adverse impacts to water quality, wildlife habitat, noise, and air quality during the construction period.

ES.4 Required Permits

Due to the project area of Alternative Z-1 (Preferred Alternative) occurring in a previously developed area primarily within the existing ROW of I-55, there are few natural resources expected to be impacted by this project. The acquisition of any required permits would occur prior to initiation of construction activities, pursuant to Section 69-3-108(a) of the Tennessee Water Quality Control Act of 1977 and other State and Federal laws and regulations. Permits anticipated to be required for this project include:

- National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit- required for grubbing, clearing, grading, or excavation of one or more acres of land. The Tennessee Department of Environment and Conservation's Division of Water Pollution Control issues NPDES permits.
- Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) – required by operators of construction sites in Tennessee.

In addition, the State of Tennessee would require water quality certification under Section 401 of the Clean Water Act. Section 401 certification ensures that activities requiring a Federal permit or license will not cause pollution in violation of State water quality standards. In addition, the general contractor and all related subcontractors associated with the project would be required to have a valid operation permit from the Tennessee Air Pollution Control Division or to obtain an exception from the regulations through board action.

ES.5 SAFETEA-LU Statute of Limitations on Filing Claims

FHWA may publish a notice in the Federal Register, pursuant to 23 USC §139(l), indicating that one or more Federal agencies have taken final action on permits, licenses, or approvals for the subject transportation project. If such notice is published, claims seeking judicial review of those Federal agency actions will be barred unless such claims are filed within 180 days after the date of publication of the notice, or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the Federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the Federal laws governing such claims will apply.

Table ES.1. Summary of project data and potential impacts to resources within the Interstate 55 Interchange study area in Shelby County, Tennessee.

Item	No-Build		Alternative A		Alternative B		Alternative Z		Alternative Z-1 (Preferred)	
Functional Classification	Interchange		Interchange		Interchange		Interchange		Interchange	
System Class	Interstate Transportation System		Interstate Transportation System							
Length (Miles)	0.75		0.75		0.75		0.75		0.85	
Cross-sections (Feet)	110		134		134		134		134	
Year 2012 AADT	60,870		60,870		61,840		61,840		61,840	
Year 2032 AADT	85,220		85,220		86,550		86,550		86,550	
Percent Trucks (DHV)	27% (6,818)		27% (6,818)		27% (6,924)		27% (6,924)		27% (6,924)	
Levels of Service (LOS)*	NB I-55	SB I-55	NB I-55	SB I-55						
2012 AM/PM	F/F	D/F	D/D	D/D	D/D	D/D	C/C	C/C	C/C	C/C
2032 AM/PM	F/F	F/F	E/E	E/E	E/E	E/E	D/D	D/E	D/D	D/E
Estimated Right-of-Way Acquisition (Acres)	0		6.2		4.10		4.10		4.10	
Residential Displacements	0		8		8		8		0	
Business Displacements	0		2		2		2		0	
Noise Receptors Impacted	24		39		37		38		32 (if at-grade); 19 (if depressed)	
Archaeological Sites Impacted	0		1		1		1		0	
Historic Sites Impacted (number)	0		0		0		0		0	
Section 4(f)/Section 6(f) Properties Impacted	0		0		0		0		0	
Wetlands Impacted	0		0		0		0		0	
Threatened and Endangered Species Impacted	0		0		0		0		0	
Total Estimated Project Cost **	0		\$32,414,600		\$31,569,250		\$37,512,000		\$33,305,000	

Source: TDOT, 2010

* These preliminary cost estimates include engineering/construction, utility, and ROW costs to be used for general comparison of alternatives. More detailed cost estimates will be determined once final design plans are available during the project design phase.

** These LOS estimates represent the worst LOS along any portion of the I-55 travel lanes, including freeway segments and weave areas. For more detailed data please see the traffic operations data and LOS diagrams in Appendix C of this FEIS.

NB=Northbound, SB=Southbound

LIST of ENVIRONMENTAL COMMITMENTS

Environmental Commitments

The project would be developed in accordance with TDOT's Standard Specifications for Road and Bridge Construction. Best Management Practices for Erosion and Sediment Control (FHWA, 1995) will also be utilized. These provisions implement the requirements of the *FHWA's Federal-Aid Policy Guide (Subchapter G part 650b)*.

Noise Commitments

Potential noise impacts from I-55 will be reduced under Alternative Z-1 due to shifting of traffic lanes eastward and away from some of the receptors impacted under the other build alternatives. Noise impacts would be mitigated by proposed noise walls or a combination of landscaping and placement of I-55 at-grade or slightly down grade from receptors. The final decision on implementation of abatement measures will be made during the final design phase and ROW phase and after consideration of any additional input from the public involvement process.

The contractor will be bound by Section 107.01 of the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic shall be routed during construction so as to cause the least practicable noise impact upon noise-sensitive areas.

Cultural Resources Commitments

If remains, artifacts, or other archaeological material is uncovered during construction, all construction in the area of the find will cease. The Tennessee Division of Archaeology and the recognized Native American tribes will be contacted immediately so representatives may have the opportunity to examine and evaluate the material.

Visual Commitments

The proposed roundabout interchange, which will replace the existing cloverleaf configuration is expected to result in improved visual appeal and may provide additional open space or areas that can be enhanced. Mitigation measures for visual impacts will include consideration of post-project aesthetic appeal during the project's functional design, surveying and clearing and preparation of areas within the ROW to permit successful revegetation programs. These programs will accommodate, preserve, and capitalize on mature and semi-mature stands of vegetation. Where feasible, native vegetation will be used during revegetation efforts. This may be accomplished either naturally or through planned seeding.

TDOT will work closely with the local officials and residents to obtain and develop ideas for designing and constructing the project with features that fit the context of the area and with any future plans for the area.

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1.0 Project Background and Purpose and Need

1.1 Background

The Tennessee Department of Transportation (TDOT) proposes to improve the I-55 Interchange at E.H. Crump Boulevard (State Route 15/U.S. 64) and South Riverside Drive, henceforth I-55 Interchange, within the western edge of the City of Memphis in Shelby County, Tennessee. Interstate 55 is one of the major north-south transportation corridors of the United States. Figure 1-1 shows the general vicinity of the I-55 Interchange project area. The I-55 Interchange is utilized by high volumes of daily local commuters and through-traffic, including an abundance of commercial truck traffic. The current outdated configuration of the I-55 Interchange poses multiple safety and efficiency problems. The proposed project would involve reconfiguring the cloverleaf design of the existing I-55 Interchange into a configuration that reduces crashes, relieves congestion, and provides route continuity of I-55 by eliminating the need for mainline I-55 traffic to utilize single-lane, low-speed ramps.

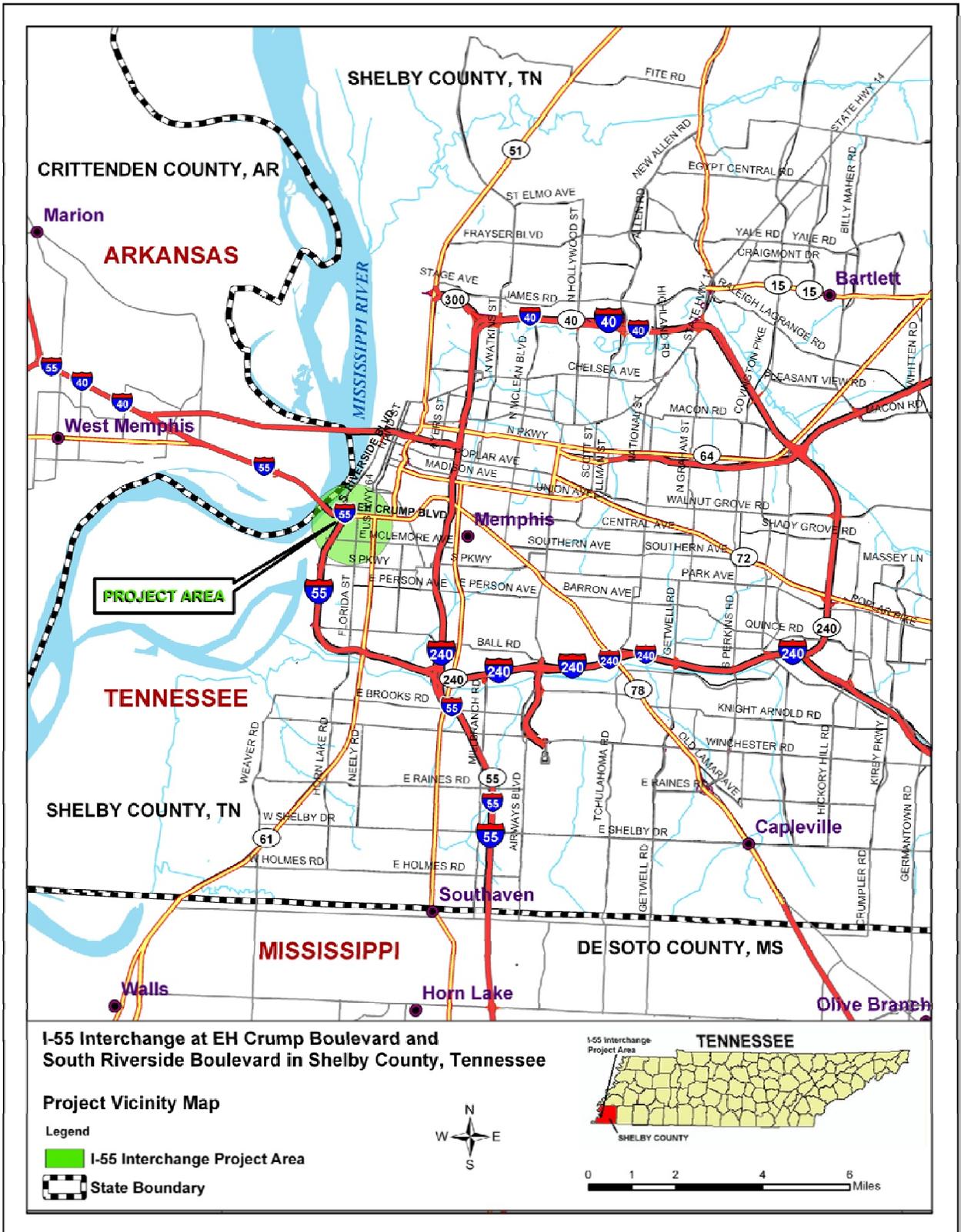
The project limits begin at the east termination of the I-55 Mississippi River Bridge in Memphis and extend southward along I-55 to near McLemore Avenue. The project study area generally consists of a 500-foot corridor along the existing footprint of I-55 from the Mississippi River Bridge extending south to McLemore Avenue. The entire footprint of the existing I-55 Interchange with E.H. Crump Boulevard and South Riverside Drive is included in the study area. The study area extends along approximately 1.5 miles of the existing I-55 alignment. No other major actions planned by other government agencies are known to be located in the same area as the I-55 Interchange project at this time.

A *Draft Environmental Impact Statement (DEIS)* prepared for the project was approved by the Federal Highway Administration (FHWA) on March 25, 2009. The DEIS discussed details of the project including: the purpose and need for the project; alternatives considered; environmental impacts; potential mitigation measures; and a summary of public involvement efforts that occurred during development of the DEIS. The DEIS is available on the project website at: <http://www.tdot.state.tn.us/i55/>.

A Public Hearing was held on July 7, 2009 following publication of the DEIS. An additional Public Meeting was held on June 15, 2010 to provide updated information regarding the project. This *Final Environmental Impact Statement (FEIS)* summarizes all changes and/or updates that have occurred since the DEIS was published in 2009, including discussion of two new alternatives developed based on public input associated with the July 2009 Public Hearing. A summary of the public involvement efforts that have occurred since publication of the DEIS is included in the FEIS. The FEIS also includes descriptions of all of the alternatives considered for the project, including the three alternatives discussed in the DEIS and the two new alternatives. Detailed information regarding TDOT's selection of a Preferred Alternative for the project, reasons for its selection, and a comparison of the impacts associated with each of the potential alternatives is contained in the FEIS. Finally the FEIS discusses the proposed mitigation or impact minimization efforts to be included with implementation of the project.

This project is listed in the current Memphis Urban Area Metropolitan Planning Organization (MPO) *2030 Long Range Transportation Plan (LRTP Project # = 60030002)*, and the MPO's *2011-2014 Transportation Improvement Program (TIP Project # = TN-IM-2011-01)*. The project is consistent with the *2011-2014 State Transportation Improvement Program (STIP)*. The project is listed as one of the MPO's top 20 Strategic Road Projects. Begun in 1998, the Strategic Road Projects campaign is designed to inform local and state officials on the needs of Memphis and Shelby County to address critical concerns about road projects in the area.

Figure 1-1. Project area and vicinity of the Interstate 55 Interchange at E.H. Crump Boulevard and South Riverside Drive.



1.2 Need for Project

Interstate 55, in the vicinity of the E.H. Crump Boulevard and South Riverside Drive Interchange, was constructed in the mid 1960s with a geometric design that does not meet current Federal or State standards. The existing I-55 is a four-lane median-divided highway with one auxiliary lane in both directions. Numerous weave areas are located within the subject area, as well as substandard acceleration and deceleration lengths for most ramp junctions. The existing I-55 Interchange is a full cloverleaf design with loop ramps in all four quadrants. All exiting and entering traffic from these loops are required to make weaving maneuvers. The posted speed limit for these ramps is 25 miles per hour (mph), but average speeds through portions of the interchange typically range from 5 to 10 mph, especially for large trucks. Figure 1-2 shows the existing I-55 Interchange.

Traffic analysis has indicated that the existing interchange is inadequate to handle current and design year traffic volumes. For Year 2012, traffic volumes are estimated at 60,870 Annual Average Daily Traffic (AADT), and for Year 2032 they are estimated to be 85,220 AADT. The existing cloverleaf configuration, the close proximity of adjacent interchanges, and the associated weave and merge problems severely congest the area and result in safety issues.

The existing I-55 Interchange at E.H. Crump Boulevard and South Riverside Drive operates at unacceptable levels of service (LOS). The existing cloverleaf configuration places very high volumes of through traffic traveling on I-55 onto single-lane ramps. These weave areas are constrictions that form queues of traffic and impede traffic flow upstream in both directions. The problem is especially severe for northbound traffic, which regularly queues as far south as the McLemore Interchange and often through the South Parkway Interchange. These long queues have been a problem for many years and are a source of extensive travel delays. The cloverleaf configuration of the existing I-55 Interchange with E.H. Crump Boulevard and South Riverside Drive, and the proximity to the Metal Museum Drive ramps, results in a large number of weaving sections carrying high volumes.

The existing I-55 Interchange currently operates at LOS F and will continue to operate at LOS F in both directions in the base year 2012 and design year 2032 due to the numerous weave areas and requirement for northbound I-55 traffic to use cloverleaf ramps to pass through the area. If no improvements are made within the existing I-55 weave areas that make up the majority of the existing I-55 Interchange within the project boundaries, traffic flows would not improve from LOS F in the reasonably foreseeable future.

The crash history for the area shows that a high number of collisions may be directly attributable to a combination of the existing interchange configuration and heavy traffic volumes. Those two factors result in frequent traffic congestion. This congestion, primarily caused by I-55 traffic being required to use the cloverleaf ramps to pass through the area, results in an abundance of rear-end and side-swipe type crashes. Most of the crashes in the project area are rear-end accidents that occur on I-55 along the roadway segments approaching the weave and ramp areas where traffic tends to back up most frequently.

Figure 1-2. Existing I-55 Interchange (No-Build Alternative).



1.3 Purpose of Project

The purpose of the proposed project is to provide a balanced solution for safety and capacity issues at the I-55 Interchange. Benefits and core objectives of the interchange improvement project include reduced congestion, reduced number of crashes, and restored north and south mainline interstate route continuity. Restored route continuity will serve national security and national defense objectives while providing economic benefits by improving north- and south-bound freight transport. Improving the I-55 Interchange will provide a logical freeway facility that connects portions of I-55 located west/north of Memphis to portions of I-55 located south of Memphis. The proposed project has logical termini and independent utility and will not restrict consideration of alternatives of other reasonably foreseeable transportation improvements.

Updated traffic studies conducted for this project indicated that each of the Build Alternatives studied in the EIS, which would provide continuous through lanes on I-55 and reduce the number of weave movements by not forcing interstate traffic to use the existing cloverleaf interchange, will meet the purpose of the project by improving overall traffic capacity, route continuity, safety, and efficiency of the interchange. The new main lanes of I-55 are anticipated to be configured with a design speed of 50 mph. The reduction in the number of weaving areas and the overall improved design of the interchange will allow it to function substantially better than the existing interchange configuration.

In general under the Build Alternatives, all weave areas, ramps, and freeway portions of I-55 within the project area would operate at LOS D or better in 2012 and LOS E or better in 2032. This would provide substantial improvement to the already poor LOS F conditions that occur at the present time. Based on recent analyses conducted for the Preferred Alternative, the new I-55 through lanes and roundabout will provide substantial improvements to LOS and travel times compared to the existing interchange configuration. The Preferred Alternative will result in an improvement from the LOS F conditions on existing I-55 in the study area to substantially better LOS C conditions in 2012 and LOS D and E in the design year of 2032. The new roundabout interchange at South Riverside Drive and E.H. Crump Boulevard will function at an equivalent LOS A in 2012 and LOS B (AM) and LOS C (PM) in 2032. Appendix C contains more detailed information regarding the traffic operations and LOS of the Preferred Alternative as reported in the I-55 Interchange Modification Study (Addendum) approved by FHWA in September 2010.

The design year 2032 LOS D and LOS E estimates for the Preferred Alternative could likely be improved even more with additional separate projects at some point in the future. These projects would include adding additional through lanes to the I-55 mainline, along with improvements to other portions of I-55 north and south of the project area, especially improvements to the existing Memphis-Arkansas Bridge over the Mississippi River to the west of the I-55 Interchange project area. Even without these additional improvements, the network will still function much better under the Preferred Alternative than the current LOS F conditions, which will only continue to worsen by 2032.

Average travel speeds through the interchange will increase from 21 mph (AM) and 22 mph (PM) in 2012 under the existing conditions, to 46 mph (AM and PM) under the Preferred Alternative. In 2032, the average speeds will increase from 18 mph (AM) and 16 mph (PM) to 42 mph (AM) and 36 mph (PM). These increases in average speeds will substantially improve travel times and these numbers reflect the more free-flowing, less congested conditions anticipated with the proposed improvements.

Based on the crash trends for the area, it is anticipated that improvements to the I-55 Interchange would decrease the number of crashes and the resulting injuries. The improvements to the interchange would reduce the number of weave areas and the associated traffic congestion that is ultimately responsible for many of the crashes that currently occur in the area. Allowing the I-55 traffic to move more efficiently through the area without being forced to utilize the existing cloverleaf

ramps would reduce the frequency of traffic jams and the resulting rear-end and side-swipe type accidents.

In addition to improved safety on I-55, the roundabout interchange at South Riverside Drive and E.H. Crump Boulevard will improve safety for local traffic. Roundabouts have been shown to noticeably reduce the severity of crashes because of the low travel speeds entering the intersection. The Preferred Alternative should eliminate much of the cut-through traffic from using the French Fort neighborhood local streets, while still providing access for Metal Museum Drive via Alston Avenue.

2.0 ALTERNATIVES CONSIDERED IN THE NEPA PROCESS

Three alternatives were considered in the DEIS, including the No-Build Alternative and two Build Alternatives (Alternative A and Alternative B). In addition, two modified alternatives, Alternative Z and Alternative Z-1, were developed following the NEPA Public Hearing. Both of these new alternatives incorporate a roundabout interchange to provide improved local access and eliminate the existing loop ramps. The footprint of both of these alternatives falls within the same study area as Alternatives A and B. Figures 2-1 through 2-4 below show the conceptual layout of each of the Build Alternatives for the I-55 Interchange. The DEIS also discussed additional alternatives, Alternatives C through G that had been previously considered, but were eliminated from further consideration prior to development of the DEIS due to substantial impacts and inadequate design that would not allow them to meet the purpose and need. For more information on the previously considered alternatives please refer to the DEIS.

2.1 No-Build Alternative

The No-Build Alternative would mean that no interchange improvements would be provided and mainline north/south I-55 traffic would continue to use the ramps at I-55/E.H. Crump Boulevard. Access to properties within the project vicinity would continue to be provided by existing local roadways, especially via Metal Museum Drive, E.H. Crump Boulevard, and South Riverside Drive. It is likely that the continued growth anticipated in the project vicinity will result in increased traffic volumes that will likely result in a reduced LOS and reduced safety on I-55 and existing secondary roads currently used to provide access to I-55. The No-Build Alternative would not meet the purpose and need of this project. The No-Build Alternative is used as a baseline comparison for the project Build Alternatives. Figure 1-2 above displays the existing interchange, or No-Build Alternative.

The weave areas associated with the existing cloverleaf places very high volumes of through-traffic on I-55 onto single-lane ramps resulting in LOS F. These form queues of traffic and impede traffic flow upstream for north and southbound traffic. The problem is especially severe for northbound traffic, which regularly queues through the McLemore Interchange and through the South Parkway Interchange. These long queues have been a problem for many years, and they are a source of extensive travel delays.

2.2 Build Alternatives

2.2.1 Alternative A

Alternative A consists of proposed modifications to the I-55 Interchange that would improve traffic movements along and between the I-55 and McLemore Interchange and the Mississippi River Bridge by eliminating the need to utilize one-lane exit/entrance ramps to remain on the interstate. The existing loop ramp in the southwest quadrant would be removed, thus improving safety by eliminating the associated weave movement in this area. This alternative would require the construction of three new structures, construction of substantial retaining walls, relocation of approximately eight residences and two businesses, and elimination of the existing ramps to the nearby Metal Museum Drive.

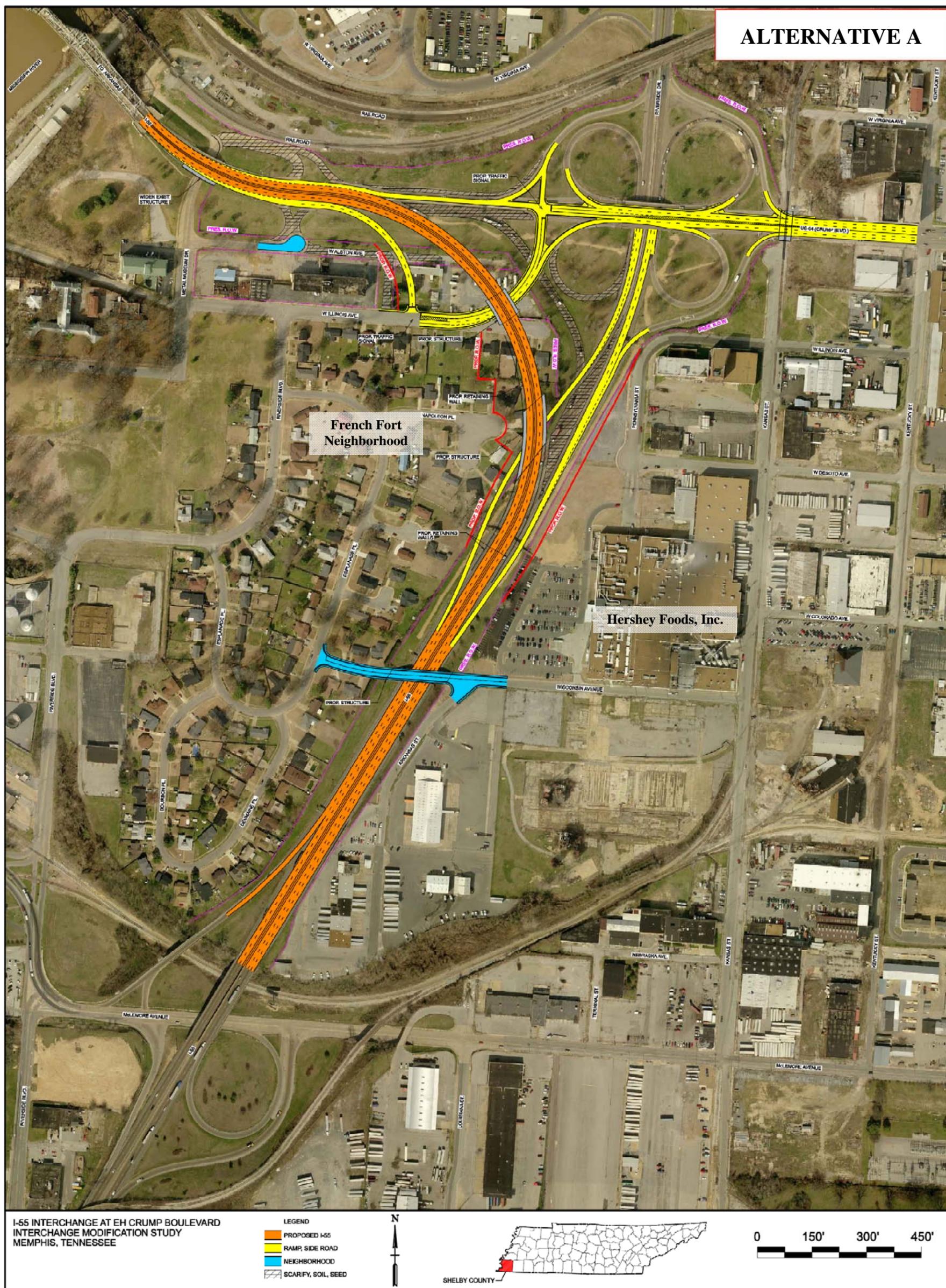
The flyover bridges for the main lanes of I-55 are configured with a design speed of 50 mph. It is expected that the typical running speed through these curves will be approximately 55 mph. This will result in congestion on the main lanes but far less than experienced with the existing or No-Build conditions. The reduced mainline travel speed will also make weaving, merging, and diverging activities easier to accomplish, so that the ramp junctions are anticipated to have acceptable operating characteristics. The number of weaving areas is greatly reduced, and the operating character of the proposed weaving areas is substantially better than No-Build conditions.

Specific changes associated with Alternative A include:

- Northbound I-55 traffic would utilize two inside travel lanes. Northbound I-55 traffic wishing to access the central Memphis business district would use South Riverside Drive via an outside auxiliary lane. In order to provide access to E.H. Crump Boulevard from Northbound I-55, minor changes would be made to the existing ramp. Northbound I-55 motorists would be able to access Metal Museum Drive by exiting onto E.H. Crump Boulevard and turning left onto Illinois Avenue.
- Southbound I-55 traffic from the Mississippi River Bridge would utilize two inside travel lanes. Southbound I-55 traffic wishing to access E.H. Crump Boulevard would utilize a proposed exit ramp to a new connector at Illinois Avenue. Flow from the exit ramp to the new connector would be controlled by a traffic light.
- Traffic from westbound E.H. Crump Boulevard to northbound I-55 would utilize a ramp in the vicinity of the former Metal Museum Drive exit. Westbound traffic from E.H. Crump Boulevard to southbound I-55 would utilize the existing northwest loop ramp to access an auxiliary ramp. This auxiliary ramp would merge traffic from E.H. Crump Boulevard with traffic from South Riverside Drive prior to merging with southbound I-55. Traffic from westbound E.H. Crump Boulevard to northbound South Riverside Drive would utilize the existing ramp that joins South Riverside Drive just south of the CSX railroad overpass.

Southbound South Riverside Drive traffic would utilize the existing ramp to access westbound I-55 into Arkansas and would yield before merging with mainline interstate traffic. Southbound traffic from South Riverside Drive to southbound I-55 would utilize a proposed ramp beneath the four-lane mainline structure. This ramp would also serve as an auxiliary lane to the McLemore Avenue Interchange. A new connector road would provide access to the southern residential community from South Riverside Drive. Through traffic on South Riverside Drive would be continuous through the proposed intersection via connector roads and would never have to enter the interstate system.

Figure 2-1. Build Alternative A for the I-55 Interchange at E.H. Crump Boulevard.



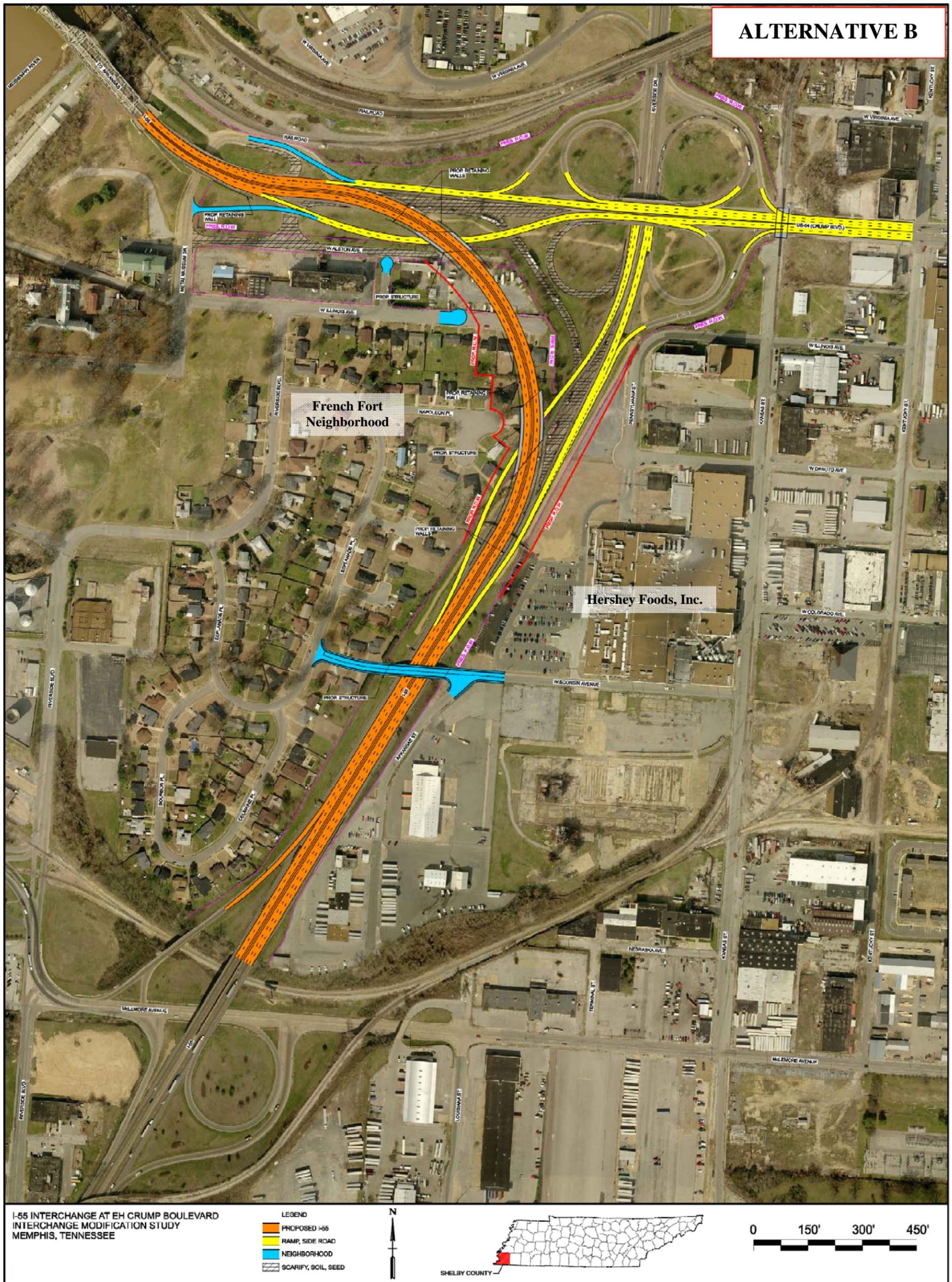
2.2.2 Alternative B

Alternative B maintains the basic design as Alternative A, but it incorporates modifications to address concerns over continuity for southbound I-55 motorists wishing to access E.H. Crump Boulevard immediately after crossing the Mississippi River. Southbound I-55 motorists would be provided continuous access to E.H. Crump Boulevard via an outside auxiliary road that would cross under the four-lane mainline structure. The two signalized intersections on Illinois Avenue proposed in Alternative A would be eliminated.

Unlike Alternative A, this option does not include direct access to the residential and commercial properties on Illinois Avenue from I-55. However, it does provide the southwest quadrant with direct access to eastbound E.H. Crump Boulevard via an added lane that connects to the outside auxiliary lane from southbound I-55. Vehicles traveling westbound on E.H. Crump Boulevard would be able to utilize the existing ramp to access Metal Museum Drive. Motorist traveling north on I-55 would have to exit at E.H. Crump Boulevard and use the northeast loop in order to access Metal Museum Drive. Southbound Riverside Drive does not have access to eastbound E.H. Crump Boulevard.

This design would require relocation of eight residences and two businesses. Unlike Alternative A, this alternative maintains the continuity of E.H. Crump Boulevard by eliminating two at-grade intersections. It also provides a more direct access to E.H. Crump Boulevard and South Riverside Drive.

Figure 2-2. Build Alternative B for the I-55 Interchange at E.H. Crump Boulevard.



2.2.3 Alternative Z

Alternative Z was developed following the NEPA Public Hearing in response to public input and desires to have a facility that does not force through traffic to enter the French Fort Neighborhood, provides secondary access in and out of the French Fort Neighborhood area, and removes the existing clover leaf ramps associated with the existing interchange. Alternative Z accomplishes all of this by adding a roundabout in the area that currently contains the cloverleaf ramps. The roundabout would provide much improved access to and from E.H. Crump Boulevard and South Riverside Drive. A secondary connector road that attaches the roundabout to the eastern end of Illinois Avenue in the French Fort Neighborhood would provide improved access to and from the French Fort Neighborhood for residents and local business traffic. The proposed roundabout associated with Alternative Z would be capable of handling the traffic volumes expected through the design year of the project and would operate at acceptable levels of service (LOS) throughout that time.

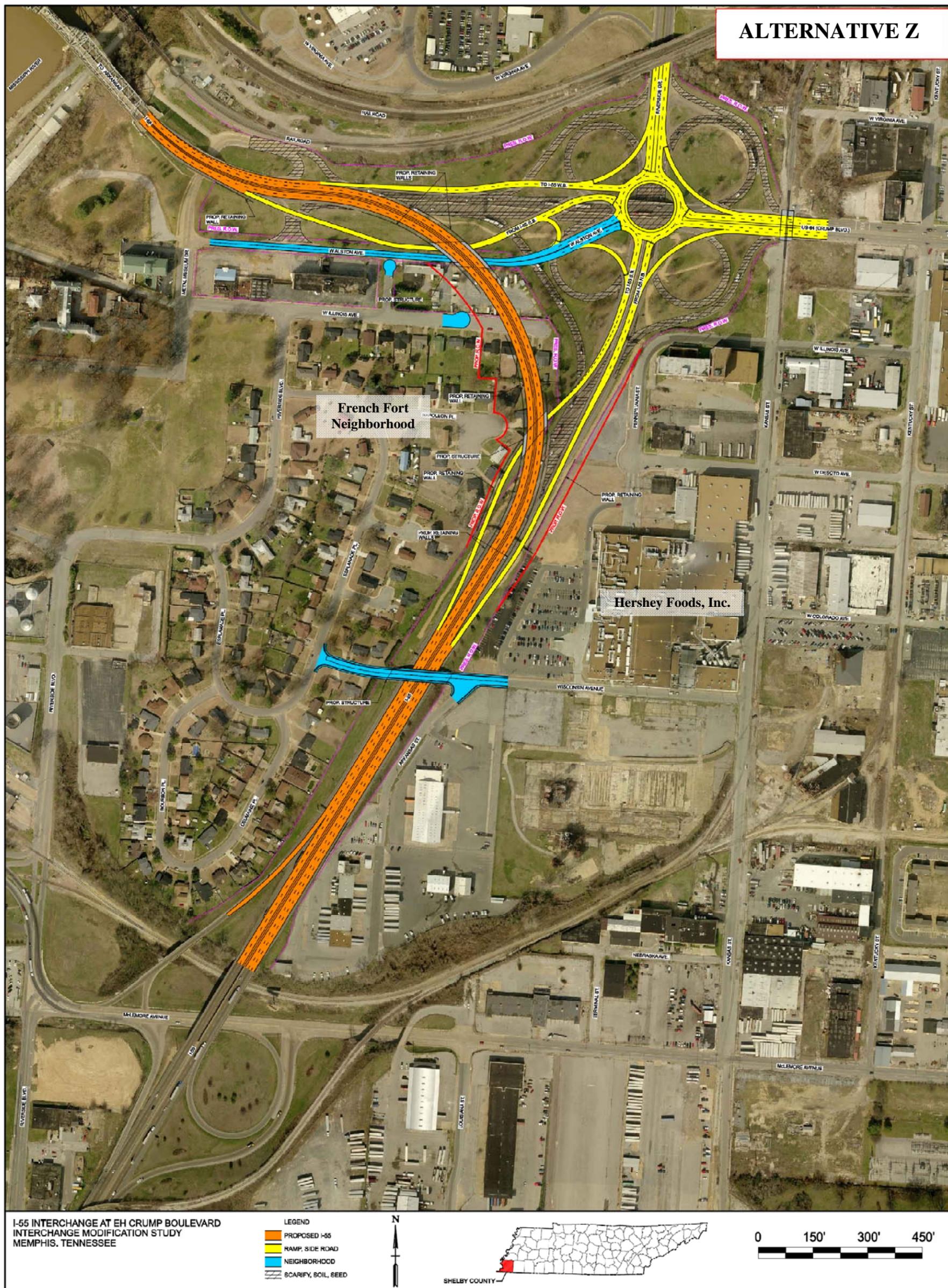
The I-55 through traffic lanes under Alternative Z would follow the same alignment as those under Alternative A and Alternative B and would therefore result in residential and business displacements. The main lanes of I-55 are configured with a design speed of 50 mph. The ramp connecting southbound I-55 to the new roundabout serving E.H. Crump Boulevard and South Riverside Drive would travel under the I-55 through traffic lanes, as would the new Illinois Avenue connector road and the ramp connecting the roundabout and Illinois Avenue slip ramp to travel to southbound I-55 toward Mississippi.

This concept would improve the visual quality in the area by providing a more modern interchange configuration that would tie into future revitalization plans for the general area.

This alternative provides better access to and from the French Fort Neighborhood than Alternative A, but with less direct impact in terms of numbers of vehicles being forced to enter the neighborhood to connect to E.H. Crump Boulevard.

This design would require relocation of eight residences and two businesses.

Figure 2-3. Build Alternative Z for the I-55 Interchange at E.H. Crump Boulevard.



2.2.4 Alternative Z-1 (Preferred Alternative)

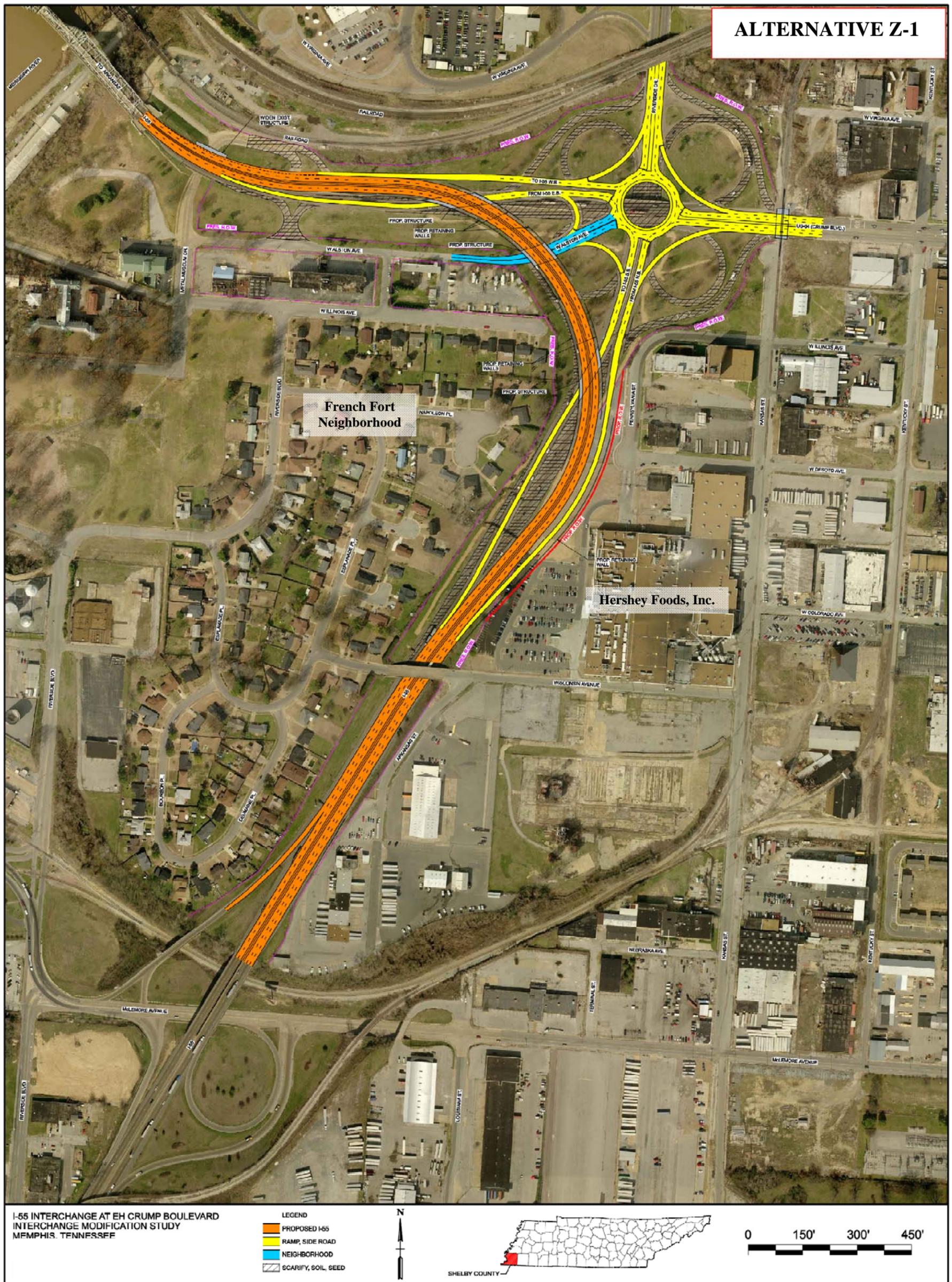
Similar to Alternative Z, Alternative Z-1 was developed in response to comments received from the NEPA Public Hearing. However, Alternative Z-1 provides additional changes based on updated design information and FHWA guidance that allows the I-55 through traffic lanes to be shifted slightly eastward to fully avoid the residences and businesses in the French Fort Neighborhood area that would otherwise be displaced under the other three build alternatives. However, one previously unaffected business (Hershey Foods, Inc.) would be partially impacted by Alternative Z-1 due to the need to remove a portion of one of their parking lots to provide additional ROW for the I-55 through traffic lanes. New options to construct the I-55 through traffic lanes at-grade, or potentially below grade, will be considered during the final design phase of the project. This may allow for further reduction in noise and visual impacts.

Alternative Z-1 would provide the same general roundabout layout as Alternative Z, with slight variation in the layout of the ramps and connector roads to accommodate the shifting of the I-55 through lanes. Alternative Z-1 would provide similar access to and from the French Fort Neighborhood from I-55, E.H. Crump Boulevard, and South Riverside Drive, and would not require through traffic to enter into the Neighborhood. This alternative would shift the I-55 through traffic lanes slightly eastward near the adjacent Hershey Foods, Inc. facilities located just east of the existing I-55 traffic lanes. Coordination with Hershey Foods, Inc. has ensured that this will not adversely impact their operations.

TDOT will continue to work with local planners and the public during the design phase of the project to further tie the project into the context of the surrounding community.

There would be no residential or business displacements under Alternative Z-1. The main lanes of I-55 are configured with a design speed of 50 mph similar to the other alternatives.

Figure 2-4. Build Alternative Z-1 (Preferred Alternative) for the I-55 Interchange at E.H. Crump Boulevard.



2.3 Preferred Alternative

Alternative Z-1 has been selected by TDOT as the Preferred Alternative after reviewing the impacts in the DEIS and the comments received at the July 7, 2009 NEPA Public Hearing and the follow-up Public Meeting held June 15, 2010. This alternative was selected as the Preferred Alternative based on the following reasons:

1. *Support from Local Officials:* The City of Memphis and State Representative Barbara Cooper stated their support for Alternative Z-1.
2. *Public Input:* After reviewing comments received at the July 7, 2009 Public Hearing related to concerns with displacement of businesses and residences associated with Alternatives A and B contained in the DEIS, as well as comments from several people wanting an alternative that combined the basic benefits of Alternatives A and B, TDOT and FHWA developed Alternatives Z and Z-1. These two Alternatives were presented to the public at the follow-up June 15, 2010 Public Meeting and almost all commenters supported Build Alternative Z-1 because it avoids all displacements, provides good local access while allowing I-55 traffic to continue through the area in an efficient manner, and removes the existing cloverleaf interchange and replaces it with a roundabout. TDOT will continue to work with the public and local planners during the final design phase of the project to finalize the design of Alternative Z-1 in an effort to minimize impacts to affected residents and businesses while maintaining the integrity of the overall design and purpose of the project.
3. *Purpose and Need.* TDOT has determined that the proposed Alternative Z-1 will meet the stated purpose and need, because it would provide:
 - increased traffic capacity or operational efficiency (LOS) of the interchange;
 - reduced congestion;
 - enhanced local and regional connectivity/mobility;
 - improved roadway safety; and
 - restored interstate route continuity for I-55 traffic.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section of the I-55 Interchange EIS will describe the social, economic, cultural, and natural resources in the project vicinity (affected environment), followed by a discussion of the potential impacts (environmental consequences) that this project may have on those resources. Following the discussion of environmental consequences, mitigation measures are discussed to explain what efforts have been or would be taken to avoid, minimize, and/or mitigate for environmental consequences resulting from this project.

As discussed in Section 2, two new alternatives, Alternative Z and Alternative Z-1 (Preferred Alternative) have been added to the Final EIS. Impacts for the No-Build Alternative and Alternatives A and B presented in the Draft EIS remain the same and are restated here.

Direct, indirect, and cumulative impacts anticipated to occur with implementation of this project are discussed by alternative under each resource category. In addition, a summary matrix is provided at the end of the section to allow for side-by-side comparison of the primary impacts associated with each alternative being considered.

3.1 Affected Environment

The affected environment portion of this section describes the existing natural, cultural, social, and economic environments occurring within the proposed project area. The affected environment results from all past and present actions in the project area. The affected environment descriptions serve to establish baseline conditions of each resource against which to evaluate anticipated environmental consequences that could result from the proposed project. The affected environment is described by resource category either in general or by subcategory where appropriate.

The following resource categories were determined to be appropriate for this study and are consistent with the general guidelines set forth by the FHWA (FHWA, 1987):

➤ Social/Community and Economic Resources including:

- Land Use and Infrastructure;
- Social Environment and Community Resources, including:
 - Environmental Justice and Non-discrimination,
 - Displacements and Relocations,
 - Neighborhood and Community Cohesion,
 - Travel Efficiency,
 - Public Services,
 - Considerations Related to Pedestrians and Bicyclists, and
 - Visual Quality.
- Economic Environment; and
- Farmland.

➤ Ecological Resources including:

- Aquatic Resources (Streams, Waterbodies, and Water Quality);
- Wetlands;
- Floodplains;

- Threatened and Endangered Species; and
- Fish and Wildlife/Habitats.
- ☞ Cultural Resources including:
 - Archaeological Resources; and
 - Historical/Architectural Resources;
- ☞ Air Quality;
- ☞ Noise;
- ☞ Hazardous Materials;
- ☞ Energy;
- ☞ Section 4(f) Properties; and
- ☞ Construction.

As discussed in Section 2, potential implementation alternatives being considered in the environmental consequences section of this Final EIS include the following:

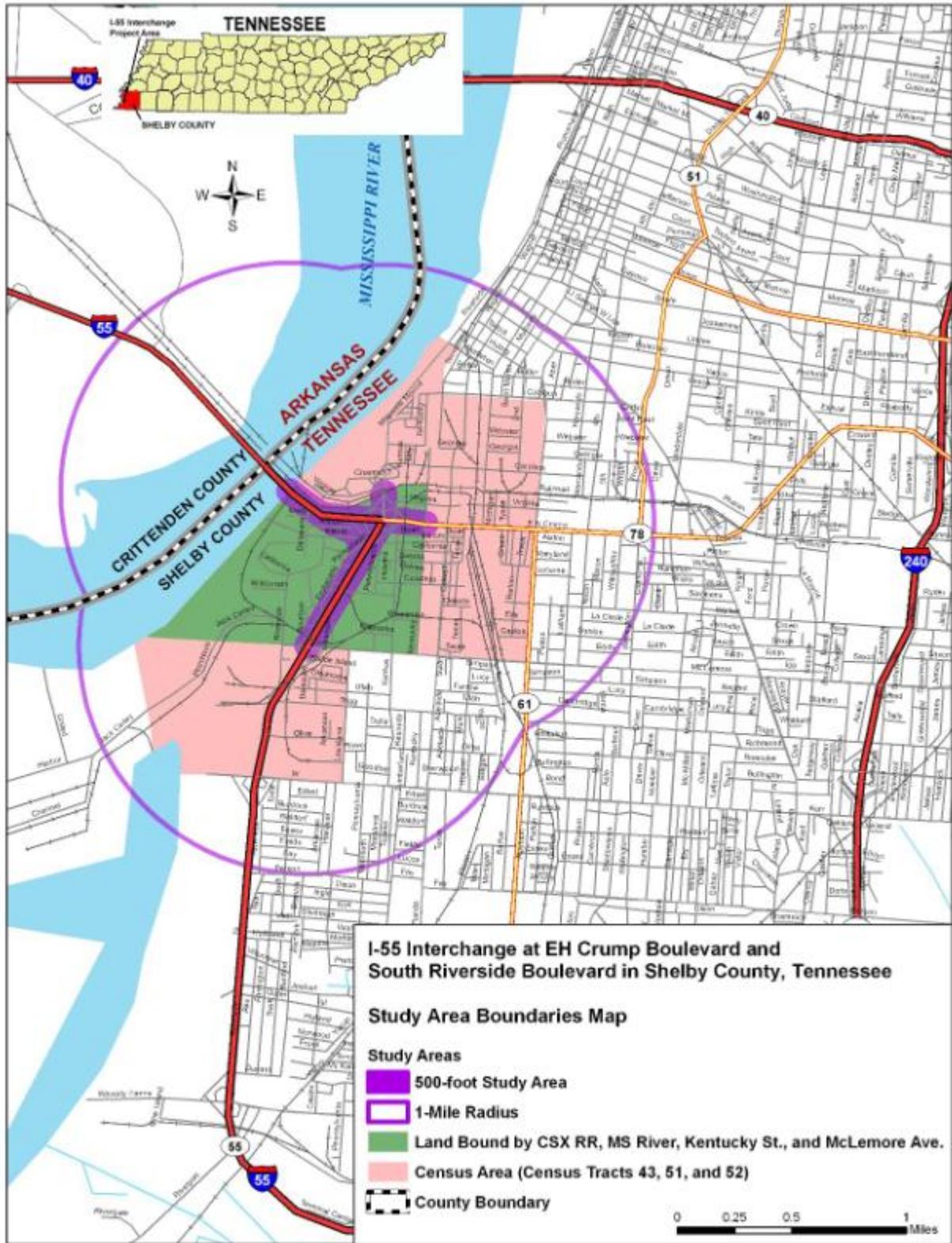
- No-Build Alternative;
- Alternative A;
- Alternative B;
- Alternative Z; and
- Alternative Z-1 (Preferred Alternative).

3.2 Impacts Analysis

As mentioned above, the environmental consequences (here forth referred to as impacts) associated with this project will be described immediately following the affected environment descriptions for each resource category. Three types of impacts will be considered including direct, indirect, and cumulative impacts. The various types of impacts are defined in the following sections.

The study area for direct impacts for most natural resources, noise, and physical environment studied in the EIS included the 500-foot study corridor surrounding the centerlines of the proposed alternatives. Some of the other resources were studied at larger scales using boundaries that fit the context of the individual resource being studied. For instance, social resources were studied within the affected census tracts that the Build Alternatives fall within; economic resources and air quality were studied within the boundaries of Shelby County; and land use was looked at based on the most likely areas to be affected due to the improved access/transportation facilities provided by the improved I-55 Interchange. That area was determined to be an area bound by the CSX Railroad to the north, the Mississippi River to the west, Kentucky Street to the east, and McLemore Avenue to the south. Beyond that area, it is less likely that the improved interchange would have a substantial affect on land use when compared to the No-Build conditions. Finally some resources, such as threatened and endangered species and hazardous materials, were studied using a one-mile radius surrounding the Build Alternative alignments. Figure 3-1 displays the various study area boundaries used for this project.

Figure 3-1. Study area boundaries used for the I-55 Interchange EIS in Memphis, Tennessee.



3.2.1 Direct Impacts

A direct impact is caused by the proposed action and occurs at the same time and place. A resource must be present in a particular area for a direct impact to occur. For example, construction of a new roadway may result in displacement of an existing residence located in the construction zone that could not be avoided. The occupants of the residence would be forced to relocate to another residence, preferably in the same general vicinity. This would be considered a direct impact to those residents.

3.2.2 Indirect Impacts

The basic concepts discussed in the National Cooperative Highway Research Program (NCHRP) Report 466 "*Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*" were used during the indirect impacts analyses. An indirect impact is caused by the proposed action and occurs later in time or is farther removed in distance but is still reasonably foreseeable. For example, the occupants of the residence described under the direct impacts discussion above would need to be relocated. The new residence may be a comparable home that may be for sale in the project vicinity or a new home may be constructed on available property within the vicinity. If an existing home in the market is suitable, there would likely be minimal potential for additional impacts to the environment to occur due to the residence relocating. However, if a new home is required to be built to provide comparable or suitable housing for the displaced resident, construction of the home may result in additional, reasonably foreseeable impacts. For instance, the new home may be constructed near an existing stream in the project vicinity that was avoided by the construction of the new roadway. Construction of the new home may result in sediment laden runoff from the home construction site entering the stream, reducing water quality and adversely impacting aquatic habitats. The impacts caused by the construction of the new home would be considered indirect impacts of the roadway project, because if it were not for the roadway forcing the residents to relocate, the impacts to the stream would not have occurred. Even though the stream was not directly impacted by the roadway construction activities, the adverse impacts to the stream were ultimately due to the roadway.

3.2.3 Cumulative Impacts

The cumulative impact analysis evaluates the direct and the indirect effects of implementing any of the study alternatives in association with past, present, and reasonably foreseeable future actions of other parties in the surrounding area (where applicable). The cumulative impacts analysis considers all potential impacts to various resources as a whole. The past, present, and reasonably foreseeable projects considered in the cumulative impacts analyses may or may not be related to the proposed action.

The CEQ has outlined a framework for incorporating cumulative effects analyses into the Environmental Impact Statement process. The framework includes the following points:

- 1) **Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions.** The effects of a proposed action on a given resource, ecosystem, and human community include the present and future effects added to the effects that have taken place in the past. Such cumulative effects must also be added to effects (past, present, and future) caused by all other actions that affect the same resource.
- 2) **Cumulative effects are the total effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (Federal, non-Federal, or private) has taken the actions.** Individual effects from disparate activities may add up or interact to cause additional effects not apparent when looking at the individual effects one at a time. The additional effects contributed by actions unrelated to the proposed action must be included in the analysis of cumulative effects. However, if the proposed action has no direct

or indirect effects on a given resource then there would be no potential for cumulative effects associated with the action. For instance, if a Build Alternative is selected but no impacts to wetlands occur, then the project would not contribute to cumulative impacts to wetlands that may be caused by other unrelated projects in the area. Although the cumulative impacts of those other unrelated projects should still be mentioned under the No-Build Alternative because those impacts would occur even if the proposed action is not implemented.

- 3) **Cumulative effects need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.** Environmental effects are often evaluated from the perspective of the proposed action. Analyzing cumulative effects requires focusing on the resource, ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects.
- 4) **It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.** For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully. The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected significantly or the effects are no longer of interest to affected parties.
- 5) **Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.** Resources typically are demarcated according to agency responsibilities, watershed boundaries, county lines, or other administrative boundaries. Because natural and socio-cultural resources are not usually so aligned, each political entity actually manages only a piece of the affected resource or ecosystem. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual socio-cultural boundaries to ensure including all effects.
- 6) **Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects.** Repeated actions may cause effects to build up through simple addition (more and more of the same type of effect), and the same or different actions may produce effects that interact to produce cumulative effects greater than the sum of the effects.
- 7) **Cumulative effects may last for many years beyond the life of the action that caused the effects.** Some actions cause damage lasting far longer than the life of the action itself (e.g., acid mine drainage, radioactive waste contamination, species extinctions). Cumulative effects analysis needs to apply the best science and forecasting techniques to assess potential catastrophic consequences in the future.
- 8) **Each affected resource, ecosystem, and human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.** Analysts tend to think in terms of how the resource, ecosystem, and human community will be modified given the action's development needs. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource (CEQ 1997).

The cumulative impact analysis has been prepared at a level of detail that is reasonable and appropriate to support an informed decision in selecting a Preferred Alternative. The cumulative impact discussion is presented according to each of the alternatives listed.

Definitions Used in Cumulative Analysis

This section defines several key terms used in the cumulative impact analysis.

Cumulative Impact Analysis Area

The cumulative impact analysis area includes that area that has the potential to be affected by implementation of any of the alternatives. The indirect impact analysis area was the same as the cumulative impacts analysis area for this project. The boundaries of the indirect impact and cumulative impact study areas varied according to the resource being considered. For most resource categories, the indirect and cumulative impacts analyses extended beyond the 500-foot study corridor used to determine direct impacts for several resources. For those categories, the cumulative and indirect impact analysis area was set based on the context of the resource. In general, the potential for the I-55 Interchange project to influence those resources, either through induced development or by affecting the same resources as other past, present, or reasonably foreseeable projects or actions in the area, was considered based on the best available information prior to initiating the study. The boundaries of the cumulative and indirect impact analysis area are described for each resource category are identified in Table 3.1 and are depicted in Figure 3-1 above.

Impact Evaluation Criteria

Impact evaluation criteria are used to define or identify the level of effect that could result in an impact to the resource being considered. Impact evaluation criteria vary by resource category. Therefore, the introductory section for each resource category defines evaluation criteria that were considered, where applicable. Both the context and severity of potential impacts were evaluated. Impacts were considered in both short-term and long-term timeframes since the proposed action would have potential to have immediate impacts due to construction activities and other impacts that may be evident well into the future.

Past Actions

Past actions are defined as actions within the cumulative impact analysis area that occurred before the EIS was initiated. These include past actions in the project area, and past demographic, land use, and development trends in the areas that surround the project area. In most cases, the characteristics and results of these past actions comprise the existing conditions that are included in the discussions of each of the resource categories.

Present Actions

Present actions include all existing or current activities, resource management programs, land uses, and development projects that are being implemented by local, state, or Federal governments and/or the private sector (where they can be identified) within the cumulative impact analysis areas.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions may include those actions in the planning, budgeting, or execution phases. Actions may be those of the Federal government, state or local government, or private organizations or individuals. Secondary or induced developments associated with projects such as new or improved roadways or interchanges that provide access to otherwise less accessible areas can also be considered reasonably foreseeable even though no plans or budgets have been created. Such developments would be reasonably foreseeable in those instances primarily based on past trends associated with similar transportation projects. Reasonably foreseeable developments often associated with new or improved access points may include highway-oriented businesses, such as gas stations, fast-food restaurants, and hotels and sometimes industrial or commercial/retail developments. Local zoning ordinances, land use plans, interviews with local officials, and other references are used to help determine what reasonably foreseeable developments are anticipated in the general project area.

Table 3.1. Study area for each resource category considered in the indirect and cumulative impacts analysis for the I-55 Interchange EIS in Memphis, Shelby County, Tennessee.

Resource Category	Analysis Area
Land Use and Infrastructure	Land bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Farmland, Soils, and Physical Environment	Land bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Social Environment	Census Block Group 1 in Tracts 43, 51, and 52.
Relocation	Land bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Economics	Shelby County, Tennessee
Air Quality	Shelby County, Tennessee
Noise	Land bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Water Quality	All watersheds or waterbodies present in the area bounded by, and including, the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South. This would include any watercourses where stormwater runoff from the project area is discharged.
Wetlands	All wetlands present in the area bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Water Body Modifications and Wildlife	Land bounded by the Mississippi River to the west, the CSX railroad line to the north, Kentucky Street to the East, and McLemore Avenue to the South.
Floodplains	Since there would be no direct or indirect impacts to floodplains from the I-55 Interchange project, no cumulative floodplain impacts would occur, and no analysis area is defined.
Threatened and Endangered Species	All potential threatened and endangered species and any terrestrial habitats within a 1-mile radius and aquatic habitats within 4 miles downstream of the proposed construction zone that are considered potential habitat for those species.
Cultural Resources	The combined areas of A, B, Z and Z-1 Alternatives [the Area of Potential Effect (APE)], including vacant properties proposed to be used for relocating displaced residences. The view shed analysis was made from areas within a one-mile radius of the APE.
Hazardous Waste Sites	All hazardous materials within one mile of Alternatives A, B, Z and Z-1.
Visual	The view shed analysis was made from areas within a one-mile radius of Alternatives A, B, Z and Z-1.
Energy	Shelby County, Tennessee
<i>Source: Parsons, 2008</i>	

Past, Present, and Reasonably Foreseeable Future Actions in the I-55 Interchange Project Area

The primary past and present actions that have occurred both within and adjacent to the project area that have been considered in the analysis of cumulative impacts are identified below. These actions are grouped in one discussion, as together they have resulted in the existing conditions of the surrounding area. A summary list of past and present actions within and around the project area that have the potential to impact the wide range of resource issues being considered in this cumulative impact analysis is provided in the following section. Existing conditions are discussed in the affected environment description for each of the resources assessed in this document.

Past and present actions that have resulted in the existing conditions of the project vicinity include the following:

- Construction of the existing transportation infrastructure, including I-55, South Riverside Drive, and E.H. Crump Boulevard;
- Construction of the French Fort Neighborhood and associated local access roads within the western project area limits;
- Construction and operation of commercial and industrial businesses and associated access roads and parking lots within the project area;
- Ongoing projects in the South Central Business Improvement District (CBID) and Gateway Commercial District, which lie immediately north/northeast of the I-55 Interchange project area. The developments mixed uses consisting of new and renovated high density, multi-family residential, office, retail, commercial, and institutional properties on both sides of E.H. Crump Boulevard. Much of this area was formerly an industrial area;
- Construction of Phase 1 of the I-40/I-240 East Interchange on the east side of Memphis;
- Implementation of the I-240 widening project to add one lane in each direction along I-240 from the I-240/I-55 Interchange north to the Midtown Interchange (I-240/I-40);
- Renovations to the I-40/I-240 Midtown Interchange. This project was developed to improve safety and traffic flow in this area, where numerous crashes had occurred over the past two decades, including fatal crashes. This massive investment by the State ended speculation that I-40 would be built through Overton Park, as was proposed in the 1960s;
- Walnut Grove Road. This project includes widening and raising a bridge over I-240, widening Walnut Grove between the interstate and the Wolf River, replacing the at-grade Humphreys intersection with a Single Point Urban Interchange, and building three new bridges over the Wolf River to replace the current structure. This project is currently under construction;
- Memphis Area Transit Authority light rail expansion; and
- Implementation of the TDOT SmartWay (intelligent transportation system) advanced information technologies including efforts to include:
 - Roadway Traffic Sensors to report traffic counts, speed, and travel time;
 - Camera Video Surveillance to monitor congested freeways and provide improved incident management capabilities;
 - Dynamic Message Signs to provide traffic and construction information to motorists, as well as provide information on Amber Alerts;
 - HELP Freeway Service Patrols to reduce congestion by removing minor incidents in a timely fashion;

- Transportation Management Centers (TMC) which serve as a focal point for traffic management operations and communications;
- Incident Management to detect, verify, and respond to incidents in an efficient manner and manage traffic conditions around the incident site;
- Construction Information that is provided to advise motorists traveling through construction sites;
- TDOT Smartway Information System (TSIS) is a system communicating data from TDOT SmartWay devices to a central location and distributing that transportation information to motorists and other interested parties before and while making trips. Information is distributed via TDOT's Web site and through the media. TDOT also launched the Tennessee 511 component of this system; and
- Information on Weather-Related Road Conditions, a new component of SmartWay, was introduced in December 2005. This feature allows TDOT to show travelers where problems may exist on any state road due to weather conditions such as snow, ice and flooding. A simple click of the mouse will highlight any areas to be avoided due to hazardous road conditions.

The primary reasonably foreseeable future actions that have been considered for cumulative impacts are listed in Table 3.2. The listing includes relevant foreseeable actions within and adjacent to the project area including other Federal Government agencies, state and local agencies, as well as private and commercial entities where information was known.

Table 3.2. Primary reasonably foreseeable future projects considered as part of the Cumulative Impacts Analysis for the I-55 Interchange EIS.

Reasonably Foreseeable Future Project	Location	Resource(s) potentially impacted*
Memphis Riverfront Development Plan	Memphis Riverfront	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Memphis Medical District Development Plan	Directly East of Downtown Core	Land use and infrastructure; soils, and physical environment; social environment; relocation; economics; air quality; noise; water quality; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Mixed Use development in the areas formerly used as an industrial and warehousing district in the South End area. This area is evolving into a mixed-use neighborhood with a booming residential market. Recently, over \$240 million in new development was announced in the South End. Estimates predict that this area will soon be home to more than 5,000 new residents.	South end of downtown Memphis, just northeast of the proposed I-55 Interchange improvement project.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Residential development in the Bluffview Residential District north of those commercial uses between Kansas Street and Texas Street. Uses in that District are focused on the retention and reuse of historic warehouse structures and the historic elements associated with them while encouraging new architecturally compatible new development with public infrastructure and amenities that will create an attractive and comfortable environment.	South end of downtown Memphis, just northeast of the proposed I-55 Interchange improvement project.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
A new fire station planned for the Riverside Residential District on Channel 3 Drive to serve the needs of the South CBID as well as those of the Project area.	South end of downtown Memphis, just north of the proposed I-55 Interchange improvement project.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.

Reasonably Foreseeable Future Project	Location	Resource(s) potentially impacted*
Additional residential uses are proposed in the South Downtown Residential District south of E.H. Crump Boulevard from Third Street to South Danny Thomas Boulevard. That District is intended to permit the development of low to moderate income housing in pedestrian-friendly neighborhoods with some subordinate mixture of local commercial and retail activities.	South end of downtown Memphis, just north of the proposed I-55 Interchange improvement project.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Phase II of the I-40/I-240 East Interchange. Provides for the separation of through traffic from traffic using the ramps to I-40 and Sam Cooper Boulevard.	East of downtown Memphis	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Renovations to the I-40/I-240 Midtown Interchange. Provides improved safety and traffic flow in this area, where numerous crashes have occurred over the last two decades.	Midtown at I-40/I-240 Interchange	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Interstate 69 (Corridor 18). This project was designated by Congress as a High Priority Corridor of National Significance. This project has been described as a "North American trade route," an "international trade route," and a "NAFTA corridor." The purpose of this project is to improve international and Interstate trade in accordance with national and state goals; to facilitate economic development in accordance with state, regional, and local policies, plans, and surface transportation.	Running in a general north/south direction through downtown Memphis and an extra route east of Memphis (System Approach).	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
I-55/Mallory Avenue Interchange Modification. This project would enhance access to the proposed Super Terminal and provide additional lanes along mainline I-55 through the interchange area.	In southwest Memphis, two interchanges south of the proposed endpoint of the I-55 Interchange project area.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.

Reasonably Foreseeable Future Project	Location	Resource(s) potentially impacted*
Extending South Parkway West to Jack Carley Causeway on Presidents Island.	Located in Southwest Memphis, southwest of the I-55 Interchange project.	Land use and infrastructure; soils, and physical environment; social environment; economics; air quality; noise; water quality; wetlands; water body modifications and wildlife; floodplains; threatened and endangered species; cultural resources; hazardous waste sites; visual impacts; and energy.
Implementation of additional phases of TDOT SmartWay (intelligent transportation system) advanced information technologies in the Memphis area.	Along major roadways within and surrounding downtown Memphis including I-55 within the project area.	Infrastructure; social environment; economics; air quality; noise; cultural resources; visual impacts; and energy.
* A resource “potentially impacted” does not imply that this resource exists or would be directly or indirectly impacted by the project. Please refer to the various resource categories for the specific Cumulative Impacts Analysis.		

3.3 Land Use and Infrastructure

3.3.1 Affected Environment

Existing Conditions and Trends

Alternative A, Alternative B, and Alternative Z traverse fully developed urban areas, following fairly closely the existing alignment of I-55, with the primary exception of the intersection with E.H. Crump Boulevard. The French Fort Neighborhood, a middle-class neighborhood of single-family residential houses on modest lots developed as part of an urban renewal project in the 1960s, is located west of I-55 in the project area. Named for a fort built nearby in 1739, French Fort Neighborhood contains nearly 150 homes and was one of the first middle-class African-American neighborhoods in the city. Alternative Z-1 avoids the French Fort Neighborhood.

Separating the northern portion of the French Fort Neighborhood from I-55 are two parks, two parcels of vacant land now used as open space, the National Ornamental Metal Museum, and a limited strip of commercial uses, including a hotel-motel, offices, a vacant mid-rise motel, and a recreational vehicle park. Light and heavy industrial uses lie to the east of I-55 and include candy manufacturing (Hershey Foods, Inc.), diesel motor sales and repair facilities, trucking and warehousing, and other light manufacturing facilities.

North of the interchange is the South Central Business Improvement District (South CBID), an area bordering Downtown that is undergoing extensive public-private renewal and investment largely driven by single- and multiple-family residential development and some associated mixed commercial-retail-office uses that are related to the recent and ongoing Downtown revitalization effort. The successful residential development in the South CBID has generated considerable interest in properties immediately south of I-55 in the study area, and they have the potential to be converted to multi-family residential and a variety of residential-related uses.

The project vicinity contains several parks and other sites of interest. Martyr Park lies northwest of the proposed project area, outside of the proposed ROW. It is a small area dedicated to Memphis citizens affected by the yellow fever epidemic of 1870. The park overlooks the Mississippi River and contains a commemorative statue for the citizens and caregivers affected by the outbreak. Other than the statue and the view, Martyr's Park features only a small parking lot and a sidewalk leading to the statue. Renovations are currently underway to add an illuminated walkway that will eventually connect the area to the Memphis Riverwalk at Mud Island.

E.H. Crump Park lies outside the proposed project ROW. It consists of a small area situated between the I-55 Bridge and The Metal Museum. The park contains a few large shade trees and provides parking spaces that overlook the Mississippi River. The park may eventually connect to Martyr Park and become part of the Memphis Riverwalk system. Because of high noise from the interstate, the park appears to be underutilized.

Chickasaw Heritage Park Previously known as Desoto Park or Desoto Mounds was established around 1911 and is on the National Register of Historic Places (NRHP) owing to its archaeological significance as a Chickasaw-Mississippian culture heritage (900 to 1800 CE) area. During the Civil War, the mounds in the park were emptied of artifacts and used to store munitions. This park is adjacent to two vacant parcels that are used for park and open-space purposes but have residential zoning.

The National Ornamental Metal Museum is located west of Metal Museum Drive along the banks of the Mississippi River, outside of the proposed ROW and the study corridor. The National Ornamental Metal Museum, the first of its kind in the country, showcases the artistry of metalworkers from around the world. It is the only museum in the United States devoted exclusively to the exhibition and preservation of fine metalwork. Located in a historic hospital overlooking the Mississippi River, the museum features a series of galleries on two floors.

T.O. Fuller State Park is located approximately four miles south of the proposed I-55 Interchange Improvement project area. It is a historically, ecologically, and culturally important area. It was built in 1937 by the Civilian Conservation Corps and consists of 1,138 acres of mostly bottomland forest and wetland. It is named for Dr. Thomas O. Fuller, an African-American activist and educator during the late 1800's and early 1900's. In 1942 the area opened as Shelby Bluffs State Park and was the first park created for African-Americans east of the Mississippi River. Prior to 1950, much of the bottomland along the Mississippi River looked like T.O. Fuller State Park. T.O. Fuller State Park is culturally important due to relics and mounds from the Chucalissa Indian tribe found within its boundaries.

Regional Development

Recent development trends in the larger area surrounding the study area include residential, retail/commercial/office, and industrial growth. Spill-over development from Downtown has directly affected areas to the south, especially in the South CBID, which has E.H. Crump Boulevard as its southernmost boundary making it immediately adjacent to the study area. The aged structures and old industrial and commercial properties in the South CBID have provided locations for new residential construction along the Mississippi River bluffs. These new residential uses include attached and detached single-family units, town homes, lofts, multiple-family apartments, and condominiums that have been constructed in renovated/rehabilitated buildings, as well as on cleared or vacant land. In addition, retail/office/commercial uses are co-locating in this area, creating an exciting mixed use environment. Recent industrial development in the area south of E.H. Crump Boulevard largely includes light industrial and trucking/warehouse uses.

Land Use Controls

The City of Memphis has in place zoning and subdivision development ordinances that establish and exercise land use controls in and around the study area.

The area traversed by the proposed project includes two zoning districts: residential and highway commercial. Single-family uses are the primary permitted uses in the R-S6 District. The list of uses permitted in the C-H District is long and varied but is primarily oriented to uses that are accessible to persons in vehicles.

Land Use Plans and Policies

Although land use in the study area is discussed in general terms in *Shelby County's Growth Plan* (adopted 1999, revised 2000), more detailed recommendations and guidelines for future land use are contained in two district plans formally adopted by the City: the *South Central Business Improvement District Comprehensive Plan* (November 2002) and the *South Memphis District Plan* (March 1999).

Ongoing and planned projects in the South CBID that lie immediately north of the project area include new and renovated mixed uses for properties in those sections of the Gateway Commercial District that are located on both sides of E.H. Crump Boulevard, from Kansas Street east to Latham Street. Those uses will include higher density residential, office, retail, commercial, and institutional. Immediately adjacent to and north of the Gateway Commercial uses are commercial and office uses in the South CBID, which will provide a campus-like environment adjacent to the CBD and to residential neighborhoods. Other planned projects include residential development in the Bluffview Residential District north of those commercial uses between Kansas Street and Texas Street. Uses in that District are focused on the retention and reuse of historic warehouse structures and the historic elements associated with them while encouraging new architecturally compatible new development with public infrastructure and amenities that will create an attractive and comfortable environment. Additional residential uses are proposed in the South Downtown Residential District south of E.H. Crump Boulevard from Third Street to South Danny Thomas Boulevard. That District is intended to permit the development of low to moderate income housing in pedestrian-friendly neighborhoods with some subordinate mixture of local commercial and retail activities. A new fire station planned for the Riverside Residential District on Channel 3 Drive will serve the needs of the South CBID, as well as those of the project area.

Land uses in the study area are determined by the *South Memphis District Plan*, which was adopted in 1999. The Plan shows that properties in the area south of E.H. Crump Boulevard and east of I-55 are zoned and recommended in the future for light or heavy industrial uses, which corresponds to their existing zoning and uses. That part of the study area south of E.H. Crump Boulevard and west of I-55 is zoned and recommended in the future for various mixed uses. Single-family residential use predominates and commercial/office, institutional, light and heavy industrial, high-density multi-family, and park-recreation are the other permitted uses, which corresponds to their existing zoning and uses.

3.3.2 Potential Land Use and Infrastructure Impacts of the No-Build Alternative

Direct Impacts: Under the No-Build Alternative existing land uses within the proposed project area would most likely continue into the future without major changes. Some minor planned changes including mixed used developments north and northeast of the project area are anticipated. Highway maintenance activities would continue at current levels.

Indirect Impacts: Because no activities related to the proposed I-55 Interchange project would occur under the No-Build Alternative, there would be no indirect impacts to land use and infrastructure.

Cumulative Impacts: Land use and infrastructure under the No-Build Alternative would likely remain similar to current conditions. There would be new developments in the area, especially north

and northeast of the project area, but no dramatic changes in land use would occur as those areas were previously developed and used for industrial uses. There are no other proposed developments that would noticeably change land use within the project area.

3.3.3 Potential Land Use and Infrastructure Impacts of Alternative A

Direct Impacts: Implementation of the proposed project will result in both adverse and beneficial impacts to existing and future land use within the project area. The primary direct adverse impact will be the conversion of currently developed residential and commercial areas to a highway and associated ROW. Approximately 25 parcels (improved and unimproved) will be directly impacted by ROW acquisition under Alternative A, with approximately 6 acres of new ROW required. Other direct adverse impacts include the displacement of eight residences and one business as a result of project implementation.

Beneficial long-term land use impacts are expected to occur as a result of project implementation. Improved accessibility under Alternative A will benefit the remaining businesses within the southwest quadrant of the project area, and those sites currently available for redevelopment, such as the former Ramada Inn site on Alston Avenue and the former U.S. Army Reserve Center. Highway improvements will update the transportation system to current standards.

Indirect Impacts: Relocation of the displaced residences may result in loss of existing open space as replacement homes may be constructed on existing vacant lands adjacent to French Fort Neighborhood and Chickasaw Heritage Park. This land is already zoned for residential land uses; therefore this would not result in major changes to anticipated land uses in the project area.

There is some potential that improvements to the existing I-55 Interchange would result in some secondary or induced growth in the general project vicinity, because traffic flow would be improved. However, due to existing zoning and limited amount of developable land in the immediate project vicinity, it is not likely that substantial development would result. Other development and revitalization projects anticipated to occur in the more general project vicinity, especially those areas north and northeast of the project, would likely occur whether or not the I-55 Interchange project is completed. Therefore, the impacts of those developments would not be considered indirect impacts of this project.

Cumulative Impacts: Cumulative impacts associated with this project in combination with other past, present, and reasonably foreseeable future projects would include potential land use changes including increased industrial, commercial, and residential development, overall improvement of the transportation infrastructure resulting in improved traffic flow and freight movement through the region, and a general revitalization of the south and west Memphis areas. It is anticipated that most of the industrial land use increases would occur in areas south or southwest of the project area, such as in the President's Island vicinity. The improved transportation infrastructure, new industrial and commercial developments, and revitalization of former industrial areas may promote increased residential development in the surrounding areas, which would maintain and enhance residential land uses in Memphis and West Memphis just across the Mississippi River in Arkansas.

The combination of all past, present, and reasonably foreseeable future development projects may result in additional infrastructure projects needing to be implemented to continue to provide adequate facilities capable of supporting the growth. In general, most areas where new developments are expected to occur would be located in previously developed areas with much of the infrastructure, such as access roads, utilities, and other essential items already in place. Therefore, it is anticipated that only a small number of measurable infrastructure expansion or improvement projects would be needed in the reasonably foreseeable future in the project vicinity. Overall, the general land uses in the project vicinity would not change substantially and would continue to be of mixed industrial, commercial, and residential land uses typical of an urban area such as Memphis. The I-55

Interchange project is not expected to contribute to any major land use changes that would not have occurred if the I-55 improvements were not made. The project will help provide needed transportation support for those projects, such as the ongoing and planned projects in the South CBID discussed in Section 3.3.1 above.

3.3.4 Potential Land Use and Infrastructure Impacts of Alternative B

Direct Impacts: Direct impacts to land use and infrastructure associated with Alternative B would be essentially the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to land use and infrastructure associated with Alternative B would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to land use and infrastructure associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.3.5 Potential Land Use and Infrastructure Impacts of Alternative Z

Direct Impacts: Direct impacts to land use and infrastructure associated with Alternative Z would be essentially the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to land use and infrastructure associated with Alternative Z would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to land use and infrastructure associated with Alternative Z would be essentially the same as those discussed under Alternative A.

3.3.6 Potential Land Use and Infrastructure Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to land use and infrastructure associated with Alternative Z-1 would be similar to Alternative A, except there would be no residential or business relocation impacts. There would be a minor impact to the Hershey Foods, Inc. property to the east, but this will not provide a measurable impact to their existing land use or infrastructure.

Indirect Impacts: Indirect impacts to land use and infrastructure associated with Alternative Z-1 would be similar to those discussed under Alternative A, except the relocation of displaced residences would not be necessary and would not result in a loss of existing open space. Replacement housing on existing vacant lands adjacent to French Fort Neighborhood and Chickasaw Heritage Park would not be necessary.

Cumulative Impacts: Cumulative impacts to land use and infrastructure associated with Alternative Z-1 would be similar to those discussed under Alternative A.

3.3.7 Mitigation

Mitigation measures, as defined by the Council on Environmental Quality (40 CFR 1508.20), include avoiding impacts, minimizing impacts, rectifying impacts, reducing or eliminating the impact over time, and compensating for the impact. Shelby County has mechanisms in effect to minimize, mitigate, or avoid adverse impacts to land use that could potentially result from project implementation. Potential changes to land use that may result from indirect and cumulative impacts can be addressed through implementation and application of applicable Memphis and Shelby County growth policy plans, zoning and subdivision ordinances, design guidelines, and other special ordinances and/or policies.

All land acquisitions and relocation of displaced households, businesses, and any other affected parties would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972 and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). For this project, it is anticipated that all of

the displaced residents will be provided the option to relocate on existing vacant land located adjacent to the west of the French Fort Neighborhood. Under Alternative Z-1 (Preferred Alternative), relocations would not be required.

3.4 Farmland, Soils, and Physical Resources

3.4.1 Affected Environment

Farmland

The Farmland Protection Policy Act of 1981 (FPPA) seeks to "to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses, and to insure that Federal programs are administered in a manner that, to the extent practicable, will be compatible with State and local government, and private programs and policies to protect farmland." In accordance with the FPPA, a Farmland Conversion Impact Rating Form was submitted to the USDA, Natural Resources Conservation Service (NRCS) in January 2003. The NRCS response letter stated that because the area in question is already considered to be under urban and transportation land uses, the area is exempt from further Farmland Protection Policy Act consideration. Therefore, no prime farmland is considered to be present in the project area. The NRCS response letter is included in Appendix A.

Soils

Soils in the project area belong to the Memphis-Grenada-Loring association (USDA, 1970). They are nearly level to sloping, well drained and moderately well drained, silty soils located on broad uplands. They are characterized by broad, rolling, low-lying hills, the sides of which are dissected by numerous small drainageways. The tops of the hills are nearly level and fairly wide. The major soils of this association are suited to a wide variety of urban uses.

The soils in this association developed in silty deposits more than 20 feet thick. Memphis soils are on the broader ridge tops and the steeper hillsides. They are well drained and have a brown, silty surface layer and subsoil. Grenada soils are common on nearly level ridge tops and sloping hillsides. They have a surface layer of brown silt loam and a subsoil of yellowish-brown silt loam. A fragipan begins at a depth of 15 to 30 inches. Loring soils are on ridge tops and hillsides. They have a brown silty surface layer and a subsoil of dark-brown silt loam. A weak fragipan begins at a depth of about 28 inches.

The project area is located in a graded land, silty materials (Gr) soil unit according to the USGS soil survey. This land type consists of areas that have been graded in preparation for subdivisions and for commercial and industrial building. Depth of grading ranges from a few inches to five feet or more. The slope after grading is generally one to five percent. In most areas the original soil profiles have been disturbed to the extent where they are no longer identifiable. Soil material is brown, yellowish brown, and dark brown in color and silty in texture. The soils immediately surrounding the project area soil unit are part of the Memphis series.

Topography and Geology

Shelby County is located in the southwest corner of Tennessee and occupies 480,640 acres (751 square miles). The average altitude in Shelby County is 300 feet above sea level. Approximately 90 percent of the county lies on the West Tennessee Plain and is rolling to hilly with various dissecting drainages. The remaining ten percent of the county is on the Mississippi River Alluvial Floodplain, half occurring on islands within the river. Wolf River, Loosahatchie River, and Nonconnah Creek are responsible for draining the majority of Shelby County's water into the Mississippi River.

The West Tennessee Plain lies between the West Tennessee Uplands and the Mississippi River Alluvial Floodplain and covers 4,700 square miles. It slopes gently westward from an elevation of

approximately 450 feet down to about 300 feet. The area is mostly gently rolling hills interrupted by small ridges and drainage divides. Some gullies have developed in local areas throughout the region and swampy conditions are very common around most of the larger drainage systems. Geologically the area is composed of sand, gravel, silt, and clay of Tertiary and Quaternary age. A thin surficial deposit of loess (wind deposited silt) covers much of the area.

The Mississippi River Alluvial Valley is the westernmost province in Tennessee. It is an almost flat, narrow belt covering more than 900 square miles from the west edge of the West Tennessee Plain to the Mississippi River. The average altitude is less than 300 feet and much of the area is marshy land below the high water mark of the river. Mud, sand, gravel, and silt (loess) of Quaternary age are the geologic formations that comprise the area.

The project area is located at the western edge of the West Tennessee Plain. Near the project location, the West Tennessee Plain extends to the edge of the Mississippi River and terminates as a bluff line. The Mississippi River Alluvial Valley is non-existent on the Tennessee side of the river adjacent to the project area. The proposed project area is located well above the 100-year and 500-year floodplains. Because the area is above the floodplain, is adjacent to the Mississippi River, and contains soils and topography conducive to urbanization, the majority of the natural surface features and habitats have been altered or completely removed from within the project area over time.

3.4.2 Potential Farmland, Soils, and Physical Resources Impacts of the No-Build Alternative, Alternative A, Alternative B, Alternative Z, and Alternative Z-1 (Preferred Alternative).

There would be no measurable direct, indirect, or cumulative impacts to farmland, soils, or physical resources for the No-Build Alternative, Alternative A, Alternative B, Alternative Z, or Alternative Z-1 (Preferred Alternative).

3.4.3 Mitigation

The NRCS determined that the project area is urban, and no areas of prime and unique farmland would be impacted by the proposed project, and therefore, no mitigation for farmland would be required under Alternatives A, Alternative B, Alternative Z, or Alternative Z-1 (Preferred Alternative).

Although only short-term adverse impacts to soils are anticipated, all reasonable precautions will be taken to ensure that any potential adverse impacts to soils are minimized. Soil protection measures are described in the following documents:

1. *Tennessee Erosion and Sediment Control Handbook* (TDEC, 2001c).
2. *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites* (Smoot, 1992).
3. *TDOT, Standard Specifications for Road and Bridge Construction* (TDOT, 2006).

Examples of mitigation measures include:

- The unnecessary removal of existing vegetation would be avoided. Canopy removal along all working or staging areas would be limited to the extent practicable.
- Where removal of vegetation is necessary, sediment control measures would be employed immediately at the start of construction.
- Areas disturbed during construction will be revegetated as soon as possible.
- Control structures would be inspected and properly maintained throughout the life of the project.

3.5 Social Environment

3.5.1 Affected Environment

Detailed population, housing, and household data were obtained from the 1990 and 2000 U.S. Census. The U.S. Census geographic areas in the project area include Shelby County, City of Memphis, Census tracts, Census block groups, and Census blocks. Each Census tract within the project area is comprised of only one block group and, thus, the data presented for the Census tract is identical to that available for the associated Census block group. A map of the Census Tracts is shown on Figure 3-2. However, each Census block group consists of various Census blocks. For example, Census tract 43 contains one Census block group and two Census blocks within the project area. Census tract 51 contains one Census block group and three Census blocks within the project area and Census tract 52 contains one Census block group and 13 Census blocks within the project area.

Population Trends

Population trends for the census geography areas are shown on Table 3.3. Although the population increased in Shelby County and the City of Memphis between 1990 and 2000, the population decreased in two of the three Census tracts within the project area. Census tract 52, which includes the southwest quadrant of the I-55 Interchange at E.H. Crump Boulevard, experienced an 11 percent decrease in population during this period, while Census Tract 51 had a 60 percent decrease. None of the population decrease in Census tract 52 occurred within the French Fort Neighborhood directly impacted by the proposed project. However, the population of Census tract 43 increased by a substantial percentage (208 percent) between 1990 and 2000. Although no Census block data is available for 1990, it is assumed that this population increase did not occur within the project area as only two blocks within Census tract 43 are included in the project area.

Neighborhood and Community Cohesion

The French Fort Neighborhood, located adjacent to the southwest quadrant of the existing interchange area, will be directly impacted by implementation of the proposed project. Although access will not be impacted and no division or splitting of this neighborhood will occur, implementation of Alternatives A, B, or Z would require the potential displacement and relocation of up to eight residences. In addition, up to two businesses would be potentially displaced and relocated under the Build Alternatives. All of these potential displacements would occur at the northeastern edge of the French Fort Neighborhood. Alternative Z-1 avoids impacts to the neighborhood and would not affect community cohesion.

Figure 3-2. Map of Census Tracts for the I-55 Interchange Project in Memphis, Tennessee.

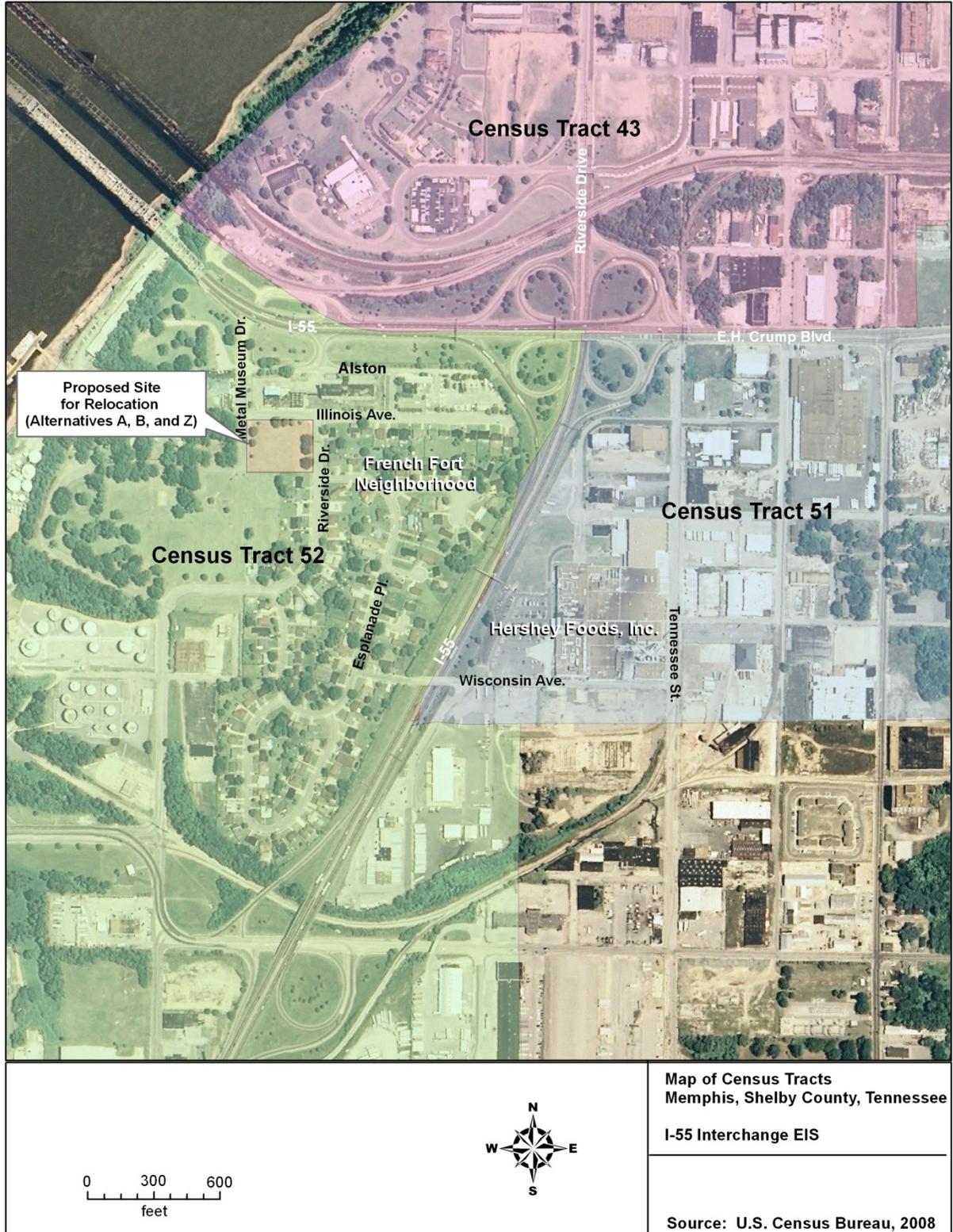


Table 3.3. Population Trends, 1990-2000.

Geographic Area	2000 Population	Percent Population Change (1990-2000)
Shelby County, TN	897,472*	8.6
City of Memphis	650,100**	6.5
Census Tract 43	870	208
Block Group 1	870	208
Block 1031	3	NA
Block 1043	0	NA
Census Tract 51	159	-60
Block Group 1	159	-60
Block 1022	0	NA
Block 1067	0	NA
Block 1070	0	NA
Census Tract 52	461	-11
Block Group 1	461	-11
Block 1000	100	NA
Block 1001	0	NA
Block 1002	0	NA
Block 1003	0	NA
Block 1004	0	NA
Block 1005	24	NA
Block 1009	0	NA
Block 1010	105	NA
Block 1012	48	NA
Block 1013	77	NA
Block 1014	17	NA
Block 1015	33	NA
NA = block level data are not available for percent population change.		
* Shelby County population estimate in 2006 was 911,438.		
** Memphis Certified 2007 Population is 689,198		
<i>Source(s): U.S. Census Bureau, 1990 and 2000 Census and 2006 American Community Survey; Department of Economic and Community Development., 2007 (2010 Census Data not yet available)</i>		

Environmental Justice

On February 11, 1994, President Clinton issued Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. This EO was issued to provide that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

A Presidential memorandum that accompanied EO 12898 specified that Federal agencies "shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities when such analysis is required by the NEPA of 1969." The memorandum further stated that Federal agencies "shall

provide opportunities for community input into the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities.”

The initial step in this process is the identification of minority and low-income populations that might be affected by implementing the proposed action. FHWA Order 6640.23 defines minority as a person who is Black, Hispanic, Asian American, or American Indian/Alaskan Native and low-income means a household income at or below the U.S. Department of Health and Human Services Poverty Guidelines. For environmental justice considerations, these populations are defined as individuals or groups of individuals that are subject to an actual or potential health, economic, or environmental threat arising from existing or proposed Federal actions and policies.

Minority and low-income population data were collected for Shelby County, the City of Memphis, Census tracts, Census block groups, and Census blocks in the project area. Table 3.4 contains a summary of the minority and low-income population data. African American is the predominant minority population within Census tract 51 and 52 at 100 percent and 93 percent respectively. Census tract 43 was 21 percent African-American and 78 percent Caucasian. The weighted average poverty threshold for a family of four in 1999 in the United States was \$17,029. The three Census tracts within the project area varied substantially in terms of the percent of population below the poverty level.

Table 3.4. Summary of Minority and Income Data for the I-55 Interchange Project Area.

Geographic Area*	Percent Minority	Percent Below Poverty
Shelby County, TN	53%	16%
City of Memphis	66%	20%
Census Tract 43: Block Group 1	21%	13%
Census Tract 51: Block Group 1	100%	67%
Census Tract 52: Block Group 1	93%	6%
*Total population data for these geographic areas is listed in Table 3.3 above.		
<i>Source(s): U.S. Census Bureau, American Fact Finder 2000</i>		

Because the area most impacted includes primarily minority populations, TDOT and FHWA have provided several opportunities for community input into the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities, or in this case the French Fort Neighborhood. As mentioned previously, the French Fort Neighborhood is a middle-class neighborhood consisting of approximately 150 single-family residential houses on modest lots and was developed as part of an urban renewal project in the 1960s. This was one of the first middle-class African-American neighborhoods in the city.

TDOT, City of Memphis officials, and members of the French Fort Neighborhood, where the primary impacts of the project would occur, have worked to find ways to minimize and compensate for the unavoidable impacts to the community. TDOT, the City of Memphis, and representatives of the French Fort Neighborhood have agreed upon an option that would provide the displaced residents from the French Fort Neighborhood an option to purchase property, currently owned by the City of Memphis, on which they could build comparable replacement housing (See Figure 3-2 above). Mitigation measures are defined in more detail in Section 3.5.5 and again in the discussions related to residential displacements in Section 3.6.

3.5.2 Potential Social Environment Impacts of the No-Build Alternative

Direct Impacts: No direct impacts to the social environment would be anticipated under the No-Build Alternative as no substantial changes from the baseline conditions would occur. No relocations of homes or businesses would be required under the No-Build Alternative.

Indirect Impacts: No substantial indirect impacts to the social environment would be anticipated under the No-Build Alternative. However, some adverse impacts to the social environment would be anticipated due to continued decreases in the already poor LOS of the I-55 Interchange. Decreasing LOS would have potential secondary impacts on other local roadways as drivers attempt to find alternative routes to avoid the highly congested I-55 Interchange. This would ultimately decrease LOS in other areas that would otherwise function better. Decreasing LOS in other areas would result in further potential adverse impacts to the local neighborhoods and communities. Increasing traffic in areas that would otherwise be utilized primarily by local traffic would result in potential increases in local congestion, commuting times, noise, and other adverse social impacts. Many of the local streets were not designed to handle large volumes of through traffic, especially large trucks. The integrity of the local roadways could be compromised, if they were used as long-term bypasses of the congested I-55 Interchange. Also, the safety of residents living along such bypass routes would decrease.

Cumulative Impacts: Some adverse cumulative impacts to the social environment would be expected due to increased industrial, residential, and commercial developments expected to occur in the general project vicinity regardless of whether the I-55 Interchange improvements are made. With no major improvement to the interchange, it would be expected that the additional traffic generated by other non-related projects would result in further decreases in LOS on local roadways. This would result in adverse impacts to the social environment due to increases in traffic congestion and noise and decreases in air quality and safety in and around the local neighborhoods. It is likely that more traffic may attempt to use the local neighborhood roadways to avoid traffic jams on I-55.

3.5.3 Potential Social Environment Impacts of Alternative A

Direct Impacts: Alternative A would require the potential displacement and relocation of eight residences. In addition, two businesses would be potentially displaced and relocated under Alternative A. The proposed realignment would have adverse impacts on minority populations. The Census data for the project area shows that the areas where reasonable alternatives could be identified for the project are also primarily populated by minorities. No reasonable alternatives could be identified that would meet the project purpose and need while eliminating impacts to minority populations. The impacts would not be considered disproportionate to minority population because there is no substantial human or environmental health impact anticipated that would differ from baseline conditions. The minority population in the project area would not suffer a greater impact than non-minority populations from the realignment.

There would be some beneficial impacts to the minority populations from improved traffic flow in the project vicinity. This would result in less traffic congestion, improved safety, and minor improvement to noise and air quality. Some loss of open space would occur due to development of the new interchange and on the vacant land where displaced residents are anticipated to relocate.

There are no anticipated disproportionate impacts to low-income populations in the project area since the population of the census tract most impacted by the proposed realignment has only six percent below the poverty level. The surrounding census tracts households below the poverty level are 13 percent and 67 percent. Low-income populations would not suffer a greater magnitude of impacts than those above poverty levels.

Indirect Impacts: The improved traffic circulation and enhanced accessibility will indirectly benefit the project area by enhancing community cohesion and providing connections between adjacent

areas. In addition, relieving some of the congestion and improving access to the area would also improve response times for emergency vehicles attempting to reach the project vicinity.

Cumulative Impacts: Opportunities for potential social and economic growth of the region would be improved as the infrastructure is modernized, which would facilitate connections between adjacent areas. The I-55 Interchange improvements would combine with all other transportation improvements in and around the City of Memphis to help relieve some of the existing traffic issues, making commuting times and interconnectivity of the entire area better.

The I-55 Interchange project would combine with other new developments in the project vicinity, especially the mixed use developments anticipated for areas to the north and east of the project area. All of these projects would combine to help revitalize several former industrial areas that have become rundown over the years and provide potential increases in quality of life and new opportunities for some of the residents within and adjacent to those areas, especially for some of the census tracts that exhibit high rates of poverty.

3.5.4 Potential Social Environment Impacts of Alternative B

Direct Impacts: Impacts associated with Alternative B would be similar to those discussed under Alternative A, except there is a possibility that only one business would be impacted by Alternative B versus the two impacted under Alternative A. If the second business, the Southern Cotton Ginners Association, is able to remain in place and function at its current capacity, then the social impacts of Alternative B would be slightly reduced compared to Alternative A. Alternative B would also eliminate the current direct access to Metal Museum Drive, which would eliminate some current through traffic in the local neighborhood, but would also adversely affect the commuting options of the local residents and may adversely affect access by emergency vehicles, such as fire and ambulance service. These impacts would be considered long term but minor.

Indirect Impacts: Indirect impacts associated with Alternative B would be essentially the same as those discussed under Alternative A. However, if the second business is not displaced then the potential social impacts would be slightly reduced. Alternative B would also eliminate the current direct access to Metal Museum Drive, which would eliminate some current through traffic in the local neighborhood, but would also adversely affect the commuting options of the local residents.

Cumulative Impacts: Cumulative impacts associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.5.5 Potential Social Environment Impacts of Alternative Z

Direct Impacts: Impacts associated with Alternative Z would be similar to those discussed under Alternatives A and B. Alternative Z would utilize community access through the roundabout discussed in Section 2 and would provide better overall neighborhood access, especially for emergency vehicles, such as fire and ambulance service. These would be considered minor long-term beneficial impacts.

Indirect Impacts: Indirect impacts associated with Alternative Z would be similar to those discussed under Alternatives A and B.

Cumulative Impacts: Cumulative impacts associated with Alternative Z would be similar to those discussed under Alternative A.

3.5.6 Potential Social Environment Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Impacts associated with Alternative Z-1 would be similar to those discussed under Alternative A, except there would be no direct adverse impact to the minority neighborhood due to displacements. Alternative Z-1 would utilize community access through the roundabout discussed in Section 2 and would provide better overall neighborhood access, especially for emergency vehicles,

such as fire and ambulance service. These would be considered minor long-term beneficial impacts. Of the build alternatives considered, Alternative Z-1 would have the least amount of adverse impacts to the social environment.

Indirect Impacts: Indirect impacts associated with Alternative Z-1 would be similar to those discussed under Alternatives A, B, and Z, however, social impacts would be reduced due to the lack of displacements and improved overall access to the French Fort Neighborhood.

Cumulative Impacts: Cumulative impacts associated with Alternative Z-1 would be similar to those discussed under Alternative A.

3.5.7 Mitigation

To make sure that the proposed project is conducted in accordance with EO 12898 "Environmental Justice", this action has been sent to TDOT Civil Rights Staff for review. TDOT Civil Rights Staff will review the project to ensure that there are not disproportionately high and adverse health or environmental effects on minority and low-income populations. Upon their review and if modifications are needed, every attempt to comply with EO 12898 will be made.

Because no other alternatives were identified during the DEIS that would allow the I-55 Interchange improvements to occur without impacting at least some of the homes in the French Fort Neighborhood, TDOT, City of Memphis officials, and members of the French Fort Neighborhood, where the primary impacts of the project would occur, worked to find ways to minimize and compensate for the unavoidable impacts to the community. For Alternatives A, B, and Z, TDOT, the City of Memphis, and representatives of the French Fort Neighborhood agreed upon an option that would provide the displaced residents from the French Fort Neighborhood an option to purchase property, currently owned by the City of Memphis, on which they could build comparable replacement housing. The property consists of vacant land located adjacent to the west side of the existing French Fort Neighborhood. Figure 3-2 above shows the location of the proposed relocation area. This land would allow those displaced residents who wish to remain part of the French Fort Neighborhood and local community enough space to relocate in the area and would therefore help to maintain neighborhood cohesion.

Since Alternative Z-1 (Preferred Alternative) avoids the impacts to the French Fort Neighborhood, additional displacement mitigation for the social environment would not be necessary.

3.6 Relocation

3.6.1 Affected Environment

A total of ten potential displacements, consisting of eight single-family residences and two businesses, would occur as a result of implementation of Alternative A. The same potential residential displacements would occur under Alternative B and Z, but with only one potential business displacement. Alternative Z-1 would not have displacements.

Residential Displacements

The potentially displaced single-family residences are located in the Southwest Quadrant of the existing I-55 and E.H. Crump Boulevard Interchange. These households consist of eight single family residences within the French Fort Neighborhood. Four of these residences are on Illinois Avenue and four are located on Napoleon Place. A visual field survey indicated that all of the potentially displaced residences are in standard or sound condition. Based upon Shelby County Assessor of Property records, seven of the eight potentially displaced residences are owner-occupied. All of the potentially displaced residences are three-bedroom ranch style homes of frame and brick veneer construction built during the period from 1969-1975. The typical lot size ranges from 0.25 acres to 0.33 acres. Real property appraisals, including both improvements and land, range from \$61,900 to \$108,500 for the potentially displaced residences based upon the 2007 records of the

Shelby County Assessor of Property. According to the 2000 U.S. Census, the median value of owner-occupied housing was \$72,800 in Census Tract 52, block group 1, compared to \$92,200 for Shelby County and \$72,800 for the City of Memphis.

The 1999 median household income for Census Tract (CT) 52, block group 1 was \$40,583. All of the potential residential displacements would occur in this block group. In 1999 the median household income was \$30,593 for Shelby County. It is estimated that none of the potential displacees would consist of a low-income household (below poverty level) based upon 1999 U.S. Census data on persons below poverty level for Census Tract 52.

The 2000 U.S. Census data for Census tract 52, block group 1, blocks 1000 through 1005 and 1014 were analyzed in order to determine general characteristics of the households to be displaced and relocated. The potential displacees are assumed to be representative of a cross-section of households within the census tract and include primarily families and elderly households. Since the majority of the residential properties are family households, there would be minimal displacement of elderly households and handicapped individuals. All of the potential residential displacees are African American. The typical household ranges in size from two to four persons, with the median age of the persons in block group 1 being 47.4 years.

Business Displacements

Minimal potential business displacement will occur with implementation of Alternatives A, B, or Z as two businesses will be displaced under Alternative A, and one business will be displaced under Alternative B and Z. Both of these businesses, which are located in the southwest quadrant of the project area, represent small businesses with less than 25 employees. These businesses include the Southern Cotton Ginners Association at 874 Cotton Gin Place and the Mississippi River RV Park at 870 Cotton Gin Place. The first business represents an office and supply storage area for the Southern Cotton Ginners Association, while the second business involves the storage of RV campers and overnight RV camping. Alternative Z-1 (Preferred Alternative) would impact part of the Hershey Foods, Inc. parking lot, but there would be no business displacements.

Non-Profit Organization Displacements

There will be no displacement of non-profit organizations or agencies within the project area.

3.6.2 Available Replacement Housing in the City of Memphis

A review of residential properties listed for sale in the Memphis Area Multiple Listing Service (MLS) revealed an adequate supply of comparable replacement dwellings within the area. Considering the appraised valuations of the potentially displaced housing, the general price range for comparable housing is considered to be within the \$60,000- \$125,000 price range. As indicated in Table 3.5, there were a total of 486 one-story, single-family homes listed for sale in the \$60,000 - \$125,000 price range in the general project vicinity in November 2007 (search area included the 38106 zip code and the zip codes that share a border with the 38106 zip code). Approximately 75 percent of these listed homes are in the \$75,000 - \$125,000 price range. Similar to the potentially displaced residences, all of these listed properties have three bedrooms.

Table 3.5. Single-Family Homes for Sale by Price Range in the City of Memphis.

Price Range	Single-Family (3BR/2BA)	Single-Family (3BR/1.5 BA)	Total
\$60,000 - \$ 74,999	49	73	122
\$75,000 - \$125,000	156	208	364
TOTAL	205	281	486

Source: Memphis Area Association of Realtors, Multiple Listing Service, November 2007.
The search area included the Memphis 38106 zip code and the Memphis zip codes that share a border with the 38106 zip code.

According to local real estate brokers, there is a sufficient supply of single-family residences and apartments for rent in the City of Memphis. Monthly rental rates for two-bedroom apartments/single-family homes generally range from \$550-\$800, and three-bedroom apartments/single-family homes range from \$600-\$950 in Memphis and the immediate area. Monthly rental rates vary depending upon location of the property, age of dwelling unit, associated dwelling amenities, length of lease period, and other factors.

Other Relocation Options Identified for Displaced Residents

The City of Memphis, TDOT, and the members of the French Fort Neighborhood have been coordinating throughout the early planning stages of this project to discuss potential options for minimizing the impact to the French Fort Neighborhood. One option that has received support from the affected parties is that the displaced residents would have the option to purchase available vacant land located immediately adjacent to the existing French Fort Neighborhood near Chickasaw Heritage Park that is currently owned by the City of Memphis. Figure 3-2 above shows the location of the relocation area. There is enough space available to provide enough lots for all of the displaced residents to relocate to this land. This would allow the displaced residents an option to construct new homes on the property and remain part of the French Fort Neighborhood while still allowing the I-55 Interchange improvements to occur. There may also be other developable land and/or abandoned properties located near the project area that could potentially be used to provide space to help relocate the displaced businesses within the general vicinity of the project area. TDOT will continue to follow the Uniform Relocation Assistance and Real Property Acquisition Act guidelines to ensure that all displacees are adequately relocated and/or compensated.

3.6.3 Potential Relocation Impacts of the No-Build Alternative

Direct Impacts: Because no activities related to the proposed I-55 Interchange would occur under the No-Build Alternative, there would be no direct relocation impacts.

Indirect Impacts: Because no activities related to the proposed I-55 Interchange would occur under the No-Build Alternative, there would be no indirect relocation impacts.

Cumulative Impacts: Because no activities related to the proposed I-55 Interchange project would occur under the No-Build Alternative, there would be no cumulative relocation impacts.

3.6.4 Potential Relocation Impacts of Alternative A

Direct Impacts: A total of ten potential displacements, consisting of eight single-family residences and two businesses, would occur as a result of implementation of Alternative A. A review of current residential properties listed for sale in the Memphis Area MLS revealed an adequate supply of comparable replacement dwellings within the general project area. However, because of the direct impacts this project would have on minority populations and because the impacted neighborhood is highly cohesive, additional efforts have been made for this project to ensure that the cohesiveness of

this neighborhood is maintained to the extent possible. Those efforts have been successful in identifying vacant land, currently owned by the City of Memphis, which will be made available for purchase by the displaced residents. This land would provide those residents space to construct new homes that could still be considered part of the French Fort Neighborhood. The vacant land is located almost directly west of the displaced residents existing homes on the west side of the existing neighborhood. The two displaced businesses relocations would be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972 and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646).

Indirect Impacts: Although it is likely that the majority of displaced residents would be relocated on the vacant land adjacent to the existing French Fort Neighborhood, at least some housing resources within the City of Memphis or the region may be necessary for relocation of some of the displaced households. If needed, current vacant housing in the area would be utilized for this purpose. Due to the relatively small number of houses that would be needed, it is not expected that this project would have noticeable impacts in terms of effects on the housing market. It is possible that some of the displaced households may be relocated in housing of higher quality and value than their existing residence under the policies and guidelines of the Uniform Relocation Assistance and Real Property Acquisition Act.

Cumulative Impacts: No cumulative impacts in terms of relocation are anticipated under Alternative A. Even when combined with potential relocations of other past, present, and reasonably foreseeable projects in the region, it is not anticipated that any impacts to the local or regional housing market would occur. There are currently no shortages in available homes in the region, and it is anticipated that additional residential developments would occur in the general project vicinity in the foreseeable future.

3.6.5 Potential Relocation Impacts of Alternative B

Direct Impacts: Direct impacts associated with Alternative B would be the same as those discussed for Alternative A. However, it is possible that there would be one less business displacement under Alternative B. If it is determined that the second business, the Southern Cotton Ginners Association, can remain at their present facility, there would be a total of nine potential displacements, consisting of eight single-family residences and one business.

Indirect Impacts: Indirect impacts associated with Alternative B would be the same as those described for Alternative A.

Cumulative Impacts: No cumulative impacts in terms of relocation are anticipated under Alternative B.

3.6.6 Potential Relocation Impacts of Alternative Z

Direct Impacts: Direct impacts associated with Alternative Z would be the same as those discussed for Alternative A.

Indirect Impacts: Indirect impacts associated with Alternative Z would be the same as those described for Alternative A.

Cumulative Impacts: No cumulative impacts in terms of relocation are anticipated under Alternative Z.

3.6.7 Potential Relocation Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Because no displacements would occur under Alternative Z-1, there would be no direct relocation impacts.

Indirect Impacts: Because no displacements would occur under Alternative Z-1, there would be no indirect relocation impacts.

Cumulative Impacts: Because no displacements would occur under Alternative Z-1, there would be no cumulative relocation impacts.

3.6.8 Mitigation

The State's Relocation Assistance Program will be utilized to ensure to the maximum extent possible the prompt and equitable relocation and reestablishment of persons and businesses displaced as a result of this project. The Relocation Assistance Program helps to ensure that displaced parties do not suffer disproportionate harm as a result of programs designed to benefit the public as a whole.

The relocation of displaced households, businesses, and any other affected party will be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646). Comparable replacement housing will be provided to all residential relocatees under the provisions of the above laws. Comparable replacement housing is defined as follows: a decent, safe, and sanitary dwelling; functionally equivalent to the existing displaced dwelling; in a location not less desirable than the existing displaced dwelling; on a site that is typical in size for residential development; currently available on the private market; and within the financial means of the displaced person. It is anticipated that all displaced will be relocated successfully. However, if any situation should exist where comparable decent, safe, and sanitary housing within the financial means of the displaced person is not available; such housing will be made available under the replacement housing of "last resort" provisions of the above laws. Relocation services will be provided without regard to race, color, religion, or national origin. Relocation payments and financial assistance will be in accordance with the above laws.

It is anticipated that at least some of the displaced residents would choose to construct new homes on the vacant land adjacent to the French Fort Neighborhood that will be made available by the City of Memphis for private purchase for residential development. This would allow those residents, who choose the option, to remain part of the neighborhood and help maintain the cohesiveness of the area. The City of Memphis, TDOT, and the residents will continue to coordinate the details of the potential relocation to the vacant property. Other displaced residents may choose to relocate to other portions of Memphis, or elsewhere.

If Alternative Z-1 (Preferred Alternative) is constructed, no mitigation would be required for relocation, because there would be no displacements.

3.7 Economics

3.7.1 Affected Environment

There are various key indicators of economic conditions and growth within an area, including changes in labor force, employment, capital investment, retail sales, and property values. These economic variables are discussed in the context of Shelby County.

Major Industries and Commercial Activity

At the center of a major distribution network, Memphis works from a broad economic base as it continues to diversify its employment opportunities. Historically a trading center for cotton and hardwood, Memphis is the headquarters for major manufacturing, services, and other business concerns. Items and goods produced in the Memphis area include chemicals, machinery, clothing, foodstuffs, electronic equipment, pharmaceuticals, cosmetics, ceiling fans, smokeless tobacco, gift wrap, and bubble gum.

The city is home to three Fortune 500 company headquarters: FedEx, AutoZone, and International Paper. FedEx began its operations in 1973, with 14 small aircraft delivering packages from Memphis International Airport. Today, FedEx averages more than 6 million shipments per day, and serves more than 220 countries and territories. AutoZone opened its first Auto Shack in Forrest City,

Arkansas in 1979; the company is now a leading auto parts retailer, with more than 3,400 stores nationwide. International Paper, organized in 1878, is the largest paper and forest products company in the world, with operations in more than 40 countries.

Memphis's economy is diverse. Services centered in Memphis include banking and finance (First Tennessee, National Commerce Bancorp, and Union Planters); real estate (Belz Enterprises, Boyle Investment Co., and Weston Co.); nonprofits including the world's largest waterfowl and wetlands conservation organization (Ducks Unlimited); and a restaurant chain (Backyard Burgers). Science and technology business is very well represented in Memphis; Brother Industries USA, Buckman Laboratories, Medtronic Sofamor Danek, Morgan-Keegan, Sharp Manufacturing of America, Smith & Nephew, and Wright Medical Technologies all have headquarters in Memphis.

Memphis is considered a mid-South retail center and an attractive tourist destination. Its early and continued role as a major cotton market makes agribusiness an economic mainstay in Memphis. Forty percent of the nation's cotton crop is traded in Memphis, home of three of the world's largest cotton dealers: Dunavant Enterprises; Hohenburg Brothers (now Cargill Cotton); and the Allenberg Company. Memphis is important in other areas of agribusiness. The city has long been established as a prime marketing center for hardwood, as well as wood and paper products. Memphis businesses are also major processors of soybeans, meats, and other foods. Enhancing Memphis's position at the center of agribusiness is Agricenter International, an \$8 million, 140,000 square-foot exhibition center for agricultural exhibitions, experimentation, and information exchange. It brings together the most technologically advanced methods of farming and farm equipment available in one location.

Commercial Shipping

Memphis' Uniport combines a Foreign Trade Zone with river, air, rail, and road facilities to make Memphis one of the nation's most important distribution centers. The Memphis River Port, which connects the City to 25,000 miles of interconnected inland waterways, is the second largest inland port on the Mississippi River, and the fourth largest port in the nation. There are three still-water harbors, which include public terminals, loading facilities, grain elevators, and intermodal connections.

Memphis International Airport is less than 15 minutes from most business centers in the area and serves major airlines and commuter lines. One of the nation's fastest-growing airports, it is often the site of expansion projects, including improvements to cargo facilities. It is the world's busiest cargo airport because of FedEx, UPS, and other air freight companies that move approximately 2.4 million tons of cargo annually.

Transport Topics, a national newspaper for the trucking industry, has called Memphis "an intermodal transportation hub like no other." The area is served by over 300 common carriers, including all major truck lines. Over 100 terminals offer direct services to all 48 contiguous states, as well as to Canada and Mexico. The presence of five Class I rail systems makes Memphis a center for world distribution in the new economy. Memphis is one of only three U.S. cities served by five or more such systems. Eight federal highways, three interstate highways, and seven state highways connect the Memphis trucking industry with the nation and with other vital forms of transportation.

Retail

Retail sales trends for Shelby County for the 1996 to 2001 time period are shown in Table 3.6. The majority of Shelby County's retail sales occur in Memphis. Shelby County experienced an approximate six percent increase in retail sales between 1999 and 2001. Retail sales trends for the post-1998 period cannot be accurately compared to the pre-1998 period because of changes in retail classification in 1998.

Table 3.6. Retail Sales Trends, 1996-2001 (\$billion).

Region	2001	2000	1999¹	1998	1997	1996
Shelby County	\$12,024	\$10,649	\$11,291	\$10,600	\$9,107	\$8,790
¹ Due to changes in retail classification in 1998, sales are not comparable to prior years. <i>Source: Tennessee Department of Economic and Community Development, 2003.</i>						

Employment

In 2007, Shelby County's annual civilian labor force and total employment approximated 451,670 and 429,950 respectively based on data from the Tennessee Department of Labor and Workforce Development. The annual average unadjusted unemployment rate in 2007 in Shelby County was 4.8 percent, with the statewide average being 4.4 percent.

Total non-farm employment within Shelby County increased by approximately 19 percent between 1990 and 2000, less than the statewide increase of 26 percent during this same period. Employment by the major industry sectors in 2006, including the government sector, is shown on Table 3.7. The services and retail trade sectors account for almost one-half of the employment in Shelby County, with government and transportation/public utility being other major employment sectors. Overall, Shelby County has a balanced and diversified employment base. The major employers in Shelby County, which are listed in Table 3.8, reflect the predominance of service sector employment.

Table 3.7. Non-Farm Full and Part-Time Employment by Major Industry Sector, Shelby County, Tennessee (by place of Work), 2006.

Industry Sector	Shelby County	
	Employment	Percent of Total
Total Non-Farm Employment	410,560	-
Sector Employment		
Ag. Services, Forestry, Fishing, Hunting, and Mining	445	<1
Construction	25,209	6
Manufacturing	40,096	10
Wholesale Trade	20,357	5
Retail Trade	49,851	12
Transportation and warehousing, and utilities	49,171	12
Information	7,088	2
Finance and insurance, and real estate and rental and leasing	27,047	7
Professional, scientific, management, administrative and waste management services	39,377	10
Educational services, health care, and social assistance	80,233	20
Arts, entertainment, and recreation, and accommodation, and food services	31,641	8
Other services, except public administration	22,866	6
Public administration	17,179	4
<i>Source: U.S. Census Bureau, 2006.</i>		

Table 3.8. Major Employers in Memphis, Shelby County, Tennessee in 2007.

Employer*	Number Employees
Federal Express (FedEx)	30,000
Memphis City Schools	16,000
United States Government	14,800
Methodist Healthcare	10,000
Baptist Memorial Health Care Corp.	8,000
Shelby County Government	7,183
Memphis City Government	6,680
Wal-Mart Stores, Inc.	6,500
Naval Support Activity Mid-South	6,500
Tennessee State Government	5,247
Shelby County Schools	5,014
Methodist Health Care	4,335
University of Tennessee, Memphis	4,000
* Several other major employers not listed in this table employ over 1,000 employees in the Memphis Area. <i>Source: Memphis Regional Chamber of Commerce, 2007.</i>	

Economic Growth and Incentive Programs

Table 3.9 portrays the trends in industrial growth investment (i.e., manufacturing, distribution, headquarters, selected service projects, etc.) during the 1992 to 2000 time period. During this nine-year period, approximately \$8,859 million was invested in new industries and expansion of existing industries in Shelby County. The majority of this growth and investment has occurred since 1997.

Table 3.9. Announced Industrial Growth/Capital Investment, 1992-2001(\$million).

Region	2000	1999	1998	1997	1996	1995	1994	1993	1992	Total ¹ 1992-2000
Shelby County	\$1,345	\$1,945	\$1,137	\$1,612	\$871	\$793	\$503	\$396	\$256	\$8,859
¹ Includes new industry and expansion of existing industries. Numbers rounded to the nearest million. <i>Source: Tennessee Department of Economic and Community Development, 2003.</i>										

Incentive Programs - New & Existing Industries

Local programs

Think Memphis: Partnership for Prosperity is a public-private initiative whose goal is to make Memphis and Shelby County more globally competitive and attractive to businesses looking to relocate and expand. The program is in part a continuation of Memphis 2005, an economic development program begun in 1996 that aimed to diversify the economy, raise the per capita income, generate 12,000 net new jobs annually, increase minority and woman-owned business development, and lower the crime rate. Memphis 2005 has been credited with Memphis' average nonresidential capital investment of more than \$1 billion a year, 10,000 net new jobs annually, and increased per capita income above the national average. *Think Memphis* also aims to enhance the economic vitality of the Memphis area through collaboration with its chambers of commerce, local and state governments, and other organizations. The initiative, a ten-year multi-million dollar marketing effort, aims to attract 10,000 newcomers to the region, and encourage Memphis residents to remain.

State programs

Tennessee is a right-to-work state, and its overall state and local tax burden is among the lowest of all 50 states. Tennessee has no personal income tax on wages or salaries. Finished goods inventories are exempt from personal property tax, and industrial machinery is totally exempt from state and local sales taxes. Manufacturers receive other tax exemptions under specified circumstances and reduced property assessments. State-administered financial programs for businesses include: the Small and Minority-Owned Business Assistance Program, currently being developed by the state Treasury Department and expected to provide assistance to small and minority-owned businesses through loans, technical assistance, and program services; the Small Business Energy Loan Program, which helps qualified Tennessee-based businesses upgrade their level of energy efficiency in their buildings and manufacturing processes; the FastTrack Infrastructure Program, which assists in the funding of infrastructure improvements for businesses locating or expanding in Tennessee; and the FastTrack Training Services Program, which helps companies provide training for their staff.

The State of Tennessee provides funds for eligible projects that can offset costs that are incurred during the training process. Each project is considered separately based on its economic impact to the state. This program does not include wage payments to persons involved in the training program. Vocational training in Memphis is available through the Tennessee Technology Center, State Technical Institute of Memphis, Mid-South Quality Productivity Center, Southeast College of Technology, and through the public schools.

Development Projects

In January of 2003, Cannon Center, a world-class performing arts center at the north end of Main Street, opened its doors. On the south end, Peabody Place Entertainment and Retail Center, a multifaceted entertainment center, opened in fall of 2001. This city within a city attracts more than 8 million visitors annually; it encompasses three blocks of Beale Street, and includes the Peabody Hotel, the Orpheum Center, FedEx Forum (home of the NBA Memphis Grizzlies) and AutoZone Park (home of the AAA Memphis Redbirds), plus 80 restaurants. A \$30 million Westin Hotel is being built next to the FedEx Forum, replacing a parking lot. AutoZone Park is a world-class baseball stadium that has been credited with stimulating nearby developments ranging from restaurants, night clubs, retail developments, and commercial and residential projects. The major one is Echelon at the Ballpark, a residential/business facility whose amenities include nine-foot ceilings, pass-through fireplaces, balconies with a ballpark view, a fitness center, and business facilities. Other recent projects include the renovation of the Kress Building (listed in the NRHP) into an annex of the adjacent Marriot Hotel, and renovation of the Lawrence Building into a luxury condominium with unique "live/work" areas on the first floor for professionals who work at home.

Property Values

Property value trends for the 2000 to 2006 time period are shown in Table 3.10. Shelby County had a 28 percent increase in total property value during this six-year period. The City of Memphis accounts for approximately 61 percent of Shelby County's total property value. Property value increases reflect primarily real property and improvements through new construction of buildings and facilities that are added to the tax rolls. However, some of the increases in property valuations during this time period were due to reassessments. Nonetheless, property valuation trends are a good indicator of economic growth and construction activity within a region or political jurisdiction.

Table 3.10. Estimated Property Values¹, 2000-2006 (\$billion).

Region	2006	2000	Percent Change, 2000-2006
Shelby County	\$59,086 ¹	\$46,097 ¹	28
¹ Appraised values. Includes real, personal, and public utility property.			
<i>Source: Tennessee Comptroller of the Treasury, Division of Property Assessments, Tax Aggregate Report, 2006 and 2000.</i>			

Real property appraisals for residences that would be impacted by the I-55 Interchange improvements, including both improvements and land, range from \$61,900 to \$108,500 for the potentially displaced residences based upon the 2007 records of the Shelby County Assessor of Property. According to the 2000 U.S. Census, the median value of owner-occupied housing was \$72,800 in Census Tract 52, block group 1, compared to \$92,200 for Shelby County and \$72,800 for the City of Memphis.

3.7.2 Potential Economic Impacts of the No-Build Alternative

Direct Impacts: Most of the existing economic conditions and trends would likely continue into the foreseeable future under the No-Build Alternative. However, not improving the existing I-55 Interchange at E.H. Crump Boulevard and South Riverside Drive would likely slow economic growth and development in the portions of Memphis that rely on I-55, E.H. Crump Boulevard, and/or South Riverside Drive as primary access routes to or from the region. As traffic volumes continue to increase in the Memphis area, the already poor LOS at the I-55 Interchange will continue to decline if no major changes are made. This would make the areas that rely on these roadways much less attractive for future development/revitalization. Because I-55 is a primary truck route, many industries rely heavily on it for transporting goods to and from their facilities. If traffic issues continue to deteriorate due to the existing interchange design, existing industries and potential new industries may not choose to continue utilizing the area. This would be detrimental to the local and regional economies. Although truck access in other portions of Memphis may be suited to continued industrial and economic growth, the southwest portion of Memphis would be adversely impacted. These adverse impacts to the economy would primarily affect the important intermodal transportation facilities available along the Mississippi River in the southwest Memphis area. This portion of the City is important to the overall economy, both locally, regionally, and at a state level.

Indirect Impacts: Not improving the existing I-55 Interchange would result in potential adverse economic impacts that could continue well into the future. Not only would declining LOS have immediate impacts to the local and regional economies, but the effects would become worse with time. Decreased transportation capabilities would ultimately influence choices made by commercial

and industrial leaders whether to locate or expand facilities in the Memphis area, versus moving to other cities that may be able to provide better transportation service. Any loss of prospective industrial development in the area due to the declining traffic conditions from not improving the I-55 Interchange would be detrimental to continued economic growth and prosperity. The impacts would ultimately result in fewer new job openings in the region and ultimately adversely impact unemployment rates, income, and other economic factors. It is not possible to quantify or determine exactly what those impacts would be at this time, but some adverse impacts would be anticipated.

Continued decreases in the already poor LOS of the I-55 Interchange would have potential secondary impacts on other local roadways as drivers attempt to find alternative routes to avoid the highly congested I-55 Interchange. This would ultimately decrease LOS in other areas that would otherwise function at a better LOS. Decreasing LOS in other areas would result in further potential adverse impacts to the local and regional economies.

Cumulative Impacts: Manufacturers, business vendors, and suppliers dependent upon product transport would not have optimum transportation infrastructure available under the No Build Alternative. The lack of optimum transportation infrastructure could curtail business potential for increased production, thereby adversely affecting employment opportunities and associated personal income in the region. Any adverse economic impacts would likely result in long-term impacts that would be difficult to mitigate or counteract. This would be especially true if a large business/employer were to choose not to locate or expand operations in Memphis due to the poor LOS along I-55 at the existing subject interchange. If such an employer were to choose another City outside of the region, it would adversely affect the local economy.

Even when combining the benefits of other past, present, and reasonably foreseeable transportation improvements in the region, it would be expected that not implementing the I-55 Interchange improvement project would be capable of resulting in adverse impacts to the local and regional economies. This is primarily due to I-55 being an important route to, from, and through the area, especially for trucks carrying freight and supplies.

Decreases in LOS on I-55 would have potential secondary impacts on other local roadways as drivers attempt to find alternative routes to avoid the highly congested I-55 Interchange. This increased traffic using local roadways would combine with any new traffic generated by other reasonably foreseeable developments in the project vicinity that may also require the use of local roadways for access. Overall decreases in the LOS of local roadways could have adverse impacts to the local economy if it deters future development in an area. It is not possible to determine the extent of those impacts at this time, but it is anticipated that at least some adverse economic impacts would result under such conditions.

3.7.3 Potential Economic Impacts of Alternative A

Direct Impacts: Both short-term and long-term beneficial and adverse economic impacts would occur under Alternative A. Short-term adverse impacts will occur due to a decrease in the real property tax base and real property tax revenues as a result of the eight residential and two business displacements. Based on the Shelby County Assessor of Property records Memphis and Shelby County real property tax revenue loss from these displacements will approximate \$18,940 annually based on current county and city tax rates and the assessed valuations (year 2007) of the structure and associated land. Real property tax revenue would also be adversely impacted by the removal of small portions of additional properties from the tax rolls for ROW acquisition.

Additional tax revenue losses could also occur due to losses of business-related taxes (e.g., sales, utility, inventory taxes, etc.). However, the tax revenue losses may only be temporary (i.e., limited to the construction phase of the project) if the displaced businesses relocate within the project vicinity. Other short-term adverse economic impacts would include relocation expenses and the temporary loss

of business income during the relocation period. Employees of the displaced businesses may become temporarily unemployed during the relocation period, unless the displaced businesses can utilize them or place them at a temporary location during that period. It is expected that the businesses would be able to locate within the general project vicinity, but if they choose not to reestablish the business, the employees would become unemployed.

Short-term beneficial impacts would be realized by employment associated with the construction of the I-55 Interchange. This new construction-related employment would create additional personal income for the local and regional purchase of consumer goods and services during the construction period, which would most likely occur intermittently over a period of several years.

Over the long term, the economic impacts of this project would be beneficial both locally and regionally. Travel benefits would include decreased travel times, lower operating expenses, and reduced crash rates for both local daily commuters and travelers passing through the area. The project would also result in improved access to the Memphis area providing benefits to local businesses whose customers utilize the I-55 Interchange area. Manufacturing companies that rely on I-55 to transport goods to and from the Memphis area would likely receive additional savings due to more efficient travel through the area, which would reduce delivery time and fuel consumption.

Indirect Impacts: Indirect short-term beneficial impacts would be realized from the additional jobs created both on- and off-site during construction and project development. Indirect employment would result in the form of jobs associated with the provision of supportive goods, supplies, and services necessary for the construction phase of the project. This creation of indirect employment would result in additional indirect personal income for the purchase of goods and services within the region.

It is possible that the I-55 Interchange improvements may promote additional commercial, industrial, and/or residential development, especially in the southern and western portions of Memphis in addition to that which is already planned or anticipated. New development would likely result in long-term economic benefits for the local and regional economies.

As new development occurs in the project vicinity, property values may increase. Some of the abandoned industrial properties located north and east of the project area may become more attractive if access to the area is improved. This would make these areas more valuable. Property values for some locations outside of the immediate project area may also be somewhat impacted by the project, if additional residential developments are needed to supply housing for the additional workforce that would be needed to support any new or expanded industrial development in the area. Areas once perceived as too far from downtown Memphis may become more attractive as commuters may be able to drive the extra distances while maintaining similar commuting times as they currently encounter due to congestion.

Minor indirect impacts to local businesses and the local economy may occur in the short term due to loss of secondary business that may be generated by the two businesses being displaced. This would be especially true of the RV park located in the project area as its tenants likely patronize local businesses for their supplies, food, fuel, and other items. Assuming the displaced businesses are able and/or willing to relocate in the area, the impacts to the secondary businesses would be short term, as well.

Cumulative Impacts: The proposed I-55 Interchange under Alternative A would create improved and expanded transportation services in the region by providing for a more efficient and safe route to travel within Memphis and between Memphis and other cities in the region. Optimum transportation infrastructure could increase business potential, thereby positively affecting employment opportunities and associated personal income in the region. The combination of all of the past, present, and future transportation improvements, revitalization of some of the former industrial areas,

and other new residential, industrial, and commercial developments would result in continued economic growth in the region. Although some of this development would likely occur without the I-55 Interchange Improvements, it is likely that the project would increase the rate at which some of the development happens and may result in some development that otherwise would not have occurred.

Areas in West Memphis, Arkansas would likely receive some of the economic benefits that would occur due to this project, because some of the commercial, industrial, and residential development would likely occur on available properties in that area. The West Memphis area is conveniently juxtaposed to downtown Memphis and has the potential to provide commuters with easy access to the area. At the present time this access is compromised by the heavy congestion on I-55 primarily at the I-55 Interchange with E.H. Crump Boulevard and South Riverside Drive. Commuters would likely be more willing and able to travel the I-55 corridor through the project area to reach their destinations in Memphis once some of the existing traffic issues are resolved by improving the interchange.

The ongoing and future businesses being promoted by the Memphis Regional Chamber, Memphis Center City Commission in the Central Business Improvement District, and by the President's Island Industrial Association would experience long-term beneficial cumulative economic impacts. No other reasonably foreseeable future projects were identified in the cumulative impact analysis area that could provide measurable cumulative economic impacts.

3.7.4 Potential Economic Impacts of Alternative B

Direct Impacts: Direct economic impacts of Alternative B would be essentially the same as those of Alternative A, except it is possible that one less business would be displaced by the project. Therefore, there would be a slight decrease in the amount of real property tax base and real property tax revenues that could be lost as a result of the business displacements. Assuming the Southern Cotton Ginners Association would not need to be displaced, the short-term property tax loss from displacements under Alternative B would be \$14,164 annually based on Shelby County Assessor of Property records (year 2007).

Alternative B would eliminate the current direct access to Metal Museum Drive, which would eliminate some current through traffic in the local neighborhood, but would also adversely affect the commuting options of the local residents. These impacts would be considered long term but minor to local residents. Consumer access to some local businesses off of Metal Museum Drive would be adversely affected.

Indirect Impacts: Indirect economic impacts of Alternative B would be the same as Alternative A, except one less business may be impacted by Alternative B. If the Southern Cotton Ginners Association office is not displaced, there would be fewer short-term indirect impacts associated with loss of business during construction. Also, secondary business that is generated by employees or visitors to the Southern Cotton Ginners Association facilities would continue to provide income for other area businesses. Therefore, the potential for adverse economic impacts would be slightly reduced compared to Alternative A.

Cumulative Impacts: Cumulative Impacts associated with Alternative B would be the same as those discussed under Alternative A except that Alternative B would eliminate the current direct access to Metal Museum Drive. This would eliminate some current through traffic in the local neighborhood, but would also adversely affect the commuting options of the local residents. These impacts would be considered long term but minor to local residents. The cumulative impact from the I-55 Interchange project coupled with likely improvements in the neighboring industrial areas would result in long-term beneficial cumulative impacts to the economy.

3.7.5 Potential Economic Impacts of Alternative Z

Direct Impacts: Direct economic impacts of Alternative Z would be similar to Alternative A and B, except all local access to the French Fort Neighborhood and the local businesses would be through the proposed roundabout interchange. These impacts would be considered long term but minor to local residents. Consumer access to some local businesses off of Metal Museum Drive would be adversely affected, but these impacts are expected to be minor.

Indirect Impacts: Indirect economic impacts of Alternative Z would be similar to Alternative B. Therefore, the potential for adverse economic impacts would be slightly reduced compared to Alternative A.

Cumulative Impacts: Cumulative Impacts associated with Alternative Z would be the same as those discussed under Alternative A and B except that local access to the French Fort Neighborhood and the local businesses would be through the proposed roundabout interchange. Direct consumer access to some local businesses off of Metal Museum Drive would be adversely affected, but these impacts are expected to be minor. The cumulative impact from the I-55 Interchange project coupled with likely improvements in the neighboring industrial areas would result in long-term beneficial cumulative impacts to the economy.

3.7.6 Potential Economic Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct economic impacts of Alternative Z-1 would be similar to those of Alternatives A, B, and Z, except there would be no businesses displaced by the project.

Alternative Z-1 would eliminate the current direct access to Metal Museum Drive, and all local access to the French Fort Neighborhood and the local businesses would be through the proposed roundabout interchange. These impacts would be considered long term but minor to local residents. Consumer access to some local businesses off of Metal Museum Drive would be adversely affected, but these impacts would be minor.

Indirect Impacts: Indirect economic impacts of Alternative Z-1 would be similar to Alternative A, B, and Z, except that Alternative Z local access to the French Fort Neighborhood and the local businesses would be through the proposed roundabout interchange. Only minor adverse economic impacts would be anticipated due to temporary disruption to local businesses during construction..

Cumulative Impacts: Cumulative Impacts associated with Alternative Z-1 would be similar to those discussed under Alternative Z. The cumulative impact from the I-55 Interchange project coupled with likely improvements in the neighboring industrial areas would result in long-term beneficial cumulative impacts to the economy.

3.7.7 Mitigation

The overall economic benefits the improved I-55 Interchange would provide to the local and regional economy in the long term would mitigate potential short-term adverse impacts. The improvements would provide for better access to existing properties in the project area that are currently limited due to traffic congestion issues at the current interchange. This improved access and traffic flow may promote additional development and economic growth in the immediate project area and for the region in general.

The State's Relocation Assistance Program will be utilized to ensure to the maximum extent possible the prompt and equitable relocation and reestablishment of businesses displaced as a result of this project. The Relocation Assistance Program helps to ensure that displaced parties do not suffer disproportionate harm as a result of programs designed to benefit the public as a whole.

The relocation of displaced businesses will be administered in accordance with the provisions and procedures of the Tennessee Uniform Relocation Assistance Act of 1972, and the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646).

3.8 Pedestrians and Bicyclists Considerations

The Build Alternatives for this project do not currently include adding facilities for pedestrians or bicycles, such as sidewalks or bike lanes as this project is being designed primarily for interstate traffic. The proposed alignments would not sever existing routes for non-motorized vehicle or pedestrian traffic.

Alternative A would provide a direct connection between Illinois Avenue and Crump Boulevard by including an underpass under I-55. This underpass would provide a direct connection to downtown Memphis for residents and businesses in the French Fort Neighborhood and areas to the south and west. There is the potential that sidewalks or bicycle lanes could be added to this new connection unless it is determined to be a safety issue. Provision of bicycle or pedestrian accommodations will be determined during the final design phase of the project. Maintaining direct access to the French Fort Neighborhood and surrounding areas via the exit ramp from Southbound I-55 to Illinois Avenue under Alternative A would result in additional through traffic in the local neighborhood, which could reduce safety for pedestrians and bicycles in the vicinity. However, the current facilities already provide access to the general area for traffic leaving I-55 so no measurable impacts, in terms of pedestrian and bicycle safety, would be expected if Alternative A were implemented.

Alternative B would eliminate the current direct access to the French Fort Neighborhood from southbound I-55 to Alston Avenue and would therefore eliminate some current through traffic and result in potential increased safety for pedestrians and bicyclists. The proposed ramp connecting southbound I-55 to eastbound Crump Boulevard would not be expected to provide pedestrian or bicycle access due to safety concerns. Therefore, no measurable impacts would be anticipated for pedestrian and bicycle facilities under Alternative B.

The Alternative Z mainline I-55 lanes would be the same as Alternative A and Alternative B. The French Fort Neighborhood access would be primarily through the roundabout described in Section 2 above. No measurable impacts would be anticipated for pedestrian and bicycle facilities under Alternative Z.

The Alternative Z-1 (Preferred Alternative) would shift the mainline I-55 lanes to the north and east to avoid residential displacements in the French Fort Neighborhood. The French Fort Neighborhood access would be primarily through the traffic circle described in Section 2 above. No measurable adverse impacts would be anticipated for pedestrian and bicycle facilities under Alternative Z-1.

3.9 Air Quality

3.9.1 Affected Environment

Regulations

The Clean Air Act (CAA), which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards has set NAAQS for six principal pollutants as shown in Table 3.11. These six are called criteria pollutants. Areas in which air pollution levels persistently exceed the NAAQS may be designated as “nonattainment”. States in which a

nonattainment area is located must develop and implement a State Implementation Plan (SIP) containing policies and regulations that will bring about attainment of the NAAQS.

Table 3.11. Summary of National Primary Ambient Air Quality Standards.

Pollutant	Primary Standard	Averaging Time	Secondary Standard
Carbon Monoxide	9 ppm (10 mg/m ³)	8-hour ⁽¹⁾	None
	35 ppm (40 mg/m ³)	1-hour ⁽¹⁾	None
Lead	1.5 µg/m ³	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m ³)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM ₁₀)	Revoked ⁽²⁾	Annual ⁽²⁾ (Arith. Mean)	
	150 µg/m ³	24-hour ⁽³⁾	
Particulate Matter (PM _{2.5})	15.0 µg/m ³	Annual ⁽⁴⁾ (Arith. Mean)	Same as Primary
	35 µg/m ³	24-hour ⁽⁵⁾	
Ozone	0.08 ppm	8-hour ⁽⁶⁾	Same as Primary
	0.12 ppm	1-hour ⁽⁷⁾ (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-----
	0.14 ppm	24-hour ⁽¹⁾	-----
	-----	3-hour ⁽¹⁾	0.5 ppm (1300 µg/m ³)

(¹) Not to be exceeded more than once per year.
(²) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM₁₀ standard in 2006 (effective December 17, 2006).
(³) Not to be exceeded more than once per year on average over 3 years.
(⁴) To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
(⁵) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).
(⁶) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(⁷) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.
(b) As of June 15, 2005 EPA revoked the [1-hour ozone standard](#) in all areas except the fourteen 8-hour ozone nonattainment [Early Action Compact \(EAC\) Areas](#).

Existing Air Quality

In 1991, the EPA designated Shelby County, Tennessee, a moderate nonattainment area for carbon monoxide (CO) and a marginal nonattainment area for ozone. Due to improvement in the ambient air quality, the EPA redesignated Shelby County to attainment for CO on August 31, 1994 and for ozone on February 16, 1995.

In April 2004, the EPA designated Memphis as an eight-hour ozone moderate nonattainment area (69 FR 23858). Included in this designation are two counties: Shelby County, Tennessee, and Crittenden County, Arkansas. On September 15, 2004, the EPA reclassified the area from moderate to marginal. The reclassification means that the area is expected to achieve clean air sooner. An earlier one-hour ozone standard was revoked on June 15, 2005. In 1978 the EPA designated Memphis, Tennessee a moderate (less than 12.7 ppm) non-attainment area for carbon monoxide (CO), with regard to the NAAQS. Due to improvements in ambient air quality, EPA redesignated Shelby County to attainment for the CO standard on August 31, 1994. Memphis' attainment status for CO was revisited in the ten-year maintenance plan for CO and the motor vehicle emission budget (MVEB) contained in it. In addition to a new budget value established for the MVEB in the ten-year plan, the last year of the plan is now 2017.

In 2006, there were three ozone monitoring stations located in Shelby County. Monitoring data for these sites was obtained from the EPA AirData website (<http://www.epa.gov/air/data/index.html>). To attain the eight-hour ozone standard, the 3-year average of the fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 parts per million (ppm). In 2006, the fourth-highest daily maximum eight-hour average exceeded 0.08 ppm at two of the three ozone monitoring stations in Shelby County. On February 3, 2010, the EPA re-designated Shelby County as attainment for the 1997 eight-hour ozone NAAQS. In order to maintain the attainment status, Shelby County will need to maintain low ozone levels for the next 10 years, which also requires demonstrating conformity for the LRTP and TIP.

Conformity

To measure the impact of projects included in the TIP, air quality conformity determination is conducted using an air quality conformity model to demonstrate the projects included in the current TIP conform to the air quality standards. The EPA's "Transportation Conformity Regulations" were updated in January 2008. The 1990 Clean Air Act Amendments (CAAAAs) and the Tennessee Transportation Conformity Rule require that each new regional *Long-Range Transportation Plan* (LRTP) and *Transportation Improvement Program* (TIP) must be demonstrated to conform to the *Tennessee State Implementation Plan* (SIP). In September 2010, the Memphis MPO Transportation Policy Board approved the FY 2011-2014 TIP. The Amended Memphis Urban Area 2030 LRTP was approved by the Memphis MPO Transportation Policy Board in March 2008.

According to the July 2004 Companion Guidance, states in a multi-state area have the option of submitting SIPs with budgets for just their own portion of the area that, when taken together, meet the applicable Clean Air Act requirement. Where states have done so and EPA has found such budgets adequate, the MPO or MPOs in each state with such budgets can determine conformity independently of the other states (*Companion Guidance for the July 1, 2004, Final Transportation Conformity Rule: Conformity Implementation in Multi-jurisdictional Nonattainment and Maintenance Areas for Existing and New Air Quality Standards*). Shelby County has budgets of its own. Crittenden County (AR) does not have budgets. After extensive interagency consultation, both counties agreed that it is best to perform this conformity demonstration independently. Therefore, the conformity determination is only for the Shelby County portion of the 8-hour ozone non-attainment area. Crittenden County is an attainment area for CO pollutant.

After utilizing the Travel Demand Model and MOBILE6.2 to obtain the necessary input factors, total emissions were calculated for the ozone precursor pollutants volatile organic compounds (VOCs) and nitrogen oxides (NO_x) as well as for carbon monoxide (CO). As a result of this analysis, it was determined that all pollutants fall within their established SIP and federally-established motor vehicle emission budgets. Therefore, it was determined that the FY 2011-2014 TIP and the Memphis Urban Area 2030 LRTP conform under the eight-hour ozone and CO NAAQS. The I-55 Interchange project is included in both of those plans.

Microscale Carbon Monoxide Hot-Spot Analysis

Since carbon monoxide is a site-specific pollutant, with its major concentrations generally found immediately adjacent to roadways, it is usually of concern on a local or microscale basis. Therefore, the study of air quality impacts as a result of project-generated traffic is typically evaluated through a microscale analysis of traffic-related CO levels. The microscale air quality analysis for this study evaluated local CO levels at receptor sites located adjacent to the project area. Carbon monoxide was selected as the air pollutant indicator to be evaluated for this project, because automobiles and trucks are major sources of CO emissions. Ozone is not a concern at the microscale level, because it is a regional pollutant that is analyzed as part of the State Implementation Plan development and conformity process. In addition, ozone, unlike CO, is reactive in that it results from a chemical interaction between volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). Meteorology plays a key role in the concentration and dispersion of ozone.

Microscale CO concentrations are estimated through the use of computerized mathematical models (MOBILE6 and CAL3QHC) since data on street level CO concentrations is not available for most projects. The carbon monoxide microscale dispersion analysis conducted is consistent with the latest mobile source emissions factors issued by the EPA known as MOBILE6 and Conformity Regulations dated November 11, 1993 (40 CFR Part 93). The CAL3QHC model, Version 2.0 (USEPA, 1992), is the model used for the microscale analysis.

Using these models, CO levels were calculated for the peak one-hour period to determine the potential highest CO concentrations for Build Alternatives A and B. A default background CO concentration of 3.2 ppm was used (i.e., the highest concentration recorded at an air quality monitoring site in Shelby County in 2006). Carbon monoxide concentrations were calculated for receptors for the years 2012 (base year) and 2032 (design year). For this analysis, receptors were located along I-55 and Illinois Avenue.

For the Build Alternatives, the maximum future one-hour CO concentrations are projected to be 5.3 ppm in 2012 and 5.4 ppm in 2032. These are well below the NAAQS one-hour standard of 35.0 ppm. The highest projected CO concentrations are located along the proposed ROW of I-55. Since the highest projected one-hour concentration is lower than the eight-hour NAAQS of 9.0 ppm, calculation of eight-hour concentrations is not required for this project.

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a *Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Source* (66 FR 17229) (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, the EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

The Clean Air Act identified 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list of toxics and selected a group of 21 that it considers MSATs. More recently, the agency has extracted a subset of this list of 21 and developed what the EPA now labels the six priority MSATs. These are benzene formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene. While the EPA has identified these as the higher priority MSATs, the agency has not proposed to establish ambient standards for any of these pollutants.

The EPA issued a final rule on *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* (66 FR 17235) in March 2001 under provisions of the Clean Air Act requiring EPA to characterize, prioritize, and control these emissions as appropriate. In addition to highlighting the 21 MSATs, the final rule summarized the mobile sources contribution to national inventories of hazardous air pollutants. Since MSATs can be loosely defined as volatile organic compounds, nonvolatile organics, diesel particulate matter/diesel exhaust gasses, or metals, the linkage with transportation vehicles and fuels is direct.

The EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines. According to a FHWA analysis, even if U.S. Annual Vehicle Miles Traveled (VMT) increases by 64 percent, reductions of 57 percent to 87 percent in MSATs are projected from 2000 to 2020 (EPA, 2006). Despite national trend information on MSATs, reductions, many questions remain unanswered about the overall health risk of these air toxics. In particular, the tools and techniques for assessing project-specific health impacts from MSATs are limited. These limitations impede the FHWA's ability to evaluate how mobile source health risks should factor into project-level decision-making under NEPA. In addition, the EPA has not established regulatory concentration targets for the six priority MSAT pollutants appropriate for use in the project development process.

Unavailable Information for Project Specific MSAT Impact Analysis

The EIS for the I-55 Interchange project includes a basic analysis of the likely MSAT emission impacts for the project. However, available technical tools do not provide the ability to predict the project specific health impacts of the emission changes associated with the alternatives carried forward in this EIS. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

- **Emissions:** The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model—emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of Particulate Matter (PM) under the conformity rule, EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis. These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.
- **Dispersion:** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.
- **Exposure Levels and Health Effects:** Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis prevent the ability to make meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There

are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from the EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- Benzene is characterized as a known human carcinogen.
- The potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- Formaldehyde is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- 1,3-butadiene is characterized as carcinogenic to humans by inhalation.
- Acetaldehyde is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- Diesel exhaust (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- Diesel exhaust also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

Additionally, the following are identified by the EPA as non-cancer health endpoints of potential concern:

- Benzene (decreased lymphocyte count)
- Acrolein (nasal lesions)
- Formaldehyde (respiratory)
- 1,3-butadiene (ovarian atrophy)
- Acetaldehyde (degeneration of the olfactory epithelium)

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by the EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes—particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based Upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this document, FHWA has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

Mobile Source Air Toxics (MSAT) Qualitative Assessment

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives*, found at:

www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

For each alternative in this EIS, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is slightly higher than that for the No-Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the I-55 Interchange under the Build Alternatives, along with a corresponding decrease in MSAT emissions along the other routes or secondary routes currently used to bypass the highly congested portions of I-55 near the existing I-55/E.H. Crump Boulevard Interchange. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under each of the alternatives are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the project area are likely to be lower in the future in nearly all cases.

The additional travel lanes and proposed realignment contemplated as part of the project Build Alternatives will have the effect of moving some traffic closer to nearby homes and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSATs could be higher under certain Build Alternatives than the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded and realigned roadway sections that would be built as part of Alternatives A, B, and Z. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. When a highway is widened and realigned, and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative. However, this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than present levels.

Global Warming

FHWA's current approach on the issue of global warming is summarized in this section. To date, no national standards have been established regarding greenhouse gases, nor has EPA established criteria or thresholds for greenhouse gas emissions. On April 2, 2007, the Supreme Court issued a decision in *Massachusetts et al v. EPA et al* that the EPA does have authority under the CAA to establish motor vehicle emissions standards for CO₂ emissions. The EPA is currently determining the implications to national policies and programs as a result of the Supreme Court decision. However, the Court's decision did not have any direct implications on requirements for developing transportation projects.

FHWA does not believe it is informative at this point to consider greenhouse gas emissions in an EIS. The climate impacts of CO₂ emissions are global in nature. Analyzing how alternatives evaluated in an EIS might vary in their relatively small contribution to a global problem will not better inform decision-makers. Further, due to the interactions between elements of the transportation system as a whole, emissions analyses would be less informative than ones conducted at regional, state, or national levels. Because of these concerns, FHWA concludes that they cannot usefully evaluate CO₂ emissions in this EIS in the same way that we address other vehicle emissions.

FHWA is actively engaged in many other activities with the DOT Center for Climate Change to develop strategies to reduce transportation's contribution to greenhouse gases, particularly CO₂ emissions, and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. FHWA will review and update its approach to climate change at both the project and policy level as more information emerges and as policies and legal requirements evolve.

3.9.2 Potential Air Quality Impacts of the No-Build Alternative

This EIS includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impact of emission changes associated with the construction of the new interchange. Due to these limitations, discussion in accordance with CEQ regulations [40 CFR 1502.22(b)] regarding incomplete or unavailable information has also been included in this EIS.

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives*, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

Under the No Build Alternative, the amount of MSATs emitted would be proportional to VMT. Over a long period of time, MSATs would be expected to decrease in the immediate area due to implementation of the EPA's vehicle and fuel regulations despite increases in ADT. On a regional basis, MSATs under this alternative would be higher than those expected under The Build Alternatives due to the continued increase in traffic congestion.

Under the Build Alternatives, operation of construction vehicles would result in short-term, localized increases in MSATs along new roadway sections. In addition, the amount of MSATs emitted would be proportional to VMT. The VMT estimated for the Build Alternatives is higher than that for the No Build Alternative, because the additional capacity of the improved highway would increase traffic efficiency and may attract rerouted trips from elsewhere in the Memphis and West Memphis transportation network. This increase in VMT would lead to a localized higher MSATs emitted for

the Build Alternatives along the improved highway. However, these increases would be reduced in the future due to the implementation of the EPA's vehicle and fuel regulations.

According to the EPA's MOBILE6 emissions model, emissions of all the priority MSATs, except for diesel particulate matter, decrease as speed increases. Upon completion of the interchange improvements, traffic flow in and around the Memphis and West Memphis transportation network would be more efficient resulting in increased speeds and an immediate reduction in MSATs emitted on a regional level. In addition to these immediate reductions, MSATs would continue to be reduced in the future due to the implementation of the EPA's vehicle and fuel regulations.

Direct Impacts: If the No-Build Alternative were selected, it is anticipated that local air quality may be adversely impacted as LOS would continue to decline and traffic congestion would continue to increase. Increased emissions from vehicles forced to idle in the area would result in potential health risks for adjacent residents. However, the extent of those risks cannot be predicted at this time.

It is likely that in the long-term, there would be some reduction in MSAT levels due to new EPA regulations and eventual fleet turnover that would provide for cleaner engines and fewer MSAT emissions. However, with no improvement to the traffic flow in the I-55 Interchange area, it is likely that at least some potential adverse air quality impacts would occur throughout the reasonably foreseeable future.

Indirect Impacts: If no improvements were made to help reduce traffic congestion at the existing I-55 Interchange, it is likely that some long-term adverse air quality impacts would occur, at least locally and possibly regionally. Continued decreases in LOS on I-55 at the existing interchange would eventually result in more traffic being forced to utilize other routes in the area resulting in potential decreased LOS on those alternative routes as well as increased VMT. Decreased LOS on other routes would likely eventually result in increased traffic congestion in those other areas. This could result in additional areas being exposed to increased vehicle emissions due to congestion. Also, use of alternative routes would result in additional VMT than would otherwise be necessary if improvements were made at the existing I-55 Interchange to help reduce congestion. Increased VMT would result in potential increases in air quality impacts.

Cumulative Impacts: It is anticipated that adverse impacts to air quality would occur if no improvements were made to the existing I-55 Interchange because traffic conditions would continue to deteriorate. Reduced LOS on the existing roadway would combine with potential increased traffic volumes generated by continued regional urban growth and increases in truck traffic. Even if other planned transportation improvements are implemented as planned around the region, potential adverse regional air quality impacts would be anticipated if the I-55 Interchange is not improved. This is because I-55 is a major corridor that carries a substantial amount of traffic, especially trucks, through the region. The existing cloverleaf ramps result in congestion and force traffic to continuously transition between deceleration, idling, and acceleration resulting in increased emissions.

3.9.3 Potential Air Quality Impacts of Alternative A

Direct Impacts: This project is not expected to cause or contribute to any violation of the NAAQS. The maximum future one-hour CO concentrations for Alternative A are projected to be 5.3 ppm in 2012 and 5.4 ppm in 2032. These are well below the NAAQS one-hour standard of 35.0 ppm. The highest projected CO concentrations are located along the proposed ROW of I-55. Since the highest projected one-hour concentration is lower than the eight-hour NAAQS of 9.0 ppm, calculation of eight-hour concentrations was not required for this project.

The amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for Alternative A is slightly higher than that for the No-Build Alternative, because the additional capacity increases the efficiency

of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for Alternative A along the I-55 Corridor, along with a corresponding decrease in MSAT emissions along the secondary routes currently used to avoid the congestion at the existing I-55/E.H. Crump Boulevard Interchange. The emissions increase would be offset somewhat by lower MSAT emission rates due to increased speeds, because according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Regardless of the alternative chosen for this project, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the project area are likely to be lower in the future in nearly all cases.

The additional travel lanes and proposed realignment contemplated as part of Alternative A will have the effect of moving some traffic closer to nearby homes and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher than the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded and realigned roadway sections that would be built. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. When a highway is widened and realigned, and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative. However, this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than present levels.

Overall, this project alone is not expected to result in any substantial impacts to air quality.

Indirect Impacts: Implementation of Alternative A may result in minor secondary impacts to air quality in terms of relieving traffic congestion on secondary roads used to bypass the existing Interchange. Improvements to the interchange could promote secondary developments in and around the project area which could result in additional impacts to air quality. Most of those impacts would likely be considered short-term due to construction equipment exhaust, dust, and other construction related activities. Secondary developments may increase the amount of traffic in the area which could eventually influence air quality if new areas of traffic congestion result. Such impacts cannot be predicted accurately at this time. However, due to the EPA vehicle and fuel regulations, coupled with fleet turnover, it is likely that air quality impacts would be minor.

Cumulative Impacts: The improvements to traffic flow resulting from the I-55 Interchange project would likely result in overall improvements to air quality when combined with other past, present, and reasonably foreseeable transportation projects and changes in EPA vehicle and fuel regulations. Overall regional air quality is expected to improve into the future even with additional development expected in the area.

3.9.4 Potential Air Quality Impacts from Alternative B

Direct Impacts: Air quality impacts associated with Alternative B would be essentially the same as those discussed for Alternative A.

Indirect Impacts: Indirect air quality impacts associated with Alternative B would be essentially the same as those discussed for Alternative A.

Cumulative Impacts: Cumulative impacts to air quality associated with Alternative B would be essentially the same as those discussed for Alternative A.

3.9.5 Potential Air Quality Impacts from Alternative Z

Direct Impacts: Air quality impacts associated with Alternative Z would be essentially the same as those discussed for Alternative A.

Indirect Impacts: Indirect air quality impacts associated with Alternative Z would be essentially the same as those discussed for Alternative A.

Cumulative Impacts: Cumulative impacts to air quality associated with Alternative Z would be essentially the same as those discussed for Alternative A.

3.9.6 Potential Air Quality Impacts from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Air quality impacts associated with Alternative Z-1 would be essentially the same as those discussed for Alternative A.

Indirect Impacts: Indirect air quality impacts associated with Alternative Z-1 would be essentially the same as those discussed for Alternative A.

Cumulative Impacts: Cumulative impacts to air quality associated with Alternative Z-1 would be essentially the same as those discussed for Alternative A.

3.9.7 Mitigation

No violations of the NAAQS are projected for this project. Therefore, no air quality mitigation measures are required for the project improvements.

During construction the contractor must comply with all federal, state, and local laws and regulations governing the control of air pollution. Adequate dust-control measures would be maintained so as not to cause detriment to the safety, health, welfare, or comfort of any person or cause any damage to any property or business.

Demolition and construction activities can result in short-term increases in fugitive dust and equipment-related particulate emissions in and around the project area. (Equipment-related particulate emissions can be minimized if the equipment is well maintained.) The potential air quality impacts would be short-term, occurring only while demolition and construction work is in progress and local conditions are appropriate. The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of materials. The potential is greatest during dry periods, periods of intense construction activity, and during high wind conditions.

Dust and airborne dirt generated by construction activities will be controlled through dust control procedures or a specific dust control plan, when warranted. The contractor and TDOT will meet to review the nature and extent of dust-generating activities and would cooperatively develop specific types of control techniques appropriate to the specific situation. Techniques that may warrant consideration include measures such as minimizing track-out of soil onto nearby publicly-traveled roads, reducing speed on unpaved roads, covering haul vehicles, and applying chemical dust suppressants or water to exposed surfaces, particularly those on which construction vehicles travel.

With the application of appropriate measures to limit dust emissions during construction, this project would not cause any short-term particulate matter air quality impacts.

3.10 Revised Noise Evaluation

3.10.1 Affected Environment

The effects of increased noise levels that could potentially result from implementing the project have been evaluated according to the guidance in the 23 Code of Federal Regulations, Part 772, which is included in the TDOT Guidelines on Traffic Noise Abatement. Please see the Noise Technical Appendix (Appendix A of this document) for details of the updated noise evaluation.

Predicted noise levels were compared to existing levels and to the Federal Noise Abatement Criteria to determine the impact of highway-generated noise on the project area. A noise impact can occur when predicted noise levels approach or exceed the noise abatement criteria and also when there are "substantial" increases in the design year noise levels over the existing noise levels. Traffic-generated noise levels were predicted for the present year and the design year (2032) using TNM 2.5, a computer simulation model based on the FHWA Highway Traffic Noise Prediction Model. This computer model takes into account anticipated traffic volumes, vehicle types, and vehicle speeds to calculate future traffic-generated noise levels. Noise levels were predicted for the outdoor living areas using the worst-case traffic conditions likely to occur on a regular basis during the design year.

A total of 76 sensitive receptors were modeled as part of this study. All of the receptors analyzed are single family residences located in the French Fort Neighborhood. Existing noise levels were estimated with computer modeling at these receptors. The existing estimated noise levels range from 58 to 74 dBA. The 67 dBA noise criterion is approached or exceeded at 26 of the receptors analyzed. Please see Table A-4 in the Noise Technical Appendix (Appendix A) for the predicted noise levels at each receptor.

3.10.2 Potential Noise Consequences of the No-Build Alternative

Direct Impacts: Noise impacts for this project were evaluated in accordance with the FHWA Noise Assessment Guidelines. Noise modeling results for the project are shown in Appendix A. Under the No-Build Alternative, 28 noise impacts are projected.

Indirect Impacts: There are no indirect noise impacts associated with the No-Build Alternative

Cumulative Impacts: There are no cumulative noise impacts associated with the No-Build Alternative.

3.10.3 Potential Noise Consequences of Alternative A

Direct Impacts: Under Alternative A, 39 noise impacts are projected.

Indirect Impacts: There are no indirect noise impacts associated with Alternative A.

Cumulative Impacts: There are no cumulative noise impacts associated with Alternative A.

3.10.4 Potential Noise Consequences of Alternative B

Direct Impacts: Under Alternative B, 37 noise impacts are projected.

Indirect Impacts: There are no indirect noise impacts associated with Alternative B.

Cumulative Impacts: There are no cumulative noise impacts associated with Alternative B.

3.10.5 Potential Noise Consequences of Alternative Z

Direct Impacts: Under Alternative Z, 38 noise impacts are projected.

Indirect Impacts: There are no indirect noise impacts associated with Alternative Z.

Cumulative Impacts: There are no cumulative noise impacts associated with Alternative Z.

3.10.6 Potential Noise Consequences of Alternative Z-1 (at-grade)

Direct Impacts: Under Alternative Z-1 at-grade, 32 noise impacts are projected.

Indirect Impacts: There are no indirect noise impacts associated with Alternative Z-1 (at-grade).

Cumulative Impacts: There are no cumulative noise impacts associated with Alternative Z-1 (at-grade).

3.10.7 Potential Noise Consequences of Alternative Z-1 (depressed)

Direct Impacts: Under Alternative Z-1 (depressed), 19 noise impacts are projected. By depressing the mainline I-55 traffic lanes, beneficial impacts would be expected compared to the existing or no-build condition and the other build alternatives.

Indirect Impacts: There are no indirect noise impacts associated with Alternative Z-1 (depressed).

Cumulative Impacts: There are no cumulative noise impacts associated with Alternative Z-1 (depressed).

3.10.8 Mitigation

Based on preliminary evaluation, a noise barrier would be feasible and reasonable to provide noise abatement for residents in the French Fort Neighborhood. Once a final highway design is completed, the feasibility and reasonableness of a noise barrier can be further evaluated. The final decision on implementation of abatement measures (e.g., noise walls) will be made during the project design phase and after consideration of input from the public involvement process. Noise walls would be designed during the final design phase of the project with public input on the design.

Trucks and machinery used for construction produce noise and vibration, which may affect some land uses and activities during the construction period. Individuals inhabiting homes along I-55 will at some time experience perceptible construction noise and vibration from the implementation of this project. Occupants of buildings within a radius of approximately 200 feet from some construction equipment may perceive ground vibration effects during the operation of that equipment. Although these effects are temporary and will vary from day to day based on specific construction operations, cosmetic damage is unlikely to occur to buildings situated beyond approximately 100 feet from the heaviest vibration generators. To minimize or eliminate the effects of construction noise on adjacent sensitive receptors, mitigation measures have been incorporated into TDOT's Standard Specifications for Road and Bridge Construction. These measures will be implemented for this project.

3.11 Water Quality

3.11.1 Affected Environment

Prior to the field surveys, USGS 7.5 minute quadrangle maps were reviewed to determine the potential existence of streams and/or other water resources within the projected ROW and 500-foot study corridor. No mapped streams were identified within the project area. To confirm this information, the entire study corridor was surveyed in the field for presence of ephemeral streams, intermittent streams, perennial streams, and wet-weather conveyances, and it was confirmed that none were present. Field surveys also concluded that there are no springs, ponds, or lakes within the projected ROW or 500-foot study corridor. No Federal Wild and Scenic Rivers or Tennessee State Scenic Rivers occur within or in the vicinity of the project area.

Because of the elevated geographic positioning of the project area relative to the immediate surrounding areas, it is likely that it never contained substantial water resources. Precipitation runoff has likely been the primary water-related influence in the area. Since European settlement, the topography and landscape within the project area has been substantially altered by extensive urban

development. This includes leveling for construction and installation of underground stormwater sewer systems. Several stormwater grates were located during field investigations, and it is likely that these now accommodate the majority of the precipitation runoff from the site. The stormwater system in the project area is monitored to ensure compliance with regulations regarding stormwater discharges. It is not anticipated that the proposed project would result in substantial changes to the existing stormwater system or the volume or quality of water transported by the system.

3.11.2 Potential Water Quality Impacts of the No-Build Alternative

Direct Impacts: Because no activities related to the proposed I-55 Interchange would occur under the No Action Alternative, there would be no direct impacts to water quality.

Indirect Impacts: Because no activities related to the proposed I-55 Interchange would occur under the No Action Alternative, there would be no indirect impacts to water quality.

Cumulative Impacts: Because no activities related to the proposed I-55 Interchange would occur under the No Action Alternative, no impacts on water quality would occur when combined with other unrelated projects in the area.

3.11.3 Potential Water Quality Impacts of Alternative A

Direct Impacts: Because there are no aquatic resources in the proposed ROW or within the 500-foot study corridor, there would be no direct impacts to these resources.

Indirect Impacts: There would be potential short-term adverse indirect impacts to water quality downstream of the site as a result of this construction. These could arise from increased soil disturbance caused by construction activities. Downstream sediment loading could increase during precipitation events. These impacts are expected to be minimal, because construction efforts would consist of improvements in a previously developed area so no major grading or cut and fill activities would be required. Best Management Practices, such as silt fencing, would be utilized to control short-term indirect impacts from sediment runoff at areas such as stormwater grates.

In the long-term, construction of the interchange and the resulting improved traffic flows could have a positive indirect impact to water quality. This positive impact would occur as congestion would be reduced allowing individual vehicles to move through the area more quickly. This would reduce the length of time that vehicles would be forced to sit idle and potentially leak fluids such as petroleum products, antifreeze, and other chemicals, some of which could wash into storm sewers in runoff from the roadway surface.

The I-55 Interchange improvements could result in an increase in secondary industrial, commercial, and/or residential developments in the general project area due to improved access and commuting times. These secondary developments could result in additional soil disturbance and sedimentation into adjacent watercourses during the construction phases of those projects, and could create more impervious surfaces that increase runoff to the stormwater system. New industries could also elevate the chance of spilling contaminated materials, resulting in potential adverse impacts to water quality. All new developments would be regulated by local, state, and federal environmental regulations to help ensure no substantial water quality issues occur.

Alternatively, if any of the secondary developments potentially spurred by the interchange improvements are built where former industrial sites occurred; it is possible that there may be slight reduction in long-term water quality impacts as those sites would likely be “cleaned-up” prior to the new developments being constructed. Removal of any contaminated soils or other potential pollutants from those sites would be beneficial.

It is anticipated that some new development would occur in the general project vicinity regardless of whether the I-55 Interchange improvements are implemented. The interchange improvements would likely increase the rate at which certain areas become developed.

Cumulative Impacts: No substantial changes to water quality would be anticipated as a result of this project, even when combined with other past, present, and reasonably foreseeable projects. There may be minor short-term adverse impacts to water quality during the construction phase of the project due to soil disturbance and potential sedimentation in downstream watercourses. If other projects are being constructed during the same period, there would be a chance that the stormwater system and downstream watercourses could be impacted at the same time. Use of BMPs during construction will decrease the risk of any substantial water quality impacts from this project. Other development projects would also be regulated by local, state, and federal environmental laws aimed at reducing environmental impacts, including water quality.

In the long-term it is anticipated that potential water quality issues in the general project area would improve due to the improved interchange, which should reduce traffic congestion and reduce the length of time vehicles spend idling in the area and possibly leaking petroleum products or other chemicals. When combined with stricter regulations regarding stormwater discharges and revitalization/clean-up of former industrial sites, the general project area should have fewer potential impacts to water quality compared to baseline conditions.

3.11.4 Potential Water Quality Impacts of Alternative B

Direct Impacts: Because no aquatic resources occur in the proposed ROW or within the 500-foot study corridor of Alternative B, there would be no direct impacts to these resources.

Indirect Impacts: Indirect water quality impacts associated with Alternative B would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative water quality impacts associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.11.5 Potential Water Quality Impacts of Alternative Z

Direct Impacts: Because no aquatic resources occur in the proposed ROW or within the 500-foot study corridor of Alternative Z, there would be no direct impacts to these resources.

Indirect Impacts: Indirect water quality impacts associated with Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative water quality impacts associated with Alternative Z would be similar to those discussed under Alternative A.

3.11.6 Potential Water Quality Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Because no aquatic resources occur in the proposed ROW or within the 500-foot study corridor of Alternative Z-1, there would be no direct impacts to these resources.

Indirect Impacts: Indirect water quality impacts associated with Alternative Z-1 would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative water quality impacts associated with Alternative Z-1 would be similar to those discussed under Alternative A.

3.11.7 Mitigation

Although only short-term indirect adverse impacts to water quality are anticipated, all reasonable precautions will be taken to ensure that any potential adverse impacts are minimized. Water quality protection measures are described in the following documents:

- *Tennessee Erosion and Sediment Control Handbook* (TDEC, 2001c)
- *Riparian Restoration and Streamside Erosion Control Handbook* (TDEC, 1998b)

- *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites* (Smoot, 1992).
- *TDOT, Standard Specifications for Road and Bridge Construction* (TDOT, 2006).

Examples of mitigation measures may include:

- The unnecessary removal of existing vegetation would be avoided. Canopy removal along all working or staging areas would be limited to the extent practicable.
- Where removal of vegetation is necessary, sediment control measures would be employed immediately at the start of construction.
- Control structures would be inspected and properly maintained throughout the life of the project.
- Permits - The acquisition of permits will occur prior to initiation of construction activities, pursuant to Section 69-3-108(a) of the Tennessee Water Quality Control Act of 1977 and other state and Federal laws and regulations. These permits could include:
 - CWA Section 404 Permit – required for construction that involves the placement of dredge and fill material in Waters of the U.S. Typical Waters of the U.S. include rivers, blueline streams, headwaters streams, and special aquatic sites, such as wetlands. The USACE would require Section 404 Permits prior to construction.
 - Aquatic Resource Alteration Permit (ARAP) – required for any alterations of state waters, including wetlands, which do not require a federal (Section 404) permit. ARAP permits are required for construction at locations where the proposed project involves placement of fill in the following: a pond that is spring fed or impacts springs; reservoirs; wetlands; blue line streams; intermittent blueline streams on the USGS quadrangle map; any stream that supports any form of aquatic life; or is in the vicinity of a State-listed endangered species. Tennessee Department of Environment and Conservation (TDEC), Division of Water Pollution Control issues ARAP permits.
 - NPDES Stormwater Construction Permit – required for grubbing, clearing, grading, or excavation of one or more acres of land. TDEC’s Division of Water Pollution Control issues NPDES permits.
 - Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) – required by operators of construction sites in Tennessee.

In addition, the State of Tennessee may require water quality certification under Section 401 of the CWA. Section 401 certification ensures that activities requiring a Federal permit or license will not cause pollution in violation of state water quality standards.

Specific mitigation measures for this project would be developed during the permit acquisition process once final design plans have been developed, but prior to any construction activities. All construction activities and associated mitigation requirements would need to be approved by the appropriate agencies responsible for protecting water resources in the project area. Continued coordination with appropriate regulatory agencies would occur during final planning and construction of the project and extend through required monitoring periods that will be established during the initial permit acquisition process.

A spill prevention, control, and counter measures (SPCC) plan would be developed for both the construction process and for operations after construction. This plan would define the emergency

response plan in cases where accidental releases of hazardous substances occurred, including potential spills or releases adjacent to stormwater systems.

3.12 Wetlands

3.12.1 Affected Environment

Section 404 of the CWA extends authorization to the USACE to regulate activities that affect waters of the United States, including wetlands, and to issue permits for the discharge of dredged or fill material into wetlands and other water of the U.S. Activities that impact wetlands or waters of the U.S. require Section 404 permitting and mitigation may be required.

The USACE defines wetlands as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR Part 328.3b). In general, to be considered jurisdictional, a wetland area must satisfy criteria for hydrology, hydric soils, and hydrophytic vegetation. Wetland hydrology means that water permanently or periodically inundates soils or that the soil is saturated to the surface for a given duration during the growing season. Hydric soils show signs of reduced rather than oxidized soil conditions. Hydrophytic plants have adapted to areas having hydric soils or to areas that have inundated or saturated soils, which create anaerobic/anoxic conditions.

Wetland areas may perform a variety of functions and provide many values for society. Functions are ecological roles that the wetland system performs within the greater landscape, such as water storage, carbon fixation, nutrient transformation, and species habitat. Values are attributed to wetlands based on their worth to humans. Examples of wetland values include flood control, hunting/recreation, timber production, and waste water treatment. Some wetlands are better at performing certain functions or providing certain values than others.

Prior to field investigations, U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and USGS topographic maps were analyzed to determine potential locations of jurisdictional wetland areas in the proposed project area. The NWI program identifies potential wetland areas through stereoscopic analysis of high altitude aerial photographs. Potential wetland areas are classified in accordance with Cowardin (1979) based on interpretation of vegetation, visible hydrology, and geography observed on the photographs. The NWI map was used as an initial screen to determine likely locations of potential wetland areas within the project area.

A thorough field survey was conducted to determine if jurisdictional wetlands occur within the boundaries of the proposed project area. It was determined that no jurisdictional wetlands occur within the proposed ROW or 500-foot study corridor.

3.12.2 Potential Wetland Impacts of the No-Build Alternative

No wetland impacts are anticipated under the No-Build Alternative.

3.12.3 Potential Wetland Impacts of Alternative A

Direct Impacts: Because no jurisdictional wetlands occur within or near the project area, there will be no direct impacts to wetlands under Alternative A.

Indirect Impacts: Although no jurisdictional wetlands occur within or near the immediate project area, there would be a slight potential for this project to result in indirect impacts to wetlands due to induced development that may occur once the new interchange were completed. The new interchange may promote additional residential, commercial, and/or industrial developments in the region due to the improved access and traffic flows anticipated. It is possible that some wetland areas could be impacted as part of those secondary developments. It is not possible to quantify such impacts at this time. All new developments in the area, whether promoted by this project or unrelated

to it, would be subject to all local, state, and federal regulations regarding environmental impacts, including wetlands. It is likely that impacts to wetlands would be avoided, minimized, and/or mitigated for as part of the permit phase of those projects.

Cumulative Impacts: There are no known wetlands within the immediate project area that could be impacted by the I-55 Interchange project. However, there may be wetlands in the region that may be impacted by secondary developments that could be spurred by the interchange improvements. Any impacts to wetlands associated with those secondary or induced developments would combine with wetland impacts from past, present, and reasonably foreseeable future projects. It is not possible to determine what, if any, indirect wetland impacts would occur at this time. However, it is anticipated that wetland impacts would likely be very minimal as all new developments would be subject to compliance with local, state, and federal regulations aimed at protecting remaining wetland resources. Also, at least some of the anticipated secondary developments and/or other unrelated developments are expected to occur in previously urbanized areas as part of the revitalization efforts aimed at removing abandoned and/or rundown industrial sites and replacing them with modern developments. Most of those areas occur on uplands where wetlands were likely never present or were only of the small, isolated nature.

3.12.4 Potential Wetland Impacts of Alternative B

Direct Impacts: Because no jurisdictional wetlands occur within or near the project area, there will be no direct impacts to wetlands under Alternative B.

Indirect Impacts: Indirect impacts to wetlands under Alternative B would essentially be the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to wetlands under Alternative B would essentially be the same as those discussed under Alternative A.

3.12.5 Potential Wetland Impacts of Alternative Z

Direct Impacts: Because no jurisdictional wetlands occur within or near the project area, there will be no direct impacts to wetlands under Alternative Z.

Indirect Impacts: Indirect impacts to wetlands under Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to wetlands under Alternative Z would be similar to those discussed under Alternative A.

3.12.6 Potential Wetland Impacts of Alternative Z-1 (Preferred Alternative)

Direct Impacts: Because no jurisdictional wetlands occur within or near the project area, there will be no direct impacts to wetlands under Alternative Z-1.

Indirect Impacts: Indirect impacts to wetlands under Alternative Z-1 would be similar those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to wetlands under Alternative Z-1 would similar to those discussed under Alternative A.

3.12.7 Mitigation

Because no known wetland impacts would occur as a direct result of this project, it is not likely that any mitigation efforts would be necessary or required. If any wetlands were discovered during any phase of this project, and it was determined that the project would impact them, TDOT would attempt to avoid them or would obtain the appropriate permits to fill or drain the wetlands, as necessary. As part of the permit process, TDOT would work with the appropriate regulatory agencies to determine what mitigation measures may be required. Similarly, if any wetlands were impacted by secondary

developments and/or other unrelated development projects they would require permits and appropriate mitigation as determined by the appropriate regulatory agencies.

3.13 Water Bodies and Wildlife Habitat

3.13.1 Affected Environment

Water Bodies

A thorough field survey was conducted to determine if any water bodies occur within the boundaries of the proposed project area. It was determined that no water bodies occur within the proposed ROW or 500-foot study corridor. It is likely that the project area was historically well-drained and has never supported substantial surface waters due to its close proximity to the Mississippi River bluff formed by the western terminating edge of the West Tennessee Plain.

Fish and Wildlife Habitat

Historically, the project area was part of the temperate-deciduous forest and fell within the Oak-Chestnut forest region of eastern North America (Braun, 1950). This forest region is composed of a limited number of co-dominant canopy species and a rich herbaceous understory. Within the project area none of the historical vegetation coverage type remains. The original biological composition of the project area has been substantially altered by long-term and intensive urban development. The vast majority of the area is being utilized for commercial, residential, transportation, and industrial activity. Very little suitable terrestrial wildlife habitat is present. The limited vegetation that persists along the river and in non-maintained areas can be classified as scrubby and low quality for most native species. No aquatic wildlife habitat is present within the 500-foot study corridor.

Nonnative flora and fauna can cause major changes to ecosystems, upset the ecological balance, and cause economic harm to agriculture and recreation sectors. In accordance with EO 13112 Invasive Species, field surveys included visual observations for invasive species populations or other evidence of invasive species. Japanese honeysuckle (*Lonicera japonica*) and Chinese privet (*Ligustrum sinense*) were common within the study area. Due to the highly disturbed nature of the site, there is potential for individuals or small isolated populations of other invasive species to be present in vicinity of the project area.

There is only limited wildlife usage within the vicinity of the project area due to the dissected and urbanized condition of the landscape. It is likely that small mammals and songbirds utilize the scrubby habitat located around the edges of existing railroad tracks and in overgrown or abandoned lots. Migrating birds may utilize some of the remaining trees along the river as resting or foraging habitats as they move through the area. A few resident species such as woodpeckers and owls may inhabit the area. Some suitable habitat might be present for squirrels, raccoons, foxes, and opossums since they are often adapted to urban settings. It is possible that an occasional individual or two of species such as white-tailed deer and coyotes may use the scrubby habitats adjacent to the Mississippi River while dispersing between suitable habitats. No aquatic habitats, such as wetlands or streams, are present within the proposed ROW or 500-foot study corridor. Therefore, no aquatic species utilize the project area due to the lack of habitat.

3.13.2 Potential Impacts on Waterbodies and Wildlife from the No-Build Alternative

No direct, indirect, or cumulative impacts to waterbodies or wildlife are anticipated under the No-Build Alternative.

3.13.3 Potential Impacts on Waterbodies and Wildlife from Alternative A

Direct Impacts: Since there are no waterbodies within the project area, direct adverse impacts to aquatic habitats would not occur as a result of interchange construction under Alternative A. Since there is only a small amount of low quality wildlife habitat within the project area, negligible impacts

to wildlife habitat would be anticipated. Minor, short-term direct disturbances to wildlife occurring within the project area would occur from construction activities and noise during construction. However, any wildlife in the project area is already accustomed to vehicle noise and other human induced disturbances so little change from baseline conditions is expected.

Indirect Impacts: Minimal short-term indirect impacts to aquatic habitats could occur from increased stormwater sedimentation originating at the construction site during precipitation events due to vegetation clearing and paving. Best management practices, such as silt fencing, would be utilized to control short-term indirect impacts from sediment runoff. Construction of the interchange could have a long-term positive indirect impact on aquatic resources. Reconfiguration of the interchange would likely decrease long-term indirect impacts from road related contaminants, such as petroleum products and antifreeze, by improving traffic flows and decreasing the time individual automobiles spend within the project area.

It is possible that some waterbodies and wildlife habitats could be adversely impacted due to secondary commercial, industrial, and/or residential developments that could be promoted by the improved I-55 Interchange under Alternative A. Such developments may result in additional clearing of habitats, potential increases in erosion and sedimentation into adjacent watercourses, and additional human disturbances in areas that may be further removed from human activities at the present time. It is anticipated that at least some of the potential new development that could be promoted by this project would occur in former developed areas, such as abandoned industrial sites in Memphis. In those cases, little or no additional impacts to waterbodies or wildlife would be anticipated. Also, it is likely that some new developments would occur in the general project area regardless of the project being implemented. This project could promote some of those developments to occur sooner than would have occurred without the interchange improvements. It is not possible to determine what the exact indirect impacts to waterbodies and wildlife would be at this time, as it is not known where new developments would occur and what size of an area they would impact. Local planning and zoning regulations may influence where developments occur and what areas could be protected from developments. Permits would be required for any developments that may impact streams and wetlands.

Cumulative Impacts: Any future development promoted by the proposed I-55 Interchange project would combine with other planned or reasonably foreseeable development projects to result in impacts to waterbodies and wildlife in the general project vicinity. The combination of all new developments would likely result in additional loss or fragmentation of wildlife habitats and may increase erosion and subsequent sedimentation into adjacent watercourses. Other roadway projects in the region would also likely impact wildlife habitats and waterbodies to some degree. Due to the continued expansion of the Memphis urban area, it is likely that continued development would occur regardless of the implementation of this project and that adverse cumulative impacts would continue to occur as new areas are developed. Local planning and zoning could be utilized to protect any areas that may have unique or important wildlife habitat value. In addition, such plans could also limit development in riparian areas or wetlands to help protect waterbodies and aquatic habitats.

It is expected that much of the development that may be attributed to the proposed interchange improvements would occur in previously disturbed areas and would not result in substantial new impacts to waterbodies or wildlife. Therefore the potential for this project to contribute to substantial cumulative impacts to waterbodies and wildlife is expected to be relatively low. However, it is not possible to determine the extent of the impacts at this time.

Reconfiguration of the I-55 Interchange would likely decrease long-term indirect impacts from road related contaminants entering stormwater and waterbodies downstream, such as petroleum products and antifreeze by improving traffic flows and decreasing the time individual automobiles spend

within the project area. These improvements, along with stricter stormwater discharge regulations would help to protect some aquatic species from water quality issues.

3.13.4 Potential Impacts on Waterbodies and Wildlife from Alternative B

Direct Impacts: Direct impacts to waterbodies and wildlife under Alternative B would be the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to waterbodies and wildlife under Alternative B would be the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to waterbodies and wildlife under Alternative B would be the same as those discussed under Alternative A.

3.13.5 Potential Impacts on Waterbodies and Wildlife from Alternative Z

Direct Impacts: Direct impacts to waterbodies and wildlife under Alternative Z would be similar to those discussed under Alternative A.

Indirect Impacts: Indirect impacts to waterbodies and wildlife under Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to waterbodies and wildlife under Alternative Z would be similar to those discussed under Alternative A.

3.13.6 Potential Impacts on Waterbodies and Wildlife from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to waterbodies and wildlife under Alternative Z-1 would be similar to those discussed under Alternative A, although there would be slightly less of an impact since most of the new construction would be on existing ROW.

Indirect Impacts: Indirect impacts to waterbodies and wildlife under Alternative Z-1 would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to waterbodies and wildlife under Alternative Z-1 would be similar to those discussed under Alternative A.

3.13.7 Mitigation

Although only minor short-term indirect adverse impacts may be anticipated, all reasonable precautions will be taken to reduce negative impacts to water quality and wildlife. Water quality protection measures and mitigation are described above in Section 3.11 (Water Quality).

3.14 Floodplains

3.14.1 Affected Environment

According to EO 11988 floodplains are lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year. This EO was signed by President Jimmy Carter in 1977 to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative

Beneficial Floodplain Values

Floodplains perform a variety of important natural functions, including the storage of floodwater, moderation of peak flows, maintenance of water quality, groundwater recharge, and prevention of erosion. Floodwaters support wetland ecosystem productivity by providing moisture and depositing beneficial nutrients to the soil. For many of the same reasons, flooded areas make lands more suitable

for growing crops. Floodplains also provide habitat for wildlife (especially migratory birds), recreational opportunities, timber supplies, and aesthetic benefits. Floodplain encroachment may diminish or impair the natural functions of the floodplain. The project is not located in the 100- or 500-year floodplains and is in an area of minimal local flooding.

Hydrological Impacts

Encroachment into floodplains decreases the capacity for the area to convey floodwaters, which increases the potential for flood hazards. Flooding can cause serious damage to homes, businesses and public works and can pose a threat to the safety of individuals.

Potential floodplain impacts associated with the proposed construction were determined by utilizing the National Flood Insurance Rate Maps (FIRMs) prepared by the Federal Emergency Management Agency (FEMA). According to the FIRMs for Shelby County, all of the project area has been surveyed for a determination of flood hazard areas (FEMA, 1994).

The project area will traverse an area that is listed in Zone X, which is defined as flood insurance rate zone that corresponds to areas outside the one-percent annual chance floodplain; areas of one-percent annual chance sheet flow flooding where average depths are less than one foot; areas of one-percent annual chance stream flooding where the contributing drainage area is less than one square mile; or areas protected from the one percent annual chance flood by levees.

3.14.2 Potential Impacts to Floodplains from the No-Build Alternative

Direct Impacts: No direct impacts to floodplains would be anticipated under the No-Build Alternative.

Indirect Impacts: No indirect impacts to floodplains would be anticipated under the No-Build Alternative.

Cumulative Impacts: No cumulative impacts to floodplains would be anticipated under the No-Build Alternative.

3.14.3 Potential Impacts to Floodplains from Alternative A

Direct Impacts: There are no floodplains that would be directly impacted by Alternative A.

Indirect Impacts: There is a chance that the proposed interchange improvements could spur some secondary developments in the general project area. Some of this development could impact existing floodplain areas, especially if any new industrial development occurs in areas along the Mississippi River south of the project area. It is anticipated that most new developments that may be spurred by the interchange improvement project would occur on upland areas closer to the project site, such as the areas north and east of the project area. Those areas currently contain several abandoned industrial or commercial sites that could be revitalized. No floodplains would be impacted in those areas.

Cumulative Impacts: Because no floodplains would be directly impacted by this project, it is anticipated that this project would not result in measurable impacts to floodplains even when combined with other past, present, and reasonably foreseeable future projects. The only way this project is anticipated to impact floodplains would be due to impacts to floodplains that would be possible due to secondary developments that may be induced by the interchange improvements. However, it is likely that most projects induced by the interchange improvements would occur on adjacent upland areas and would not impact floodplains.

Other unrelated projects in the region may impact floodplains, especially any projects that occur along the Mississippi River south of the project area. The I-55 Interchange project is not anticipated to result in substantial changes to planned or anticipated developments in those areas. Most development in the areas outside of the immediate interchange project area would likely occur

regardless of the I-55 Interchange project. Local planning and zoning maps could be used to reduce the amount of development in remaining floodplains in the region, which would help to reduce the potential for floodplain impacts.

3.14.4 Potential Impacts to Floodplains from Alternative B

Direct Impacts: Direct impacts to floodplains under Alternative B would be similar to Alternative A.

Indirect Impacts: Indirect impacts to floodplains under Alternative B would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to floodplains under Alternative B would be similar to Alternative A.

3.14.5 Potential Impacts to Floodplains from Alternative Z

Direct Impacts: Direct impacts to floodplains under Alternative Z would be similar to Alternative A.

Indirect Impacts: Indirect impacts to floodplains under Alternative Z would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to floodplains under Alternative Z would be similar to Alternative A.

3.14.6 Potential Impacts to Floodplains from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to floodplains under Alternative Z-1 would be similar to Alternative A.

Indirect Impacts: Indirect impacts to floodplains under Alternative Z-1 would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to floodplains under Alternative Z-1 would be similar to Alternative A.

3.14.7 Mitigation

Mitigation is not necessary, because no floodplain impacts are anticipated. Local planning and zoning regulations could be used to protect floodplains from future development impacts.

3.15 Threatened and Endangered Species

3.15.1 Affected Environment

Certain rare species are given protection under the Endangered Species Act of 1973 (ESA), as amended. The ESA, administered by the U.S. Department of the Interior, USFWS, and U.S. Department of Commerce, National Marine Fisheries Service, provides federal protection for all species designated as *endangered* or *threatened*. An *endangered* species is “in danger of extinction throughout all or a substantial portion of its range,” and a *threatened* species “is likely to become an endangered species within the foreseeable future.” The “take” of species listed as *threatened* or *endangered* under the ESA is prohibited, unless the take is incidental to otherwise lawful activities. To “take” a listed species includes to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. The USFWS and TDEC, Natural Areas Program were contacted to obtain a list of Federally-listed threatened and endangered (T&E) species that are known to occur in Shelby County, Tennessee. As shown in Table 3.12, there are four Federally-listed T&E species listed for Shelby County.

Table 3.12. Federal Threatened and Endangered Species in Shelby County, Tennessee.

Group	Common Name	Scientific Name	Federal Status
Bird	Wood stork	<i>Myceteria americana</i>	LE
Bird	Least tern	<i>Sterna antillarum</i>	LE
Mammal	Indiana bat	<i>Myotis sodalis</i>	LE
Mussel	Turgid-blossom pearly mussel	<i>Epioblasma turgidula</i>	LE
Status key: LE-Listed Endangered LT-Listed Threatened <i>Source: TDEC, 2001</i>			

Bald eagles (*Haliaeetus leucocephalus*) were previously listed as a Federally-listed threatened species. On June 28, 2007 the bald eagle was officially taken off of the Federal list of endangered and threatened species. Bald eagles will continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both federal laws prohibit "taking" -- killing, selling, harassing, or otherwise harming eagles, their nests or eggs. No bald eagles nests or habitats occur within the 500-foot study boundary for this project.

The USFWS was contacted to determine which, if any, Federal T&E species have been documented to occur in the project area and/or have suitable habitat within the project area. According to the agency response letter received from the USFWS, included in Appendix A, there are no Federally-listed or proposed T&E species known to occur within the impact area of this project. No critical habitat, highly unique/notable habitat, or other suitable habitat, including wetlands, for the Federal T&E species listed for Shelby County was identified in the project area. According to USFWS (2002), the requirements of Section 7 of the ESA have been fulfilled.

According to TDEC, Natural Areas Program, there are no sensitive resources within one mile of the proposed corridor. Sensitive resources tracked by the Natural Areas Program include Federal and state-listed and proposed T&E species, other species deemed in need of management, and ecologically significant and/or managed areas. The Natural Areas Program maintains a database and map filing system in which sensitive resource locations are plotted on United States Geological Survey (USGS) 7.5-minute topographical quadrangle maps. A review of the Natural Areas Program files indicated that there have been no sensitive resources identified within the project area.

3.15.2 Potential Impacts to Threatened and Endangered Species from the No-Build Alternative

Because there are no known threatened or endangered species within the immediate project area and no substantial changes in the baseline conditions are anticipated under the No-Build Alternative, no direct, indirect, or cumulative impacts to threatened or endangered species would be expected.

3.15.3 Potential Impacts to Threatened and Endangered Species from Alternative A

Direct Impacts: Because there are no known threatened or endangered species or suitable habitats for them within the immediate project area, no impacts to threatened or endangered species would be expected under Alternative A.

Indirect Impacts: There is a slight potential that some potentially suitable threatened or endangered species habitats could be adversely impacted due to secondary commercial, industrial, and/or residential developments that could be promoted by the improved I-55 Interchange under Alternative A. Such developments may result in additional clearing of habitats, potential increases in erosion and

sedimentation into adjacent watercourses, and additional human disturbances in areas that may be further removed from human activities at the present time. It is anticipated that at least some of the potential new development that could be promoted by this project would occur in former developed areas, such as abandoned industrial sites in Memphis. In those cases, no impacts to threatened and endangered species would be anticipated.

If new developments occur along the Mississippi River, especially within riparian areas, there would be some potential for impacts to threatened and endangered species, both terrestrial species such as Indiana bats, and aquatic species, such as mussels. It is unlikely that this project would promote substantial development in such areas. However, regardless of this project, there may be other unrelated development projects that occur in areas containing potentially suitable habitats for listed species. Although those developments would likely occur with or without this project, it is possible that this project could promote some of those developments to occur sooner than would have occurred without the interchange improvements. It is not possible to determine what the exact impacts to threatened and endangered species may be at this time, as it is not known where new developments would occur and what size of an area they would impact. Overall, it is not anticipated that this project would result in any measurable impacts to threatened or endangered species, because no substantial changes in baseline conditions or development trends are anticipated.

Reconfiguration of the I-55 Interchange would likely decrease long-term indirect impacts from road related contaminants entering stormwater and waterbodies downstream, such as petroleum products and antifreeze by improving traffic flows and decreasing the time individual automobiles spend within the project area. These improvements, along with stricter stormwater discharge regulations would help to protect some aquatic species from water quality issues.

Cumulative Impacts: Because no known populations of threatened or endangered species or suitable habitats for them occur in the project vicinity, no substantial impacts would be anticipated. However, other reasonably foreseeable projects in the region could have some impacts to potential suitable habitats for such species. Any future development promoted by the proposed I-55 Interchange project would combine with other planned or reasonably foreseeable development projects to result in potential impacts to any populations of threatened or endangered species or their habitats in the general project vicinity. Due to the continued expansion of the Memphis urban area, it is likely that continued development would occur regardless of this project and that adverse cumulative impacts would continue to occur as new areas are developed. Local planning and zoning could be utilized to protect any areas that may have unique or important habitat values, especially riparian areas or wetlands.

It is expected that most developments that may be attributed to the proposed interchange improvements would occur in previously disturbed areas and would therefore not result in impacts to threatened or endangered species. Therefore, the potential for this project to contribute to measurable cumulative impacts to threatened and endangered species is expected to be low. However, because the locations or sizes of potential secondary developments are not currently known, it is not possible to determine the extent of the impacts at this time.

3.15.4 Potential Impacts to Threatened and Endangered Species from Alternative B

Direct Impacts: Because there are no known threatened or endangered species or suitable habitats for them within the immediate project area, no impacts to threatened or endangered species would be expected under Alternative B.

Indirect Impacts: Indirect impacts to threatened and endangered species under Alternative B would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to threatened and endangered species under Alternative B would be similar to Alternative A.

3.15.5 Potential Impacts to Threatened and Endangered Species from Alternative Z

Direct Impacts: Because there are no known threatened or endangered species or suitable habitats for them within the immediate project area, no impacts to threatened or endangered species would be expected under Alternative Z.

Indirect Impacts: Indirect impacts to threatened and endangered species under Alternative Z would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to threatened and endangered species under Alternative Z would be similar to Alternative A.

3.15.6 Potential Impacts to Threatened and Endangered Species from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Because there are no known threatened or endangered species or suitable habitats for them within the immediate project area, no impacts to threatened or endangered species would be expected under Alternative Z-1.

Indirect Impacts: Indirect impacts to threatened and endangered species under Alternative Z-1 would be similar to Alternative A.

Cumulative Impacts: Cumulative impacts to threatened and endangered species under Alternative Z-1 would be similar to Alternative A.

3.15.7 Mitigation

Since there would be no measurable direct, indirect, or cumulative adverse impacts to threatened and endangered species, there would be no species-specific mitigation measures required. However, all reasonable precautions and standard best management practices will be taken to reduce potential negative impacts to water quality and the surrounding environment.

3.16 Cultural Resources

3.16.1 Affected Environment

The two primary laws that apply to transportation projects and their impacts to cultural resources are Section 106 of the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966. Cultural resources include prehistoric and historic archaeological sites and historic bridges, buildings, sites, objects, and districts. The purpose of cultural resource investigations is to consider the impact of federally funded undertakings on such features that are listed in, or may be eligible for inclusion in the National Register of Historic Places (NRHP). The criteria of adverse effect, the standard by which effects to historic properties are measured, are included in 36 CFR 800.

Two types of cultural resources need to be identified to satisfy the requirements of Section 106 of the National Historic Preservation Act of 1966: architectural/historical resources (e.g., buildings and structures) and archaeological resources (e.g., sites).

An important part of the Section 106 process is consultation with the Tennessee State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), federally recognized Native American tribes that may attach cultural or religious significance to properties within the project study area, and local governments. Section 4 of this document contains a brief summary of the coordination and consultation efforts for this project and a summary of responses received from the various parties involved. Appendix B contains copies of all coordination letters related to cultural resources issues for this project.

Architectural/Historical Resources

A historic property, as defined in regulation 36 CFR Section 800.16(I)(1), is any cultural resource included in, or eligible for inclusion in, the NRHP. A cultural resource is eligible for listing in the NRHP if it meets one or more of the four NRHP Criteria and retains sufficient integrity to convey historic significance. The NRHP Criteria states that the quality of significance is present in cultural resources when resources:

- Are associated with events that have made a significant contribution to the broad patterns of our history; or
- Are associated with the lives of persons significant in our past; or
- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield information important in prehistory or history.

In addition to significance, a property must also have integrity of location, design, setting, materials, workmanship, and feeling to be eligible for inclusion in the NRHP. This means that not only must a resource generally be 50 years of age or older, it must also retain many of its original features and be significant under one or more of the four criteria listed above.

Between 2002 and 2005 TDOT historians surveyed the I-55 Interchange at E.H. Crump Boulevard and South Riverside Drive area of potential effect (APE) (TDOT 2005). The APE for the Historical/Architectural Assessment included a corridor approximately 1,500 feet from the proposed interchange improvements that require additional ROW and the subsequent transition work south on I-55 that would require additional ROW, areas within the nearby viewshed of the proposed project, and areas within the potential noise impact area (up to 500 feet from the proposed improvements).

A total of three properties were identified in the APE that are listed on the NRHP: the Memphis-Arkansas Bridge, the U.S. Marine Hospital Executive Building and Laundry-Kitchen (including the expanded boundary), and the Chickasaw Heritage Park. One additional property, the W.T. Rawleigh/United Warehouse, was also considered eligible for listing in the NRHP in the TDOT survey. The Tennessee SHPO has concurred with these findings (SHPO 2006), and determined that "... the project as currently proposed will not adversely affect these resources." A copy of the SHPO letter is included in Appendix B of this EIS.

Archaeological Resources

As part of the Section 106 consultation process TDOT consulted with the following federally recognized Native American tribes:

- Quapaw Tribe of Oklahoma
- Eastern Shawnee Tribe of Oklahoma
- United Keetowah Band of Cherokee Indians
- Muscogee (Creek) Nation
- Choctaw Nation of Oklahoma
- Chickasaw Nation
- Alabama-Quassarte Tribal Town

- Kialegee Tribal Town
- Thlopthlocco Tribal Town
- Shawnee Tribe

The Chickasaw Nation and Muscogee (Creek) Nation were the only respondents to the Section 106 Consultation efforts for this project. The former requested to be notified only in the event of an inadvertent discovery, while the latter requested to be a Consulting Party on the project. TDOT will continue to coordinate with the Muscogee (Creek) Nation as a Consulting Party.

A Phase I Cultural Resources (archaeological) survey was conducted for the proposed improvements at the I-55 Interchange at E.H. Crump Boulevard and South Riverside Drive. The APE for the Phase I Cultural Resources survey began at the east termination of the I-55 Mississippi River Bridge and extended southward along I-55 to McLemore, Avenue. The APE included the proposed ROW of the Build Alternatives being considered in this EIS. This area is primarily in the southwest quadrant of the existing interchange. More details regarding the APE are included in the 2008 Phase I Cultural Resources Survey Report on file with TDOT.

The field surveys occurred in late 2007, and the surveys included trench excavations within portions of the APE, where background research suggested an increased probability for intact cultural deposits. Twelve trenches and one block were excavated, and 46 subsurface archaeological features were identified. A single site was assigned state site number 40SY709. It includes remnants of Fort Pickering fortifications, dating to the Civil War Period, two largely intact cisterns, brick foundation piers, and numerous post molds dating to the late nineteenth to early twentieth century residential occupation on the site (Weaver & Associates, 2008).

Site 40SY709 is in the northwest portion of the interchange project area. Current information suggests that archaeological deposits are located at depths greater than 1.3-feet below the surface. Based upon the existing data Site 40SY709 has been recommended as being potentially eligible for the NRHP under Criterion D. The SHPO recommended that Phase II testing be completed to further define the nature of the site under Alternatives A, B, and Z. Should one of those alternatives be pursued, Phase II testing will be conducted for this project. Alternative Z-1 will not require Phase II testing because it remains within the existing ROW at this location. The Tennessee SHPO has concurred with these findings in a letter dated May 24, 2011, which stated that "... the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places." A copy of the SHPO letter is included at the end of Appendix B of this EIS.

See Appendix B for coordination letters from the SHPO regarding cultural resources issues associated with the project. The Chickasaw Nation and Muscogee (Creek) Nation were the only respondents to the Section 106 Consultation efforts for this project. The former requested to be notified only in the event of an inadvertent discovery, while the latter requested to be a Consulting Party on the project.

3.16.2 Potential Impacts to Cultural Resources from the No-Build Alternative

There would be no direct, indirect, or cumulative impacts to historical/architectural resources under the No-Build Alternative. There would be no direct, indirect, or cumulative impacts to archaeological resources from the No-Build Alternative.

3.16.3 Potential Impacts to Cultural Resources from Alternative A

Direct Impacts: There would be no direct impacts to historical/architectural resources under Alternative A of the I-55 Interchange project.

There would be direct impacts to archaeological resources (Site 40SY709) from Alternative A during construction of the main line lanes of I-55 and for the exit ramps to West Alston Avenue, West

Illinois Avenue, and E.H. Crump Boulevard. Due to the large size and linear nature of Site 40SY709, it is not possible to completely avoid this site during construction of Alternative A. It is recommended that Phase II testing be completed to further define the nature of the site if Alternative A is pursued.

Indirect Impacts: There would be no indirect impacts to historical/architectural resources under Alternative A of the I-55 Interchange project.

There would be indirect impacts to archaeological resources (Site 40SY709) from Alternative A following construction of the main line lanes of I-55 and for the exit ramps to West Alston Avenue, West Illinois Avenue, and E.H. Crump Boulevard. The indirect impacts would primarily be from the secondary development that may occur in the vicinity of Site 40SY709 and from displaced residents that may be relocated to a parcel of vacant land south of West Illinois Avenue and east of Metal Museum Drive. It is recommended that Phase II testing be completed to further define the nature of the Site 40SY709 if Alternative A is pursued. The vacant land south of West Illinois Avenue and east of Metal Museum Drive should also be surveyed if displaced residents plan to relocate to that location. There may also be short-term indirect impacts to Site 40SY709 during construction operations that could adversely affect the site.

Cumulative Impacts: There would be no cumulative impacts to historical/architectural resources under Alternative A of the I-55 Interchange project.

There is a potential for cumulative impacts to archaeological resources (Site 40SY709) from Alternative A following construction of the primary traffic lanes of I-55 and for the exit ramps to West Alston Avenue, West Illinois Avenue, and E.H. Crump Boulevard. The cumulative impacts would primarily be from any secondary development that occurs outside of the TDOT ROW. As currently designed only a small area of Site 40SY709 would be outside of the TDOT ROW. It is recommended that Phase II testing be completed to further define the nature of the site under Alternative A.

3.16.4 Potential Impacts to Cultural Resources from Alternative B

Direct Impacts: There would be no direct impacts to historical/architectural resources under Alternative B of the I-55 Interchange project.

There would be direct impacts to archaeological resources (Site 40SY709) from Alternative B during construction of the main line lanes of I-55 and for the exit ramps to E.H. Crump Boulevard and the entrance ramp from Metal Museum Drive to the E.H. Crump Boulevard exit ramp. As currently positioned, Alternative B would have greater impacts to Site 40SY709 than the other build alternatives, because the E.H. Crump Boulevard ramp bisects the site through its longest axis. Due to the large size and linear nature of Site 40SY709, it is not possible to completely avoid this site during construction of Alternative B. It is recommended that Phase II testing be completed to further define the nature of the site if Alternative B is pursued.

Indirect Impacts: There would be no indirect impacts to historical/architectural resources under Alternative B of the I-55 Interchange project.

Indirect impacts to archaeological resources from Alternative B would be similar to Alternative A.

Cumulative Impacts: There would be no cumulative impacts to historical/architectural resources under Alternative B of the I-55 Interchange project.

Cumulative impacts to archaeological resources from Alternative B would be similar to Alternative A.

3.16.5 Potential Impacts to Cultural Resources from Alternative Z

Direct Impacts: There would be no direct impacts to historical/architectural resources under Alternative Z of the I-55 Interchange project.

There would be direct impacts to archaeological resources (Site 40SY709) from Alternative Z during construction of the main line lanes of I-55 and for the exit ramps to the E.H. Crump Boulevard and Riverside Drive roundabout, because the E.H. Crump ramp bisects the site through its longest axis. Since there would not be a connector entrance ramp from Metal Museum Drive to the roundabout mentioned above, the impacts of Alternative Z would be slightly less than Alternative B, but greater than Alternative A. Due to the large size and linear nature of Site 40SY709, it is not possible to completely avoid this site during construction of Alternative Z. It is recommended that Phase II testing be completed to further define the nature of the site if Alternative Z is pursued.

Indirect Impacts: There would be no indirect impacts to historical/architectural resources under Alternative Z of the I-55 Interchange project.

Indirect impacts to archaeological resources from Alternative Z would be similar to Alternative A.

Cumulative Impacts: There would be no cumulative impacts to historical/architectural resources under Alternative Z of the I-55 Interchange project.

Cumulative impacts to archaeological resources from Alternative Z would be similar to Alternative A.

3.16.6 Potential Impacts to Cultural Resources from Alternative Z-1 (Preferred Alternative)

Direct Impacts: There would be no direct impacts to historical/architectural resources or archaeological resources under Alternative Z-1 of the I-55 Interchange project, because the mainline I-55 lanes and the exit ramps to the E.H. Crump Boulevard and Riverside Drive roundabout would avoid Site 40SY709. Nearly all of the proposed roadway would be constructed within existing ROW. As currently positioned, Alternative Z-1 would have the least amount of impacts to Site 40SY709 of any of the build alternatives.

Indirect Impacts: There would be no indirect impacts to historical/architectural under Alternative Z-1 of the I-55 Interchange project.

Indirect impacts to archaeological resources would primarily be from any secondary development that may occur in the vicinity of Site 40SY709 as a result of the project.

Cumulative Impacts: There would be no cumulative impacts to historical/architectural resources under Alternative Z-1 of the I-55 Interchange project.

Cumulative impacts to archaeological resources from Alternative Z-1 would be similar to Alternative A, but would be minimized due to use of existing ROW.

3.16.7 Mitigation

Since there would be no impacts to historical/architectural resources from any of the alternatives (No-Build, Alternative A, B, Z, or Z-1), mitigation for historical/architectural resources would not be necessary.

Since there would be direct impacts to Site 40SY709 from three build alternatives (Alternative A, B, and Z) and since the site has mixed features from the Civil War era and late nineteenth and early twentieth century residential occupation, it is recommended that Site 40SY709 be further evaluated with Phase II testing should one of those three alternatives be pursued. TDOT in coordination with the SHPO commits to making the requisite investigations and mitigation necessary to avoid, minimize, or mitigate potential impacts to this site. Alternative Z-1 avoids direct impacts to Site 40SY709, therefore no Phase II testing is considered necessary under this alternative. However,

TDOT will continue to coordinate with the SHPO should new information be obtained or changes to the layout of the alternative change to result in potential direct impacts to the site.

3.17 Hazardous/Special Waste Sites

3.17.1 Affected Environment

A Hazardous Materials, Hazardous Waste, and Special Waste Study was conducted for the I-55 Interchange project. A copy of the full Technical Report is available upon request through TDOT. The purpose of the study was to identify hazardous materials, hazardous waste, and special waste sites that may affect or be affected by construction of the proposed I-55 Interchange improvement project. The presence of these sites within or adjacent to the proposed alignments was determined by conducting an environmental database search, by reviewing aerial photographs underlain by CAD layouts, and by conducting a field survey.

Database Search

A search of federal and state environmental databases was conducted to identify potential sites of concern within a one-mile radius of the project area (EDR, 2003). A description of the databases is shown in the EDR report.

The database search returned a total of 51 records for sites with known (mapped) locations within one mile of the I-55 Interchange project area. Some records were for sites with more than one facility. Some facilities were listed in more than one database. In addition, dozens of unmapped (“orphan”) sites were identified. Orphan sites are identified by EDR (2003) as occurring in the project area vicinity, but precise locations are not known. Orphan sites usually have limited facility information available, and this is reflected in the report.

Aerial Photograph Review

Aerial photographs were reviewed to identify facilities within the study area that may warrant a site inspection. Facilities that were identified from the aerial photos were visually surveyed for their potential to handle or generate hazardous and/or special waste. Those facilities were compared to the environmental database list of sites in the area.

Field Survey

A field survey of the study area was conducted to verify the findings from the database search and aerial photographs. A one-to-one correlation with the environmental database list was performed for many of the facilities identified. The locations and names of the facilities included on the environmental database were confirmed or modified, as appropriate. The field survey was also used to eliminate facilities from the environmental database list that were erroneously reported to be located within the study area. In addition, existing facilities not identified on the database lists were noted, if they were considered to potentially handle or generate hazardous and/or special waste.

As discussed above, EDR (2003) identified all known facilities located within one mile of the I-55 Interchange project area. Many of these facilities present extremely minor contamination risk due to the nature of the operations at the facility and its location in relation to the project area. For example, the database search yielded records for a facility that has a single, permanently closed underground storage tank (UST) and is located nearly one mile from the project area. During the field survey, only facilities that are located within 0.25 miles from the project area were investigated unless the site had hazardous conditions that may impact the I-55 Interchange project.

Some of the facilities identified in the database report, and reported to occur within the minimum search distance, could not be located during the field survey. In these instances, it is likely that the database contained outdated or inaccurate information. Possible reasons may include: the facility

may no longer exist at the location; business may be performed under a different name than is listed on the database; or an administrative address may have been listed rather than a street address.

Identification and Rating of Sites

Parcels were evaluated based upon their current usage, past usage, and the location of the property relative to the proposed ROW for the I-55 Interchange project. As discussed above, the assessment consisted of an environmental database search, a review of aerial photographs, and field reconnaissance. Overall, a total of 53 separate hazardous waste, special waste, or other sites were identified that may potentially impact, or be impacted by, construction of the interchange reconfiguration. These sites are listed in the Hazardous Materials, Hazardous Waste, and Special Waste Study.

Site Ratings

After the completion of the database search and the visual assessment of properties within the study area, the sites were assigned hazard ratings. As shown on Table 3.13, the hazard rating system is divided into three degrees of risk: “no indication,” “low,” and “high.” Parcels were evaluated based upon their current and past usage, and the location of the property relative to the project area. Professional judgment was used to determine the appropriate category for each site. It was assumed for the site rating that sites adjacent to the proposed highway expansion would not be categorized. Table 3.14 lists the sites that had a hazard rating of “low” and “high”.

Table 3.13. Hazard Rating System for Identified Hazardous Waste and Special Waste Sites for the I-55 Interchange Project.

Rating	Rationale
No Indication	<ul style="list-style-type: none"> • There is no indication that hazardous waste/materials or special wastes would impact highway construction after a review of all available information and a visual survey of the site from the road. • The site was identified by the database search at occurring at a specific location, however the facility could not be found during the field survey. • This does not preclude the possibility that hazardous waste/materials or special wastes could have been handled at this address at one time or at a nearby location.
Low	<ul style="list-style-type: none"> • Hazardous waste/materials or special wastes may have existed or may currently exist on the site, but there is limited likelihood that there would be any involvement with these wastes or materials during roadway construction. • This type of site is too distant to the corridor to impact the project.
High	<ul style="list-style-type: none"> • Hazardous waste/materials or special wastes were stored or handled on the site, or could currently exist at the site, and there is a possibility of soil or groundwater contamination that could impact roadway construction. • These sites have had contamination problems in the past, would pose greater risk due to the type(s) of hazardous waste/materials or special wastes, and/or are relatively close to the project area. • Sites that were found to be located within the proposed ROW (including sites not identified by the database report) that may be associated with hazardous waste/materials or special wastes were assumed to pose a high risk and given a “high” rating since they would likely be removed.

Table 3.14. Rating of Identified Hazardous Waste and Special Waste Sites for the I-55 Interchange Project

Site ID¹	Site Name	Site Address	Site Type	Approximate Distance from Corridor	Site Rating
5	BP Service Station	694 Riverside Drive	LUST	0.125 miles N	Low
11	Jehl Cooperage Co.	4 E Virginia	CERCLIS RCRIS- SQG FINDS UST	0.125 miles E	Low
15	Phillips 66	291 Alston	LUST UST	0.1 miles S	Low
17	Gand W. Diesel Service Co.	892 West Kansas St.	RCRIS- SQG FINDS	0.1 miles E	Low
20	Penske Truck Leasing Co.	922 Pennsylvania St.	RCRIS- SQG FINDS LUST UST	< 0.125 miles E	Low
30	Cooper Air Freight	1081 Arkansas St.	UST	0.1 miles E	Low
34	Ryder Truck Rental Inc.	1135 Riverside Drive	RCRIS- SQG FINDS AST UST LUST	0.125 miles W	Low
35	Exit 11 of Interstate 55	N/A	ERNS	0.0 miles S	Low
36	Churchill Truck Lines	215 West McLemore	LUST UST	0.125 miles SE	Low
37	Yellow Freight System Inc.	185 West McLemore	RCRIS- SQG UST	0.25 miles SE	Low

Site ID ¹	Site Name	Site Address	Site Type	Approximate Distance from Corridor	Site Rating
40	Texaco Sales Term 29-344	1237 Riverside Drive	RCRIS-SQG FINDS CERC-NFRAP	0.25 miles S	Low
40	Union Co. of California Chemical Co.	1235 Riverside Drive	UST	0.25 miles S	High
40	Unocal Chemicals	1235 Riverside Drive	CERCLIS RCRIS-SQG FINDS	0.25 miles S	High
40	Apex Chemical Co.	1232 Riverside Drive	RCRIS-SQG FINDS TRIS UST ERNS	0.25 miles S	Low
13	Exxon R/S #5-0123	833 South 3 rd St.	UST LUST	> 0.5 miles E	Low

Summary of Hazardous/Special Waste Sites in the I-55 Interchange Project Vicinity

The presence of hazardous and/or special waste with the proposed project vicinity was determined by reviewing federal and state environmental records, by reviewing aerial photographs, and by conducting a field survey. Each site was assigned a risk level of either “no indication,” “low,” or “high.” Two of the 53 identified sites (four percent) were assigned a “high” risk rating. In this case both of the sites are listed at the same address. Generally, the sites given a “high” risk rating are located within the proposed ROW or immediately adjacent to the project area, may be associated with hazardous waste/material or special waste, and would likely need to be removed during highway construction.

Overall, most of the existing sites or abandoned facilities are found in the EDR report, because the site contains USTs. Only six of the sites are known to have LUSTs. Many of the identified sites are either current or former gasoline stations. These sites are not technically classified as hazardous waste sites but are potential sources of petroleum products or special wastes. These special waste sites are regulated under different regulations and requirements for monitoring and cleanup than for hazardous materials and waste.

3.17.2 Potential Impacts to Hazardous/Special Waste Sites from the No-Build Alternative

Direct Impacts: Because no activities related to the proposed I-55 Interchange project would occur under the No-Build Alternative, there would be no direct impacts to existing hazardous/special waste sites in the project vicinity. However, not improving the existing interchange may result in an

increased potential for accidental spills of hazardous or special wastes in the area due to continued reduction in LOS on I-55 and adjacent roadways. Continued, or worsening, traffic congestion problems could result in increased crash rates in the project area. It is possible that some of those crashes could involve vehicles transporting hazardous or special wastes through the area. According to the 2005-2007 crash data, a total of 18 crashes within the immediate interchange study area involved vehicles containing hazardous cargo. Also, fuels and other liquids from vehicles damaged during a crash could leak onto the highway and be washed into stormwater sewers resulting in potential impacts to water quality where those sewers discharge. The Tennessee Emergency Management Agency (TEMA) has the responsibility and authority for coordination of all state and local agencies during accidents involving hazardous materials. The TEMA has demonstrated its ability to effectively manage such incidents.

Indirect Impacts: If the existing I-55 Interchange is not improved, it is likely that traffic conditions would continue to deteriorate on I-55 and the adjacent roadways including E.H. Crump Boulevard and South Riverside Drive. As traffic conditions and LOS decline, drivers, including drivers of large trucks, may choose to use alternative routes. This may increase the risk of crashes along those alternative routes. This would likely increase the risk of accidental spills of fuel, antifreeze, and engine oil in additional areas outside the immediate project area due to crashes. These contaminants could flow into stormwater sewers and eventually discharge into downstream watercourses or wetlands. In some cases, these contaminants may not reach downstream watercourses until enough precipitation occurs to transport the materials through the stormwater pipes.

There would be additional concerns that the poor LOS anticipated at the interchange under the No-Build Alternative would result in increased congestion that would force vehicles to remain in the project area for longer periods. The longer individual vehicles remain in the area, the more chance there would be for potential hazardous and/or special wastes issues due to leaks from vehicles containing them, including leaks of fuels, oils, and other liquids used for vehicle operation. Over time, leakage from individual vehicles could accumulate on the roadway surface and then be washed into stormwater sewers and eventually be carried into downstream watercourses.

Cumulative Impacts: Because no construction activities would occur under the No-Build Alternative, there would be a low potential for this project to result in cumulative impacts to hazardous or special waste sites. However, the No-Build Alternative could result in long-term adverse cumulative impacts due to increased potential for accidental spills or leaks of hazardous or special waste materials on local highways. The LOS on I-55 and other adjacent roadways would continue to decline due to the interchange improvements not being completed in combination with continued urban growth in the region that is expected to continue to increase traffic volumes. The poor LOS expected on I-55 within the project area would likely result in increased crash rates, which would in turn increase the risk of accidental spills or leaks of contaminants. Also, additional traffic volumes and decreased LOS may force vehicles to move more slowly through a given stretch of roadway resulting in potential for accumulation of vehicle contaminants from vehicle leakage. All spills or leaks of any hazardous materials or special wastes could potentially result in adverse impacts to the local environment. In addition, if an accidental release of a hazardous material were to occur on the roadway, it could pose health and safety risks to nearby residents, especially those living near the roadways that could be exposed to toxic fumes or the materials themselves.

Although it is expected that at least some of the existing hazardous or special wastes sites located in the general project vicinity would be "cleaned-up" as part of the anticipated revitalization efforts, it is likely that not constructing the I-55 Interchange would slow the rate at which that revitalization occurred. With no improvement to the existing traffic issues in the area due to the existing interchange configuration, the area would remain less attractive to potential developers and/or tenants. Therefore, it is more likely that some of the idle sites containing hazardous or special wastes

may remain idle for longer periods and increase the risk for potential leaks or exposure in the long term.

Conversely, leaving the existing sites idle could reduce the chance of hazardous or special waste sites being disturbed. In some cases, not disturbing previously contaminated sites may be safer, especially if proper techniques are not used to deal with or dispose of contaminated soils, equipment, or tanks. It is likely that any construction projects in the former industrial areas would be monitored closely by the EPA, state, and/or local agencies to ensure that any contaminants are properly removed from the site or otherwise contained appropriately.

3.17.3 Potential Impacts to Hazardous/Special Waste Sites from Alternative A

Direct Impacts: No long-term adverse impacts to hazardous/special waste from construction activities are anticipated under Alternative A. Only the sites located at 1235 Riverside Drive (Unocal Chemicals) were identified as being a potential high risk to the I-55 Interchange project during the Hazardous Materials, Hazardous Waste, and Special Waste Study. Although, this area is near the project area, the groundwater flow is expected to be towards the west in that area. Therefore, any potential contaminants from those sites would likely not be within the I-55 project boundaries. Soil contamination is not expected to be an issue due to the distance between the interchange construction zone and the location of the site. If any new hazardous or special waste sites or potentially contaminated soils are discovered during demolition of existing buildings or during construction, they will be dealt with in an appropriate manner to ensure contaminants are removed and disposed of properly.

There is a potential for minor, short-term adverse impacts during construction due to leaks or spills of contaminants from construction equipment. No construction activities would be conducted in any watercourses or wetlands. Therefore, there is limited chance of introducing contaminants into waters. Use of BMPs and proper maintenance and cleaning of construction equipment and vehicles will reduce the potential for adverse impacts.

Improvements to the I-55 Interchange would help to reduce traffic congestion in the area allowing vehicles to move through the area more efficiently and potentially reduce crash rates. These factors would reduce the chance for accidental spills and leaks of hazardous materials or special waste in the project area. Less congestion would also reduce the amount of time vehicles leaking fluids would spend at any one location along the roadway, thus reducing the chance for heavy accumulations of hazardous fluids from leaking vehicles.

Indirect Impacts: Increased highway accessibility and efficiency could result in greater volumes of hazardous materials being transported through the project area. However, more efficient, faster traffic movement through the area would reduce the time that hazardous materials are on the local highways and roads. Spills on highways can cause water quality degradation and can be a possible public health hazard. The TEMA has the responsibility and authority for coordination of all state and local agencies during accidents involving hazardous materials. The TEMA has demonstrated its ability to effectively manage such incidents.

Improving traffic issues along the I-55 corridor under Alternative A would potentially remove some traffic from other local roadways that are currently used to bypass traffic congestion, or that would become more heavily used in the future for that purpose if the interchange were not improved. This would help reduce the risk of accidental spills or leaks of hazardous materials along other roadways in the area, some of which may be local neighborhood streets or other roadways with more residences along them.

There is potential that the interchange improvements could promote secondary development in the general project vicinity due to better traffic flow and accessibility. Some of this new development is expected to occur in the abandoned industrial sites in the areas north and east of the project, some of

which are thought to contain potential hazardous or special waste sites. In general, revitalization of those areas would have long-term beneficial impacts due to removal and “clean-up” of potentially harmful materials from those sites. The sooner the materials, tanks, and old equipment are removed from those locations the less chance they would have to result in leaks or spread of contaminants from those sites.

Alternatively, it is possible that disturbance of some of the potentially contaminated sites could result in the spread or transport of those materials to other sites. The EPA and state and local agencies would monitor revitalization efforts in former industrial sites to ensure that all potentially harmful materials are dealt with appropriately and thoroughly. In most cases, “clean-up” would simply involve removal of old USTs or ASTs or old equipment containing greases, oils, or other potential contaminants. However, at sites where known LUSTs are located, or were located in the past, the “clean-up” efforts would be more involved and may include excavation and removal of existing soils where contaminants may have leaked.

It is possible that the interchange improvements could promote development of gas stations in the area as part of the secondary developments that could occur. Gas stations would bring with them the risk of contamination due to fuel stored in USTs and due to potential spills on the surface. However, the risks associated with modern gas stations containing new USTs are lower than in the past due to more stringent requirements for storing and handling fuels and other potentially harmful substances. Therefore, even if new gas stations were developed in the project vicinity, it is not likely that overall risks would increase substantially.

Cumulative Impacts: There are not expected to be any substantial adverse impacts due to hazardous/special waste sites associated with Alternative A, even when combining the potential impacts of the interchange improvements with impacts from other past, present, and reasonably foreseeable projects. In general cumulative impacts to hazardous and special waste sites would be beneficial in the project vicinity due to revitalization and “clean-up” of former industrial sites, some of which still contain potentially harmful materials. It is likely that new developments, both those promoted by the I-55 Interchange project and those that are unrelated to the project, would be constructed on at least some of the former industrial sites. The I-55 improvements may promote some of those sites to be developed sooner due to improved traffic flow and access to some sites. However, this would likely result in more potential beneficial impacts than adverse impacts. Some adverse impacts may occur due to disturbance or transport of contaminated soils; however, it is likely that developments on contaminated sites would be closely monitored by appropriate regulatory agencies to ensure all contaminated materials are dealt with appropriately.

More stringent environmental regulations placed on new developments, including new USTs installed at new gas stations, would also help to reduce potential adverse impacts from hazardous materials in the project vicinity. Therefore, even though continued development is expected, no substantial increases in risks associated with hazardous materials are anticipated.

Continued urban growth in the region would generate additional traffic volumes on local roadways, including I-55. This long-term increase in traffic volumes would eventually lead to declines in LOS on some roadways and increased crash rates. Those factors may contribute to more potential for accidental spills or leaks of hazardous materials on those roadways. At least in the reasonably foreseeable future through the design year of this project (2032), the I-55 Interchange would be expected to handle the forecasted increases in traffic in the region. Even in 2032, LOS would be expected to be better than the existing LOS at the I-55 Interchange (currently LOS F). Therefore, in the long-term, Alternative A would result in improvements to traffic flow and therefore crash rates and associated spill potential.

3.17.4 Potential Impacts to Hazardous/Special Waste Sites from Alternative B

Direct Impacts: Direct impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative B would be essentially the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative B would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.17.5 Potential Impacts to Hazardous/Special Waste Sites from Alternative Z

Direct Impacts: Direct impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z would be similar those discussed under Alternative A.

Indirect Impacts: Indirect impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z would be similar to those discussed under Alternative A.

3.17.6 Potential Impacts to Hazardous/Special Waste Sites from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z-1 would be similar to those discussed under Alternative A.

Indirect Impacts: Indirect impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z-1 would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to or from hazardous materials, hazardous waste, and special waste sites associated with Alternative Z-1 would be essentially the same as those discussed under Alternative A.

3.17.7 Mitigation

Any hazardous wastes encountered within the proposed ROW would be remediated in accordance with the applicable sections of the Federal Resource Conservation and Recovery Act (RCRA), the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Tennessee Hazardous Waste Management Act of 1983. All project-related activity that involves USTs would adhere to the Tennessee Petroleum Underground Storage Tank Act of 1998 (Tennessee Code Annotated, section 68-215-101 *et seq.*) and the rules set forth by TDEC's Underground Storage Tank Program (Tennessee Code Annotated, section 68-215-201 *et seq.*).

3.18 Visual Quality

3.18.1 Affected Environment

The general setting of the I-55 Interchange project area consists primarily of an urban setting with mixed views throughout the length of the project. Most areas within the southwest quadrant of the I-55 Interchange are considered visually appealing due to the presence of the well-kept French Fort Neighborhood, parks, National Ornamental Metal Museum, and other features. The abandoned hotel and associated property located just southwest of the existing interchange has become rundown and has reduced visual appeal. Several large trees are present in the southwest quadrant, which help the

visual quality in that area. Areas in the northwest quadrant of the project area contain a mixture of developed areas including commercial properties and railroad tracks as well as a park. Some of the structures are new or revitalized and some are older and more rundown. Some trees and shrubs are located in the northwest quadrant, which helps screen some of the rundown sites and railroad tracks from roadway users. The northeast and southeast quadrants are dominated by industrial sites including older brick, concrete, and or metal buildings, many of which are abandoned. Several industrial or commercial sites occur east of the existing I-55 and are better maintained than the abandoned properties in the area. Many of the abandoned properties contain buildings with broken, missing, or boarded windows and doors, rusted tin roofs and siding, graffiti, non-maintained lawns and landscaping, and numerous piles of junk or abandoned materials or equipment. Many of these areas present negative visual qualities.

In terms of direct views for travelers on I-55 in the project area, the best existing view may be for travelers heading north on I-55 toward the existing interchange. Travelers heading north from the southern portions of the project area can see a backdrop that includes portions of the downtown Memphis skyline. Also, after passing through the interchange and continuing west (on northbound I-55) the same travelers can see the existing bridges over the Mississippi River and trees lining the river bank. Travelers heading south on I-55 from the existing interchange can see various sights, some that are of maintained ROW areas along the roadway, and others of more rundown abandoned properties and associated visually unappealing areas.

The views within the immediate I-55 Interchange ROW itself consist of roadways, bridges, ramps, and some scattered trees in the sparsely landscaped ROW. In general, the existing interchange is lacking visual appeal due to the older, less maintained structures and older design of the roadway features. The area lacks modern or updated infrastructure and landscaping that is often perceived to be more visually appealing, especially in urban settings.

3.18.2 Potential Impacts on Visual Quality from the No-Build Alternative

Direct Impacts: Not improving or reconfiguring the existing I-55 Interchange and associated ROW would result in potential long-term declines in visual quality in the immediate project area. Although general maintenance activities would continue to occur to maintain the function of the roadway, as time goes on, it is likely that the roadway structures and other features, such as guardrails, fencing, landscaping, and other visible aspects of the existing interchange would continue to deteriorate in visual quality. Because the existing I-55 Interchange ROW has already become somewhat visually unappealing due to the aging roadway and structures, including landscaping in the ROW, the overall impacts to visual quality from the No-Build Alternative would be minor.

For residents in the French Fort Neighborhood, the visual impacts associated with the No-Build Alternative would be relatively unchanged because the existing trees separating their homes from I-55 would remain intact and help screen views of the highway.

Indirect Impacts: If the I-55 Interchange is not reconfigured or improved, it is likely that revitalization or redevelopment of other adjacent properties may be slower to occur. This would result in potential long-term adverse impacts, because the existing run-down abandoned buildings and associated properties would remain in place and likely continue to deteriorate. This would take away from more visually appealing areas like the French Fort Neighborhood and areas surrounding the Metal Museum in the southwest quadrant of the interchange.

Cumulative Impacts: Not implementing the I-55 Interchange improvements could have long-term cumulative adverse impacts to the visual quality of the general project area primarily due to continued deterioration of existing roadway infrastructure and landscaping within the existing ROW and the abandoned buildings in the vicinity. Although some redevelopment and revitalization would likely occur in the area regardless of the interchange improvements, the continued traffic issues caused by

the current interchange configuration would not promote the amount of redevelopment otherwise anticipated. Any of the abandoned properties that were not revitalized would continue to deteriorate visually.

3.18.3 Potential Impacts on Visual Resources from Alternative A

Direct Impacts: Alternative A would have adverse impacts on the visual quality of the project area. The visual impacts would be most noticeable for residents of the French Fort Neighborhood whose view of the existing I-55 Interchange is presently blocked by other existing homes and large trees located to their north and/or east. Because some homes and trees located at the northeast corner of the neighborhood would be removed to make room for the new interchange, several of the remaining homes would be exposed to I-55 and the interchange area. Their exposure to the interchange would be increased due to the proposed through lanes for I-55 being shifted closer to the neighborhood, and because the I-55 lanes would be elevated to accommodate the underpass for the proposed connection between Illinois Avenue and Crump Boulevard.

Most of the adverse visual impact associated with the project will occur during the construction phase of the project. These short-term adverse impacts would be due to the presence of heavy equipment, construction materials, and non-vegetated areas that would be visible. Proper construction techniques would be utilized to help reduce short-term visual impacts and long-term lingering effects of construction. However, as discussed above, even after construction is complete, several homes located along the northeastern edge of the French Fort Neighborhood will continue to be exposed to views of the new interchange and associated infrastructure. TDOT will continue to coordinate with residents to determine potential ways to help reduce those impacts, such as planting vegetation screens or providing aesthetically pleasing features as part of the highway design.

Although some residents of French Fort Neighborhood will experience unavoidable adverse visual impacts, it is anticipated that reconfiguration of the I-55 Interchange under Alternative A would be perceived by some people, including frequent users of I-55 and developers wanting to revitalize the area, as a visual enhancement due to the long-term benefits to the improved visual quality of the I-55 Interchange ROW itself. Once the project is completed and all the construction areas are cleaned and revegetated, it is likely that the interchange itself would be perceived as visually improved compared to baseline conditions. New signs, fencing, guardrails, landscaping, and other features would help to improve the overall look of the interchange. TDOT will continue to work with residents, local officials, and other stakeholders through the design phase of the project to help develop an interchange that fits into the context of the community while providing the needed transportation improvements.

Indirect Impacts: The anticipated visual improvements and basic revitalization of the I-55 Interchange and ROW, along with improved traffic conditions, would likely promote some new development and revitalization of other properties in the surrounding area. It is likely that some of this development would occur on existing abandoned properties containing run-down structures and poorly-maintained properties. Replacing those structures with modern buildings and improved landscaping would result in long-term beneficial impacts to visual quality in the project vicinity. Conversely, some secondary developments promoted by the interchange improvements may be constructed on previously undeveloped sites resulting in additional loss of open space, forests, or other more visually appealing locations. In those cases, the long-term visual impacts would likely be considered adverse. However, depending on the type of development and the surrounding setting, it may be perceived as positive by other individuals.

As discussed in previous sections of this EIS, it is anticipated that some of the displaced residences would be relocated on vacant open land just west of the existing French Fort Neighborhood. This would result in short-term adverse impacts during construction of the new homes. Long-term visual impacts of the new homes may be perceived as adverse or beneficial depending on individual

preferences. Placement of new homes and landscaping could improve visual quality and possibly increase values of adjacent properties. However, the homes would be placed on lands that are currently vacant open space that is perceived as visually pleasing to many residents in the area. The adverse visual impacts would likely affect the adjacent residents that can currently see the open space from their homes. However, it may also affect local residents who pass through the area or use the vacant land for recreational purposes. The open space associated with other areas, including Chickasaw Heritage Park and E.H. Crump Park would not be impacted by this project.

Cumulative Impacts: Alternative A would be anticipated to have an overall positive effect on visual quality in the general project area due to improvements to infrastructure and the roadway ROW within the project limits. These potential benefits to the visual quality of the area would combine with visual benefits expected from other development projects and revitalization projects in the area that are constructed in previously disturbed or abandoned sites. There would be short-term adverse impacts during the construction period of each of the projects, but once the construction is completed the long-term impacts would be beneficial.

Some of the anticipated roadway, residential, commercial, or industrial developments that would occur in the reasonably foreseeable future may combine with this project to result in additional loss of open space or currently undeveloped lands in the general vicinity of the project. This may result in some adverse impacts to visual quality in the localized areas surrounding the new developments or project sites.

In general, it is anticipated that any secondary development associated with the I-55 Interchange project would occur in previously disturbed urban areas where abandoned buildings and run-down properties exist. If those sites are redeveloped and revitalized, there would be long-term beneficial impacts, especially when combined with other revitalization efforts in the area that are unrelated to the new interchange. Some negative visual impacts may occur for some of the individual residents of the French Fort Neighborhood. However, it is likely that the revitalization efforts in portions of the areas surrounding the project would likely be perceived as beneficial to the local residents as a whole.

3.18.4 Potential Impacts on Visual Resources from Alternative B

Direct Impacts: Direct impacts to visual quality associated with Alternative B would be essentially the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to visual quality associated with Alternative B would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to visual quality associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.18.5 Potential Impacts to Visual Resources from Alternative Z

Direct Impacts: Direct impacts to visual quality associated with Alternative Z would be similar those discussed under Alternative A. However, the roundabout intersection would be developed as a gateway for the City of Memphis and would be more aesthetically appealing than Alternatives A and B.

Indirect Impacts: Indirect impacts to visual quality associated with Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to visual quality associated with Alternative Z would be similar to those discussed under Alternative A.

3.18.6 Potential Impacts to Visual Resources from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to visual quality associated with Alternative Z-1 would be similar to those discussed under Alternative A. However, the roundabout intersection would be developed as a

gateway for the City of Memphis and would be more aesthetically appealing than Alternatives A and B.

Indirect Impacts: Indirect impacts to visual quality associated with Alternative Z-1 would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to visual quality associated with Alternative Z-1 would be essentially the same as those discussed under Alternative A.

3.18.7 Mitigation

Short-term visual impacts are expected with any construction project due to construction equipment, grading, and storage of materials on site. Most visual impacts due to construction typically end once a project is complete. However, careless construction techniques can have long-term aesthetic consequences. Examples of careless construction techniques include inappropriately located disposal sites, unnecessary damage to trees that are supposed to remain on the site and poorly located access and haul roads that cause unnecessary removal of vegetation or other impacts. Also, not properly grading, revegetating, or landscaping construction sites can result in visual impacts. If proper vegetation, such as grass or other groundcover, is not established on disturbed areas following construction, the area would likely be perceived negatively by most individuals. Non-vegetated areas also tend to have erosion issues, which usually lead to further visible issues. All of these types of construction impacts can remain visible for long periods following construction.

One of the goals of most modern construction projects, including TDOT roadway projects, is typically to provide structures or facilities that fit into the surrounding setting as well as possible so the visual effect is an improvement over existing conditions. If not perceived as an improvement, the goal would be to maintain the general visual quality in an area to the extent practical.

Mitigation measures, as defined by the CEQ (40 CFR 1508.20), include avoiding impacts, minimizing impacts, rectifying impacts, reducing or eliminating the impact over time, and compensating for the impact. Potential mitigation measures for visual impacts should include, but not be limited to:

- Consideration of post-project aesthetic appeal during the project's functional design, surveying and clearing.
- Preparation of areas within the ROW to permit successful revegetation programs that accommodate, preserve and capitalize on mature and semi-mature stands of vegetation. Care should be taken to establish native vegetation. This may be accomplished either naturally or through planned seeding.

TDOT will continue to work closely with the City of Memphis and local residents to obtain and develop ideas for designing and constructing a new I-55 Interchange that fits the context of the area and with any future plans for the area.

3.19 Energy

3.19.1 Affected Environment

The current commitment of energy resources (mainly gasoline and diesel fuels) in the project area is influenced by traffic flow patterns. When traffic flow is congested, which often occurs on the existing I-55 Interchange in Memphis, higher consumption of fuel is required than when traffic flow is flowing more freely.

Construction equipment used for roadway projects requires the use of additional energy. However, the short-term uses of extra energy during construction are typically offset by the energy resources saved due to improved traffic flows in the long-term.

There are no energy sources in the I-55 Interchange project area that would be potentially impacted. If electrical lines and gas pipelines are impacted in the project construction zone, they would be relocated as part of the project.

3.19.2 Potential Impacts on Energy from the No-Build Alternative

Direct Impacts: Not improving or reconfiguring the existing I-55 Interchange would result in potential long-term adverse impacts to energy resources. Traffic congestion would continue to worsen at the existing interchange and would likely eventually cause additional roadways to have reduced LOS as people looked for alternative routes to avoid the I-55 Interchange area. The poor traffic flow would continue to result in extra commitment of energy resources (diesel fuel and gasoline) than would be needed if traffic flowed more freely and efficiently.

Indirect Impacts: Not improving the I-55 Interchange would likely result in more congestion on other roadways in the region as people attempt to use other routes to avoid congestion. This would likely result in reduced LOS on those alternative routes and would cause increases in VMT and travel times. All of those factors would result in increased fuel consumption in the region which would cause adverse impacts to energy resources. This extra fuel would also have secondary economic impacts for local residents and businesses due to the extra fuel that would need to be purchased for commuting to and from work or for shipping items in and out of the area.

The No-Build Alternative would not promote new development in the general project area, because the traffic congestion problems would dissuade developers and potential tenants from locating in the area. This may have some potential benefits in terms of energy, because less construction would occur and less long-term energy consumption would be needed if fewer developments occurred. However, it is likely that those developments would just shift to other portions of the Memphis area or other cities putting additional energy demands on those areas. Also, if the vacant areas near the project area are not utilized/revitalized to their full potential because of traffic issues, it may result in additional energy impacts. This is because those developments, including residential, commercial, and/or industrial developments, would likely be located farther away from the downtown Memphis area and may result in longer commutes requiring additional fuel consumption. If the areas closer to downtown can be utilized less fuel would be required, especially for residents and businesses that require travel into the downtown Memphis area on a daily or regular basis.

Cumulative Impacts: Reduced LOS and increased congestion at the I-55 Interchange under the No-Build Alternative would have adverse impacts to energy resources, primarily fuel. When viewed cumulatively with other past, present, and reasonably foreseeable projects and trends, the impacts to energy would be even more adverse. It is anticipated that traffic volumes will continue to increase in the region due to continued urban development and economic growth in the area. Extra vehicles generated by new developments would result in worsening traffic congestion at the I-55 Interchange and other local roadways, if no improvements were made. This would result in unnecessary increases in fuel consumption.

A minor amount of relief to the potential extra fuel consumption may result from more efficient vehicles due to more stringent regulations by the government promoting auto makers to produce more fuel efficient vehicles. However, the benefits of those efforts would not be as noticeable if traffic flow issues remain due to the poor LOS on the I-55 Interchange. Anticipated improvements and addition of other roadways in the region may also help alleviate some of the traffic problems in the region as a whole. However, because I-55 is a major route and handles a substantial amount of through traffic, especially trucks, not improving the interchange would have noticeable adverse impacts due to increased energy consumption.

Revitalization efforts anticipated for portions of Memphis near the I-55 Interchange project area may be slowed or halted if the interchange improvements were not made. Not taking full advantage of

available developable sites closer in to the center of the City would cause additional impacts to energy resources. If the developable sites were not utilized, it is likely that more people would be forced to have longer commutes or travel distances and, therefore, utilize more fuel.

3.19.3 Potential Impacts on Energy from Alternative A

Direct Impacts: The improved traffic flow and reduction in commuting times would decrease the amount of fuel consumption in the region. The improved LOS would allow both local commuters and through traffic to move through the area more efficiently and without having to find alternative routes to avoid congestion at the I-55 Interchange.

Short-term adverse impacts would occur due to extra fuel consumption during construction of the project. However, those short-term impacts would be more than offset by the long-term benefits of the new interchange in terms of providing more efficient travel through the area.

There could be temporary disruption of electric and gas service in the area while powerlines and/or gas pipelines are relocated (if necessary). These impacts would be short-term and would likely not cause noticeable impacts.

Indirect Impacts: The improved I-55 Interchange would likely help to improve LOS on other local roadways making them more efficient. This improved LOS would be due to removing some of the traffic from those other roadways that drivers currently use to avoid congestion at the I-55 Interchange. Providing better access to the areas surrounding the project area would promote more development in the area. In terms of energy, this would likely be beneficial in the long-term, because it would take advantage of developable land close to the Downtown Memphis area. This in turn would provide for shorter commuting distances or shipping distances for residents, businesses, or industries choosing to locate in the area. The benefits of providing better access and more efficient travel to areas located adjacent to the project would result in overall positive impacts to energy.

Secondary developments promoted by the interchange improvements may put more demands on some sources of energy like electric and natural gas. However, it is likely that if the area around the I-55 Interchange were not developed, the developments would take place in other parts of the region putting the same demands on energy in those areas.

Cumulative Impacts: The I-55 Interchange improvements would provide for more efficient travel through the area resulting in increased fuel efficiency and beneficial impacts to energy. Those benefits would combine with benefits of other past, present, and reasonable foreseeable transportation improvement projects in the Memphis area. Also, continued improvements by automakers in providing more fuel-efficient vehicles would also add to the overall positive impacts to energy.

Revitalization efforts near the project area would also ultimately help to reduce commuting distances and travel times for many residents and businesses that choose to locate there instead of areas located further from downtown. This would also help offset some of the increased energy demands expected throughout the Memphis region due to continued urban development and economic growth.

Continued growth in the Memphis area would occur with or without the I-55 Interchange project. Therefore, this project would not necessarily add to any increased energy demands. Instead, it would help to compensate for some of the increased demands by providing for more efficient travel through the area.

3.19.4 Potential Impacts on Energy from Alternative B

Direct Impacts: Direct impacts to Energy associated with Alternative B would be essentially the same as those discussed under Alternative A.

Indirect Impacts: Indirect impacts to Energy associated with Alternative B would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to Energy associated with Alternative B would be essentially the same as those discussed under Alternative A.

3.19.5 Potential Impacts to Energy from Alternative Z

Direct Impacts: Direct impacts to Energy associated with Alternative Z would be similar those discussed under Alternative A.

Indirect Impacts: Indirect impacts to Energy associated with Alternative Z would be similar to those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to Energy associated with Alternative Z would be similar to those discussed under Alternative A.

3.19.6 Potential Impacts to Energy from Alternative Z-1 (Preferred Alternative)

Direct Impacts: Direct impacts to Energy associated with Alternative Z-1 would be similar to those discussed under Alternative A.

Indirect Impacts: Indirect impacts to Energy associated with Alternative Z-1 would be essentially the same as those discussed under Alternative A.

Cumulative Impacts: Cumulative impacts to Energy associated with Alternative Z-1 would be essentially the same as those discussed under Alternative A.

3.19.7 Mitigation

Construction of the I-55 Interchange improvements would be conducted in an efficient manner to avoid unnecessary consumption of energy. Construction equipment will be maintained regularly to allow for efficient operation and fuel efficiency.

The I-55 Interchange project has been developed to improve traffic flow conditions in the Memphis region. Meeting that goal would result in improved fuel efficiency for some vehicles traveling in the area.

3.20 Construction Impacts

Adverse impacts from construction would be primarily short-term in duration. Construction inconveniences such as noise, dust, and traffic conflicts are likely to be unavoidable yet are greatest during the construction phase only.

In order to minimize potential detrimental effects from noise, siltation, soil erosion, or possible pollution of area watercourses, the construction contractors would be required to comply with the special provisions of *Standard Specifications for Road and Bridge Construction* (TDOT, 2006) and the *Best Management Practices for Erosion and Sediment Control* (FHWA, 1995). These provisions implement the requirements of the FHWA's *Federal-Aid Policy Guide* (Subchapter G part 650b).

Contractors would be required to conduct and schedule operations according to these provisions. For example, the contractor would be bound by Section 107.01 of the Standard Specifications to observe any noise ordinance in effect within the project limits. Detoured traffic would be routed during construction in a manner that has the least noise impact practicable upon residential and noise sensitive areas. In addition, coordination with affected utility companies would minimize disruption to utility services. Furthermore, TDOT would coordinate with local governments during the construction phase to minimize disruption to communities accepting detoured traffic.

Any action involving open burning would be in accordance with Chapter 1200-3-4 ("Open Burning") of the *Tennessee Air Pollution Control Regulations*. Any action resulting in fugitive dust would be in accordance with Chapter 1200-3-8 ("Fugitive Dust"). The general contractor and all related subcontractors associated with the project would be required to have a valid operation permit from the

Tennessee Air Pollution Control Division or to obtain an exception from the regulations through board action.

Solid waste generated by construction activities would be disposed of in accordance with all state rules and regulations concerning solid waste management. Where possible, land debris would be disposed at a registered sanitary landfill site. If the use of a landfill is not possible, the contractor would dispose of the solid waste in a manner that is compliant with NEPA regulations.

Proper sediment control measures, such as silt fences, would be used as outlined in the *Tennessee Erosion and Sediment Control Handbook* (TDEC, 2001b) and *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites* (Smoot et al., 1992).

3.21 Required Permits

The acquisition of permits would occur prior to initiation of construction activities, pursuant to Section 69-3-108(a) of the Tennessee Water Quality Control Act of 1977 and other State and Federal laws and regulations. These permits could include:

- CWA - Section 404 Permit – required for construction that involves placement of dredge and fill material in Waters of the U.S. and/or impacts to Waters of the U.S. where federally-listed Threatened or Endangered species are present. Typical Waters of the U.S. include rivers, blueline streams, headwaters streams, and special aquatic sites, such as wetlands. Section 404 Permits are issued by the USACE.
- ARAP – required for any alterations of State waters, including wetlands that do not require a Federal (Section 404) permit. The ARAP permits are required for construction at locations where the proposed project involves placement of fill in the following: a pond that is spring fed or impacts springs; reservoirs; wetlands; blue line streams; intermittent blueline streams on the United States Geologic Survey (USGS) 7.5 quadrangle map; any stream that supports any form of aquatic life; or is in the vicinity of a State-listed endangered species. The TDEC, Division of Water Pollution Control issues ARAP permits.
- NPDES Stormwater Construction Permit – required for grubbing, clearing, grading, or excavation of one or more acres of land. TDEC’s Division of Water Pollution Control issues NPDES permits.
- Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) – required by operators of construction sites in Tennessee.

In addition, the State of Tennessee would require water quality certification under Section 401 of the CWA. Section 401 certification ensures that activities requiring a Federal permit or license will not cause pollution in violation of State water quality standards.

3.22 Section 4(f) Properties

According to Section 4(f) of the Department of Transportation Act of 1966, recodified as 49 United States Code Section 303, “The Secretary [of Transportation] shall not approve any program or project which requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic structure of Federal, State, or local significance as so determined by such officials unless:

- There is no feasible and prudent alternative to the use of such land; and
- The project includes all possible planning to minimize harm to the land resulting from such use.

There are no existing or proposed public lands, including nature preserves, parks, forests, wildlife management areas, Federal Wild and Scenic Rivers, or Tennessee State Scenic Rivers found within the proposed project area ROW. No naturally occurring unique or notable habitats such as glades, bald cypress/tupelo swamps, or old growth forests, were identified. Some publicly owned lands and notable areas are located in the general vicinity of the project area, but those areas are not anticipated to be impacted by the I-55 Interchange project. Some of the publicly owned lands include Martyr Park, E.H. Crump Park, Chickasaw Heritage Park (Desoto Park), and T.O. Fuller State Park (located 4 miles south of the project area).

3.23 Relation of Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The local short-term impacts of the proposed action and the use of resources for it are consistent with the maintenance and enhancement of long-term productivity for the region. Creation of the project would support growth and development of employment and population in the region. This project would support short-term and long-term goals by improving means of transport into and out of the region.

The level of development anticipated provides the basis for improved delivery of services and goods to and from the region. It should enhance the quality of life as access is improved and traffic travel times throughout the region are reduced. There would be no discernable difference between the build alternatives.

3.24 Irreversible and Irretrievable Commitment of Resources

The proposed action would require the expenditure of human and fiscal resources and the potential modification of natural resources. Land and materials utilized in the construction of the project are considered an irreversible commitment.

Land used in the construction of the proposed facilities is considered an irreversible commitment during the period that the land is used for the highway interchange. However, if a greater need arises for the use of the land, or if the highway facilities are no longer needed, the land can be converted to another use. At present, there are no reasonably foreseeable reasons to believe such a conversion would ever be necessary or desirable. Resources affected by construction of the project may be irreversibly altered.

Construction would require the expenditure of materials that are generally not retrievable. Considerable amounts of fossil fuels, labor, and construction materials such as cement, aggregate, iron, gravel, and bituminous material would be expended and large amounts of labor and natural resources are necessary in the fabrication and preparation of construction materials. However, although these materials are generally not retrievable, they are not in short supply and their use would not have an adverse effect upon continued availability of these resources. In addition, construction would also require large, one-time investment of both state and federal funds that are not retrievable.

The commitment of these resources is based on the concept that residents both within the project area, as well as the region, would benefit by improvements in the quality of the local and regional highway transportation system. The facilities would improve the highway capabilities of the region by substantially enhancing accessibility and saving time. The facilities should provide a positive influence on the economy of the region and the livelihood of its citizens.

3.25 Summary of Environmental Consequences

This section was prepared to provide a summary of the potential impacts of each of the proposed alternatives for the project. The Executive Summary also contained a general summary of the environmental consequences associated with the project. Table 3.15 shows side-by-side comparisons of impacts associated with the No-Build Alternative, and Alternatives A, B, Z and Z-1). Table 3.16 lists the primary pros and cons of each alternative.

3.25.1 No-Build Alternative

The No Build Alternative would involve: no residential or business displacements; continued poor LOS and safety concerns due to crashes; continued noise impacts for 28 receptors from increased traffic volumes and traffic using secondary routes to avoid the I-55 interchange; and this alternative would not meet the purpose and need of the proposed project.

3.25.2 Alternative A

Build Alternative A would involve: long-term beneficial impacts to traffic and interstate route continuity; enhanced community cohesion with better connections between adjacent areas; and reduced congestion and improved emergency response times. Adverse impacts include: eight residential and two business displacements; 39 potential noise impacts from I-55, but reduced noise on secondary routes; potential cultural impacts to an archaeology site (Site #40SY709) that would require further Phase II testing; and there would be minor short-term adverse impacts to water quality, wildlife habitat, and hazardous materials during construction.

3.25.3 Alternative B

Build Alternative B would involve long-term beneficial impacts to traffic and interstate route continuity and result in reduced congestion. Adverse impacts include: eight residential and two business displacements; direct access to Metal Museum Drive would be eliminated; 37 potential noise impacts from I-55 but reduced noise on secondary routes; potential cultural impacts to an archaeology site (Site #40SY709) that would require further Phase II testing; and there would be minor short-term adverse impacts to water quality, wildlife habitat, noise, air quality, and hazardous materials during construction.

3.25.4 Alternative Z

Build Alternative Z would involve long-term beneficial impacts to traffic and interstate route continuity; improved connections between the interstate and local roadways; improved aesthetic impacts by replacing cloverleaf ramps with a more modern design scheme involving a roundabout; and better access to and from the French Fort Neighborhood area. Adverse impacts include: eight residential and two business displacements; direct access to Metal Museum Drive would be eliminated; 38 potential noise impacts from I-55 but reduced noise on secondary routes; potential cultural impacts to an archaeology site (Site #40SY709) that would require further Phase II testing; and there would be minor short-term adverse impacts to water quality, wildlife habitat, noise, air quality, and hazardous materials during construction.

3.25.5 Alternative Z-1 (Preferred Alternative)

Build Alternative Z-1 would involve long-term beneficial impacts to traffic and interstate route continuity; improved connections between the interstate and local roadways; better access to and from the French Fort Neighborhood area; no residential or business displacement; reduction of potential noise impacts from I-55 due to shifting of traffic lanes eastward and away from some of the existing residences (32 receptors impacted if constructed at grade; 19 impacted if using the depressed design); and improved aesthetic impacts by replacing cloverleaf ramps with a more modern design scheme involving a roundabout. There would be very minimal adverse impacts to cultural resources, because archaeology Site #40SY709 would be avoided. Adverse impacts include: minor property impacts to

an existing parking lot, owned by Hershey Foods, Inc.; direct access to Metal Museum Drive would be eliminated; and there would be minor short-term adverse impacts to water quality, wildlife habitat, noise, hazardous materials, and air quality during construction.

Table 3.15. Summary of project data and resources affected within the Interstate 55 Interchange study area in Shelby County, Tennessee.

Item	No-Build		Alternative A		Alternative B		Alternative Z		Alternative Z-1 (Preferred)	
Functional Classification	Interchange		Interchange		Interchange		Interchange		Interchange	
System Class	Interstate Transportation System		Interstate Transportation System							
Length (Miles)	0.75		0.75		0.75		0.75		0.85	
Cross-sections (Feet)	110		134		134		134		134	
Year 2012 AADT	60,870		60,870		61,840		61,840		61,840	
Year 2032 AADT	85,220		85,220		86,550		86,550		86,550	
Percent Trucks (DHV)	27% (6,818)		27% (6,818)		27% (6,924)		27% (6,924)		27% (6,924)	
Levels of Service (LOS)*	NB I-55	SB I-55	NB I-55	SB I-55						
2012 AM/PM	F/F	D/F	D/D	D/D	D/D	D/D	C/C	C/C	C/C	C/C
2032 AM/PM	F/F	F/F	E/E	E/E	E/E	E/E	D/D	D/E	D/D	D/E
Estimated Right-of-Way Acquisition (Acres)	0		6.2		4.10		4.10		4.10	
Residential Displacements	0		8		8		8		0	
Business Displacements	0		2		2		2		0	
Noise Receptors Impacted	24		39		37		38		32 (if at-grade); 19 (if depressed)	
Archaeological Sites Impacted	0		1		1		1		0	
Historic Sites Impacted (number)	0		0		0		0		0	
Section 4(f)/Section 6(f) Properties Impacted	0		0		0		0		0	
Wetlands Impacted	0		0		0		0		0	
Threatened and Endangered Species Impacted	0		0		0		0		0	
Total Estimated Project Cost **	0		\$32,414,600		\$31,569,250		\$37,512,000		\$33,305,000	
<i>Source: TDOT, 2010</i>										
* These preliminary cost estimates include engineering/construction, utility, and ROW costs to be used for general comparison of alternatives. More detailed cost estimates will be determined once final design plans are available during the project design phase.										
** These LOS estimates represent the worst LOS along any portion of the I-55 travel lanes, including freeway segments and weave areas. For more detailed data please see the traffic operations data and LOS diagrams in Appendix C of this FEIS.										
NB=Northbound, SB=Southbound										

Table 3.16. Comparison of the Pros and Cons for all Interstate 55 Interchange Alternatives.

No-Build	Alternative A	Alternative B	Alternative Z	Alternative Z-1
<p>Pros:</p> <ul style="list-style-type: none"> + Access remains the same resulting in less confusion for local roadway users already familiar with the existing interchange configuration. + No residential or business displacements. <hr/> <p>Cons:</p> <ul style="list-style-type: none"> - Continued traffic delays, congestion, and safety issues in the general interchange area, especially on I-55. - Continued use of French Fort Neighborhood streets as a bypass route to avoid I-55 congestion. 	<p>Pros:</p> <ul style="list-style-type: none"> + Improved I-55 traffic operation due construction of new interstate mainline lanes to avoid use of cloverleaf ramps. + Access to French Fort Neighborhood from I-55 and E.H. Crump Boulevard is provided. <hr/> <p>Cons:</p> <ul style="list-style-type: none"> - Displacement of eight residences and up to two businesses. - Eastbound I-55 traffic to E.H. Crump Boulevard must exit to Illinois Avenue in the French Fort Neighborhood. - Potential for continued use of French Fort Neighborhood streets as a bypass route due to direct access for eastbound/southbound I-55 traffic. - Noise impacts will occur for residences due to relocation of I-55 mainline lanes closer to existing homes that remain in place. - One archaeological site (Site 40SY709) would be impacted. 	<p>Pros:</p> <ul style="list-style-type: none"> + Improved I-55 traffic operation due construction of new interstate mainline lanes to avoid use of cloverleaf ramps. + Direct access from I-55 into the French Fort Neighborhood is not provided reducing the use of the streets as a bypass route. <hr/> <p>Cons:</p> <ul style="list-style-type: none"> - Displacement of eight residences and up to two businesses. - Results in limited access into the French Fort Neighborhood and adjacent local businesses. - Noise impacts will occur for residences due to relocation of I-55 mainline lanes closer to existing homes that remain in place. - One archaeological site (Site 40SY709) would be impacted. 	<p>Pros:</p> <ul style="list-style-type: none"> + Improved I-55 traffic operation due construction of new interstate mainline lanes to avoid use of cloverleaf ramps. + Convenient access from I-55 and E.H. Crump Boulevard into the French Fort Neighborhood. + The existing cloverleaf ramp configuration is replaced by a roundabout offering improved access/traffic flow for local traffic. + Roundabout uses less ROW than existing cloverleaf . + Use of French Fort Neighborhood streets as a bypass less likely. <hr/> <p>Cons:</p> <ul style="list-style-type: none"> - Displacement of eight residences and up to two businesses. - Noise impacts will occur for residences due to relocation of I-55 mainline lanes closer to existing homes that remain in place. - New roundabout may confuse inexperienced drivers. - One archaeological site (Site 40SY709) would be impacted. 	<p>Pros:</p> <ul style="list-style-type: none"> + No residential or business displacement are required. + Improved I-55 traffic operation due construction of new interstate mainline lanes to avoid use of cloverleaf ramps. + Convenient access from I-55 and E.H. Crump Boulevard into the French Fort Neighborhood. + The existing cloverleaf ramp configuration is replaced by a roundabout offering improved access/ traffic flow for local traffic. + Noise impacts reduced compared to other Build Alternatives, especially if mainline is depressed/below grade. + Roundabout uses less ROW than existing cloverleaf. + Use of French Fort Neighborhood streets as a bypass less likely. + Avoids archaeological site (Site 40SY709). <hr/> <p>Cons:</p> <ul style="list-style-type: none"> - New roundabout may confuse inexperienced drivers.

4.0 SUMMARY OF AGENCY COORDINATION and PUBLIC INVOLVEMENT

A summary of early coordination and public involvement efforts for this project are contained in Section 4 of the DEIS. Two public involvement meetings were held following completion of the DEIS. The first was a NEPA Public Hearing held on July 7, 2009 to gather public input on the findings of the DEIS and to determine which alternatives the public would support. The second public meeting was held on June 15, 2010 as a follow-up to the NEPA Public Hearing. The June 2010 meeting was primarily aimed at providing information related to the two new build alternatives, Alternatives Z and Z-1, and to determine which alternative the public preferred out of all of the alternatives available. Alternatives available to choose from were the three alternatives covered in the DEIS including: the No-Build Alternative, Build Alternative A, and Build Alternative B; or the new alternatives, Build Alternative Z and Build Alternative Z-1.

4.1 Summary of Coordination Letters

Four letters containing comments were received from agencies and other project stakeholders regarding the I-55 Interchange project subsequent to the DEIS being published. Section 4.1.1 contains a summary of the comments received. Copies of the coordination letters are contained in Appendix B.

4.1.1 Agency/Stakeholder Coordination

U.S. Department of the Interior

Office of the Secretary

Letter dated September 10, 2009

SUMMARY

- “The Department processed the Draft EIS as a Section 4(f) case due to the project’s potential involvement with archaeological resources (Site 40SY709).”
-“The Department recommends coordination between TDOT and the SHPO to develop a Memorandum of Agreement after Phase II testing, describing mitigation measures necessary to avoid, minimize, or mitigate potential impacts to the site.”

DISPOSITION

- Because TDOT selected Alternative Z-1, the potential impacts to Site 40SY709 will be avoided and therefore there would be no Section 4(f) impacts. TDOT coordinated with the SHPO subsequent to selection of Alternative Z-1 as the Preferred Alternative. It was agreed that no Phase II testing was necessary for Alternative Z-1 because it will be constructed in previously disturbed areas mostly within the existing I-55 ROW. TDOT will continue to coordinate with the SHPO and commits to making any requisite investigations and mitigation necessary to avoid, minimize, or mitigate potential impacts to any cultural resources sites that may be discovered in the project area during construction. If remains, artifacts, or other archaeological material is uncovered during construction, all construction in the area of the find will cease. The Tennessee Division of Archaeology and the recognized Native American tribes will be contacted immediately so representatives may have the opportunity to examine and evaluate the material.

U.S. Department of the InteriorFish and Wildlife Service

Letter dated October 12, 2010

SUMMARY

- ...“Alternative Z-1 was developed in response to comments received during the NEPA Public Hearing and has been selected as the Preferred Alternative. As provided...there are no anticipated impacts to wetlands or federally listed species as a result of the project. Moreover, information available to our office does not indicate that any streams are present within the project area.”
- ...“Also, a review of our endangered species collection records does not indicate that federally listed or proposed endangered or threatened species occur within the present study area at this time...Based on the best available information at this time, we believe that the requirements of Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled for this project.”.....

DISPOSITION

- TDOT agrees that this project would not have any substantial impacts to natural resources, including federally-listed species based on the findings of the DEIS and additional reviews conducted for Alternative Z-1. The footprint of the project is primarily within the previously developed areas within the existing I-55 ROW.

Tennessee Wildlife Resources Agency

Letter dated June 25, 2009

SUMMARY

- “We have no current concerns regarding potential environmental impacts associated with potential stream and wetland impacts, floodplain encroachment, and potential impacts to rare species.”

DISPOSITION

- TDOT agrees that this project would not have any substantial impacts to natural resources based on the findings of the DEIS and additional reviews conducted for Alternative Z-1. The footprint of the project is primarily in previously developed areas within the existing I-55 ROW.

Hershey Foods, Inc.

Letter dated May 21, 2010

SUMMARY

- “...The Hershey Company owns the property and manufactures confections at 975 Kansas Street, Memphis, TN....Hershey has reviewed Alternatives A, B, Z, and Z-1. From an operational perspective – all of the scenarios are workable, and you can proceed, knowing that Hershey will be cooperative whichever alternative is chosen.”
- “...Hershey’s single issue will be the “future value” of the property. By future value, what I mean is that the size of the remaining property will be materially reduced and this would impact the future flexibility and use for the site. This concern is both for Hershey’s alternative use or expansion as well for the value to any purchaser of the site in the future if Hershey were ever to sell the site. Therefore, Hershey would look to be compensated, not

solely for the land which would be sold for the ROW, but also for the impact on valuation to the remainder of the property.”...

DISPOSITION

- TDOT appreciates Hershey’s cooperation with us on this important, much needed project. Our ROW staff will continue to work with Hershey during the ROW acquisition phase and will have all properties appraised on the basis of comparable sales and land values in the area. Owners of properties from which ROW will be acquired will be offered and paid fair market value for their property. Hershey representatives will be interviewed during the acquisition phase, and more specific solutions will be made at that time and after all the facts are gathered.

4.2 Summary of July 2009 NEPA Public Hearing

TDOT held a Public Hearing for the proposed project on July 7, 2009 from 6:00 p.m. to 8:00 p.m. at the Central Station Board Room in Memphis, Tennessee. Approximately 65 people attended the Public Hearing. Public officials present at the hearing included State Representative Barbara Cooper who has been actively involved with the project since the early planning stages.

A presentation was given that explained the history of the project, the findings of the NEPA study as well as the next steps in the project development process. A question and answer session followed the formal presentation. Following the question and answer session, displays of the proposed alternatives were made available and TDOT representatives assisted members of the public with individual questions and concerns. Comment cards were distributed to all hearing attendees to record any comments they had about the project. Hearing attendees had the option of returning the comment card before leaving the meeting, or mailing the comment card and/or letter to TDOT by July 28, 2009. A Court Reporter was also present to record the discussion at the Public Hearing and verbal comments from individuals.

In addition to several verbal comments received at the public hearing and recorded in the official public hearing transcript, a total of 13 comment cards were completed and submitted at the meeting or were mailed to TDOT within the 21-day comment period. Additionally, seven people mailed letters and two people sent e-mails to TDOT. The following sections provide a summary of the basic comments provided by the public via oral statements at the public hearing, comment cards, letters, and e-mails.

4.2.1 Summary of Oral Comments Received during the Public Hearing

Several people provided oral statements during the Question and Answer Session held at the NEPA Public Hearing and to the Court Reporter. Table 4.1 contains a summary of the main oral comments received at the public hearing.

Table 4.1. Public Comment Summary from Oral Comments at the Public Hearing.

Comment	Number of Respondents
Concerned about access to and from the French Fort Neighborhood and adjacent businesses.	14
Want to remove the existing cloverleaf ramps and use extra space for economic development.	6
Want a Build Alternative that keeps Alternative B ramp from southbound I-55 to E.H. Crump Boulevard, but provides additional access into Neighborhood.	6
Concerned about impacts/accommodations for pedestrians/bicycles.	4
Concerned about through traffic entering the French Fort Neighborhood.	4
Concerned about the visual impact of project to area/suggested aesthetic improvements with project.	3
Confused by potential separate “Safety Project” presented at Public Hearing.	3
Concerned about residential/business relocations.	2
Concerned about traffic light on Illinois Avenue at end of Alternative A ramp.	2
Would like to know project timeline.	1
Concerned about quality of life and safety of residents with dumping traffic into neighborhood.	1

4.2.2 Summary of Public Comments Received on Comment Cards

By the close of the comment period (received or postmarked by July 28, 2009), TDOT had received thirteen completed comment cards.

Participants were asked to comment on the transportation needs of the I-55 Interchange project area. Table 4.2 contains a summary of the responses received:

Table 4.2. Public Comment Summary Regarding Transportation Needs in the Area.

<u>Comment Card Question:</u> <i>What do you see as the primary transportation needs of the area?</i>	Number of Respondents
Less Congested Roadways	8
Safer Roadways	9
More Direct Routes to Destinations	9
Improved Through Traffic Connections	10
Other	4

Participants were also asked to select which alternative they preferred of those presented in the DEIS. In total, 12 of the comment cards received had responses to this question. The choices were No-Build Alternative, Build Alternative A, Build Alternative B. Table 4.3 contains a summary of the responses received:

Table 4.3. Public Comment Summary Regarding Choice of Alternatives.

<u>Comment Card Question:</u> <i>Of the alternatives presented, which alternative do you prefer?</i>	Number of Respondents
No-Build Alternative	0
Build Alternative A	3
Build Alternative B	5
Other (not considered in DEIS)	4

Of those that stated they would prefer something other than the alternatives considered in the DEIS, all 4 people stated that they preferred a Build Alternative that combines Alternative A and Alternative B by allowing I-55 traffic heading eastbound to E.H. Crump Boulevard to use a continuous ramp as shown in Alternative B, but still provide a ramp that connects to Illinois Avenue to provide access for French Fort Neighborhood residents and local businesses.

Participants were also asked what issues and concerns they had about the project. In total, 12 of the comment cards received had responses to this question. Table 4.4 contains a summary of the responses received:

Table 4.4. Public Comment Summary Regarding Issues and Concerns.

<u>Comment Card Question:</u>	Number of Respondents
<i>What issues and concerns do you have about the project?</i>	
Impacts to the Environment (natural resources)	6
Impacts to Existing Development (homes/businesses)	12
Air and Noise Impacts	8
Impacts to Historic and/or Archaeological Resources	7
Others	3

4.2.3 Summary of Public Comments Received in Letters and E-Mails

By the close of the comment period (postmarked by July 28, 2009), TDOT had received seven letters and two e-mails. Two additional e-mails were received after July 28. Those comments, both dealing with provision of pedestrian/bicycle access as part of this project, were included in this comment summary. Table 4.5 contains a summary of the main comments through letters and e-mails during the Public Hearing comment period.

Table 4.5. Public Comment Summary from Letters/E-mails.

Comment	Number of Respondents
Concerned about impacts/ accommodations for pedestrians/bicycles.	7
Concerned about access to businesses east of I-55 and south of E.H. Crump Boulevard.	1
Want to remove the existing cloverleaf ramps and use extra space for economic development.	1
Wants the project to take into consideration other infrastructure projects in the wider region.	1
Concerned about through traffic entering the French Fort Neighborhood.	1
Concerned about the visual impact of project to area/suggested aesthetic improvements with project.	1
Does not want the separate "Safety Project" presented at Public Hearing to be completed.	1
Concerned about residential/business relocations.	1
Concerned about noise impacts.	1

4.2.4 General Overview of Public Hearing Comments

Several basic conclusions were drawn from the comments received as part of the Public Hearing and DEIS reviews. The following main items were considered by TDOT in selection and refinement of the Preferred Alternative (Alternative Z-1) being presented in this document:

- several people suggested that TDOT consider developing and constructing an alternative that would basically combine the main distinguishing attributes of Alternative A and Alternative B in that it would provide better access to and from the French Fort Neighborhood and adjacent businesses, while not requiring E.H. Crump Boulevard through traffic to enter directly into the neighborhood;
- several people indicated that the existing cloverleaf ramps would be obsolete once the I-55 through traffic was removed and that a new intersection should be developed for the E.H. Crump Boulevard/South Riverside Drive intersection so that additional land could be used for economic development or revitalization projects in the area;
- residence and business owners stated concerns over impacts to their properties and relocations; and
- several people were concerned about pedestrian/bicycle access, especially access to the Mississippi River Bridge and Mississippi River Trail at the western end of the project area.

In response to these main concerns, TDOT developed Alternatives Z and Z-1 described in Section 2.2 of this FEIS. Both of these alternatives include a roundabout and a secondary connector roadway that will provide direct access to and from the French Fort Neighborhood from I-55, E.H. Crump Boulevard, and South Riverside Drive, but does not require through traffic to enter into the neighborhood. Alternative Z-1 shifts the I-55 through traffic lanes slightly eastward of the existing I-55 traffic lanes eliminating the need to relocate residences and businesses. However, one previously unaffected business (Hershey Foods, Inc.) would be partially impacted by Alternative Z-1 due to the need to remove a portion of one of their parking lots to provide additional ROW for the I-55 through traffic lanes. This business is located east of I-55 and south of E.H. Crump Boulevard. TDOT will continue to coordinate with this business and will compensate them in accordance with the Tennessee's Uniform Relocation Assistance Act of 1972, and the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (PL91-646), as amended.

This project is not expected to result in any severance of existing bicycle and pedestrian facilities and is not expected to limit the potential for development of new facilities in the future. Details of the pedestrian and bicycle accommodations that will be provided within the project area as part of this project will be determined during the design phase of the project. TDOT will continue to work with the City of Memphis, other project stakeholders, and the public during that time to ensure that this project ties into the goals and context of the community. However, some new pedestrian/bicycle facilities would likely be developed separate from this I-55 Interchange project since some of those may be developed using only local and/or state funding.

4.3 Summary of Stakeholder Coordination Efforts during Winter/Spring 2010

Following development of Alternative Z and Alternative Z-1, TDOT met with several project stakeholders individually to provide updated information regarding the proposed layout and anticipated impacts associated with the new alternatives.

TDOT first met with the City of Memphis in December 2009 to ensure the proposed new alternatives, including the proposed roundabout, would be acceptable and correspond with local plans and transportation needs. Next, TDOT met with representatives of Hershey Foods, Inc. in late December 2009 to discuss the potential impacts the new alternatives would have on their property (parking lot).

Following acceptance of the new alternatives by both the City of Memphis and Hershey Foods, Inc. representatives, TDOT met with the State Representative for the area on February 17, 2010 to discuss the new project developments. Based on that meeting it was determined that the best path forward was to provide the updated information to the local residents of the French Fort Neighborhood and local business owners that would have been affected by Alternative A or Alternative B. A meeting was held on March 19, 2010 with the French Fort Neighborhood residents and local businesses to discuss the new alternatives and allow them the opportunity to provide input regarding the new project developments. The outcome of the meeting was positive with the majority of residents and business owners supporting Alternative Z-1 because it provides the best option to eliminate all residential and business displacement and improves connections for their community to and from I-55, downtown Memphis, and other areas east of I-55.

Once TDOT determined that all of the primary project stakeholders and local officials supported further consideration of Alternative Z and Alternative Z-1 in the FEIS, TDOT held a Public Meeting to allow all members of the public to provide input on the project based on the new information. This meeting also provided the public an opportunity to provide input regarding selection of a Preferred Alternative. The following section summarizes this Public Meeting, which was held in June 2010.

4.4 Summary of June 2010 Public Meeting

A Public Meeting for the proposed project was held on June 15, 2010 from 5:00 p.m. to 7:00 p.m. at the Central Station in Memphis, Tennessee. Approximately 32 people attended the Public Meeting based on the meeting sign-in sheets. A total of 15 TDOT representatives and consultants were present to assist the public.

A handout, which contained the meeting agenda, project history and summary information, and a comment sheet, was provided to each person as they signed in. After providing attendees time to review the handouts, a slide presentation was given that explained the history of the project alternatives, the findings of the NEPA Public Hearing, the new alternatives developed since the Public Hearing, and the next steps in the project development process. Following the presentation, attendees were invited to participate in a formal question and answer session and to view the project displays/maps and talk one-on-one with the TDOT representatives that were available.

The meeting attendees were given the option of returning their completed comment sheets before leaving the facility by placing them in a drop box or mailing the comment card and/or letters to TDOT by July 6, 2010. A Court Reporter was also present to record the discussion at the meeting and to take comments from individuals wanting to make verbal comments.

The official record had a total of 20 comments. A total of 11 comment cards were completed and submitted at the meeting or were mailed or e-mailed within the 21-day comment period. Additionally, nine comments were received through statements during the question-and-answer period. No verbal comments were made to the court reporter.

Of the 11 people who expressed a preference on the official comment cards, ten favored the Build Alternative Z-1 and nobody favored the No-Build Alternative. A total of three of the respondents were concerned citizens, five were affected landowners, and four were affected businesses. One person favored Alternative Z during the question and answer session.

The most commonly discussed issues or concerns discussed at the public meeting or on comment cards received following the meeting are outlined and addressed in Table 4.6.

Table 4.6. Summary of Public Comments Received at the June 2010 Public Meeting.

Comment	Disposition
<p>Comments related to support for the Build Alternative Z-1 and/or the beneficial effects the new roundabout interchange is expected to provide including: improved access to French Fort Neighborhood; improved access to Metal Museum and businesses; economic benefits; improved safety; improved regional connectivity; provides a gateway to the city; better traffic flow on area roads; and reduced number of displacements (11 comments).</p>	<p>These comments related to alternative Z-1 are consistent with the stated purpose and need for the project. Please refer to Tables 3.15 and 3.16 in Section 3 of this EIS for more detailed discussions regarding both the beneficial and adverse impacts anticipated to occur as a result of this project.</p>
<p>Comments related to concerns about the traffic operation of the roundabout associated with Alternative Z-1 especially from inexperienced drivers and tourists. Also concerned that the roundabout will cause serious back-ups on feeder roads (2 comments).</p>	<p>Based upon TDOT's analysis of the roundabout and traffic simulation, the roundabout would function at an acceptable level of service through the design year. Historically, roundabouts are safe and efficient at moving traffic.</p>
<p>Comment regarding concerns about safety for pedestrians and bicyclists (2 comments).</p>	<p>The project will be designed to allow safe pedestrian and bicycle access.</p>
<p>Comment regarding desire for public art (beautification) and/or gateway for the City of Memphis in the roundabout (2 comments).</p>	<p>During the final design of the project TDOT will solicit input from the public related to the design. The principles of context sensitive design will be used to insure that the design is aesthetically pleasing and that it meets the necessary safety and design features as stipulated in the appropriate state, federal, and American Association of State Highway and Transportation Officials (AASHTO) guidelines.</p>
<p>Comments related to support for the Build Alternative Z (1 comment).</p>	<p>These comments related to alternative Z are consistent with the stated purpose and need for the project. Like Alternatives A and B, Alternative Z would have more impacts to residents of the French Fort Neighborhood than Alternative Z-1.</p>

Comment	Disposition
<p>Comments regarding the needs/desires for improvements to McLemore Interchange beyond the study limits of this proposed Build Alternatives (2 comments).</p>	<p>The I-55 Interchange project is considered to have independent utility and is considered a necessary component of the transportation network based on existing regional plans, including those developed by local and regional planning organizations. Improvements to other roadways in the region will be identified and developed on an as need basis. Concerns related to specific roadways/interchanges in the area should be directed to the appropriate local officials or organizations who may in turn file requests that studies be conducted by TDOT to determine the need for such improvements. Additional improvements to local roadways/interchanges will likely continue to occur as additional residential, commercial, and/or industrial development occurs resulting in larger populations and increased traffic volumes.</p>
<p>Comment letter from The Hershey Company (May 21, 2010, Jeff Edleman) that their single issue with the proposed build alternatives would be the "future value" of the property. By future value, Hershey means that the size of the remaining property will be materially reduced and this would impact the future flexibility and use for the site. This concern is for both Hershey's alternative use and expansion as well for the value to any purchaser of the site in the future, if Hershey were ever to sell the site. Therefore Hershey would look to be compensated, not solely for the land which would be sold for the ROW, but also for the impact on valuation to the remainder of the property (1 comment).</p>	<p>In regard to tracts where only a portion of the property is being acquired, the ROW appraisers will take this fact into consideration when assessing any damages. In order to minimize the unavoidable effects of ROW acquisition and the displacement of businesses, TDOT will carry out a ROW and Relocation Program in accordance with Tennessee's Uniform Relocation Assistance Act of 1972, and the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (PL91-646), as amended. Owners of property to be acquired will be offered and paid fair market value, based on comparable sales and land use values in the area, for their property rights. Relocation services and payments are provided without regard to race, color, religion, or national origin.</p>

Comment	Disposition
Comments regarding concerns that Hershey Foods, Inc. may be adversely impacted (1 comment).	Based upon correspondence with Hershey Foods, Inc. (Jeff Edleman, Sr. Director) Hershey owns the property and manufactures confections at 975 Kansas Street, Memphis, Tennessee. Hershey has reviewed all the alternatives (A, B, Z, and Z-1) and from an operational perspective all of the scenarios are workable. None of the options are perceived by Hershey to interfere with their current operations in any material way. Hershey stated that TDOT can proceed knowing that they will be cooperative with whichever alternative is chosen.
Comment stating desire to change street names from Alston to Metal Museum Drive (1 comment).	This would have to be addressed by the City of Memphis with input from the local community.
Comment stating that they would like noise study to be performed (1 comment).	A noise study was prepared in support of the EIS. In the design phase, a supplemental analysis will be conducted to determine whether noise walls or other noise mitigation will be included in the project design.
Comment stating that slip ramps are not necessary on roundabout and the desire for more green space available for development (1 comment).	TDOT determined that the slip ramps will improve the LOS for the five-leg roundabout. The final decision regarding the need for the slip ramps will be included in the final design of the roundabout. TDOT will make a final determination on the amount of ROW needed for the roundabout and slip ramps during the final design phase. TDOT will continue to coordinate with the City of Memphis regarding excess ROW, if any, that may be available as open space or usable space following removal of the clover leaf ramps.

APPENDIX A: NOISE TECHNICAL APPENDIX

A.1 Introduction

Following the June 7, 2009 public hearing, TDOT examined the build alternatives to alter the mainline I-55 and interchange ramps which would allow better access to and avoid impacts to the French Fort Neighborhood and businesses. Since the mainline shifted in the refined alternatives, additional noise studies were necessary to evaluate the impacts to the various receptors. This technical appendix looks at Alternatives A, B, Z, and Z-1 (at grade and depressed).

A.2 Affected Environment

A.2.1 Regulations

The Federal Aid Highway Act of 1970 established the requirement that noise control be a part of the planning and design of all federally-aided roadways. The FHWA has developed guidelines for conducting noise studies and has established noise abatement criteria for different land use activity categories. FHWA guidelines are set forth in 23 CFR 772. Noise impacts for this project were evaluated in accordance with FHWA noise assessment guidelines.

A.2.2 Noise Assessment Guidelines

Traffic noise levels are expressed in terms of the hourly, A-weighted equivalent sound level in decibels (dBA). The A-weighted sound level is a single number measure of the sound intensity with weighted frequency characteristics that correspond to a human's response to noise. However, because most environmental noise fluctuates from moment to moment, it is common practice to condense information into a single number called the equivalent sound level (L_{eq}). The L_{eq} is the value of a steady sound level that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, L_{eq} is typically evaluated over a one-hour period and is denoted in $L_{eq}(h)$.

Within the urban and rural environment, noise generated by vehicular traffic is one of the most substantial of the common noises because of its prevalence and its intensity or loudness. The increase in noise levels that accompany the routing of high volumes of automobiles and truck traffic onto expressway facilities, which are located in areas of diversified land use, necessitates that a quantitative environmental noise impact analysis be conducted during the planning and design stages.

A highway noise impact would occur when predicted noise levels approach (1 dBA less than the criteria), equal, or exceed the FHWA Noise Abatement Criteria (NAC) shown on Table A.1. Also, TDOT has defined a substantial increase in existing noise levels to be greater than 10 dBA. Highway traffic noise impacts would also occur if there is a substantial increase in design year noise levels above the existing noise levels when the predicted design year noise levels are between 57 and 66 dBA L_{eq} . The criteria for a noise level increase are shown on Table A.2.

Table A.1. Noise Abatement Criteria.

Activity Category	$L_{eq}(h)$ (dBA)	Description of Activity Category
A	57 (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 area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic area, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
<i>Source: 23 Code of Federal Regulations Part 772</i>		

Table A.2. Noise Level Impacts.

Increase (dBA)	Subjective Description
0 – 5	Minor Increase
6 – 9	Moderate Increase
10 or More	Substantial Increase
<i>Source: TDOT Policy on Highway Traffic Noise Abatement</i>	

Federal guidance for the identification of highway traffic noise impacts is contained in 23 CFR Part 722. Predicted noise levels have been compared to existing levels and to the Federal Noise Abatement Criteria to determine the impact of highway-generated noise on the population in the vicinity of the project build alternatives. The results of this comparison are shown later in this section on Table A.4.

A.2.3 Existing Noise Levels

Noise measurements were taken in the project area to identify existing background L_{eq} , A-weighted sound levels. These noise level readings were used to confirm modeled existing noise levels were reasonable. Noise levels recorded for this project are listed in Table A.3.

Table A.3. Existing Noise Levels.

Location	Noise Level (dBA)
1055 Esplanade Place	58
1098 Esplanade Place	58
221 Rampart Place	59
1111 Esplanade Place	60
215 Chartres Place	57
217 Napoleon Place	57
188 Napoleon Place	58
241 Illinois Avenue	55
207 Illinois Avenue	60
1055 Deumaine Place	57
1072 Deumaine Place	60
1066 Bourbon Place	56
922 Riverside Drive	54
Abandoned Hotel	67
Metal Museum Drive	62
Channel 3 Drive	56
United Warehouse	69
MS River RV Park	65
East End of Illinois Avenue	64
East End of Napoleon Place	64
<i>Source: Parsons 2010</i>	

A total of 76 sensitive receptors were modeled as part of this study. All of the receptors analyzed are single family residences located in the French Fort Neighborhood. Figure A-1 shows the location of each of the sensitive receptors modeled. Existing noise levels were estimated with computer modeling at these receptors. The existing estimated noise levels range from 58 to 74 dBA. The 67 dBA noise criterion is approached or exceeded at 26 of the receptors analyzed, as shown on Table A.4.

A.2.4 Predicted Noise Levels

With the utilization of the most recent traffic forecasts available, design year 2032 peak-hour traffic levels were predicted at various representative locations along the two build alternatives. The Federal Highway Traffic Noise Prediction Model (TNM), version 2.5, was used to predict these levels.

In general, a doubling (or halving) of the receptor distance from the noise source produces a decrease (or increase) of three to five dBA. A change of three decibels or less is not readily perceptible to the average human ear, while an increase of 10 dBA is equivalent to an apparent doubling of the sound.

Table A.4 identifies the number of sensitive receptors that would experience traffic noise impacts for existing, no-build, and build conditions. Based on the noise analysis conducted for this project, the No-Build Alternative would result in 28 impacts. Projected impacts for the build alternatives range from 19 (Alternative Z-1 depressed) to 39 (Alternative A) receptors that experience noise impacts.

Figure A-1. Locations of Sensitive Receptors Modeled in the Noise Analysis



Table A.4. Predicted Noise Levels (in dBA) and Noise Impacts.

Receiver	Existing		No-Build			Alternative A			Alternative B			Alternative Z			Alternative Z-1 (at grade)			Alternative Z-1 (depressed)		
	Noise Level	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact
101	63		64	1		70	7	X	70	7	X	69	6	X	66	3	X	60	-3	
102	62		64	1		69	7	X	69	7	X	68	6	X	65	3		60	-3	
103	62		63	1		69	7	X	68	6	X	67	6	X	65	3		59	-2	
104	61		63	1		68	7	X	67	6	X	67	5	X	64	3		59	-2	
105	61		62	1		67	6	X	66	5	X	66	5		64	3		59	-2	
106	61		62	1		66	6	X	65	5		65	5		64	3		59	-1	
107	64		65	1		71	7	X	71	7	X	70	6	X	66	3	X	60	-4	
108	63		64	1		69	7	X	69	7	X	68	6	X	65	3		59	-3	
110	61		63	1		67	6	X	67	5	X	67	6	X	64	3		59	-3	
111	61		62	1		66	6	X	66	5		66	5		63	3		58	-2	
112	60		61	1		66	6		65	5		65	5		63	3		58	-2	
113	60		61	1		65	5		64	4		64	5		62	3		58	-2	
109	62		63	1		68	6	X	68	6	X	68	6	X	65	3		59	-3	
114	70	X	72	1	X	73	3	X	74	4	X	76	5	X	70	0	X	65	-6	
115	69	X	70	2	X	74	5	X	73	5	X	74	5	X	69	0	X	64	-5	
116	64		65	1		69	5	X	69	5	X	69	6	X	65	1		59	-4	
117	63		64	1		68	5	X	68	5	X	68	5	X	64	1		59	-4	
118	62		64	1		68	5	X	67	5	X	68	5	X	64	2		58	-4	
119	61		62	1		66	5		65	5		66	5		63	2		57	-3	
120	60		62	1		65	5		65	5		66	5		62	2		57	-3	
121	66		67	1	X	71	5	X	71	5	X	71	5	X	66	0	X	62	-4	
122	62		64	1		67	5	X	67	5	X	68	6	X	63	1		58	-4	
123	60		61	1		65	5		65	5		65	5		62	2		57	-3	
124	74	X	76	2	X	75	1	X	75	0	X	75	1	X	72	-2	X	70	-4	X
125	62		63	1		66	5	X	66	5	X	67	5	X	63	1		60	-2	
126	63		65	2		68	4	X	68	4	X	68	5	X	64	1		61	-2	
127	73	X	74	1	X	74	2	X	74	1	X	74	2	X	73	1	X	72	-1	X
128	73	X	74	2	X	74	2	X	74	2	X	74	2	X	74	2	X	73	1	X
130	59		61	1		64	5		64	5		65	5		61	2		58	-1	
131	60		62	1		65	4		65	4		65	5		62	1		59	-1	
132	71	X	72	2	X	72	2	X	72	2	X	73	2	X	73	3	X	73	2	X
133	62		63	2		65	3		65	3		66	4		64	2		63	1	
134	63		64	2		66	3		66	3		67	4	X	64	2		63	1	
135	59		61	2		63	4		63	3		64	4		61	2		60	1	
136	60		62	1		63	3		63	3		64	4		62	2		61	1	
137	67	X	68	2	X	69	2	X	69	2	X	70	3	X	69	2	X	69	2	X
138	63		65	2		66	2		65	2		66	3	X	65	2		65	2	
139	65		66	1		66	2	X	66	2	X	67	3	X	66	2	X	66	2	X
140	66	X	68	1	X	68	2	X	68	2	X	69	2	X	68	2	X	68	2	X
141	68	X	70	1	X	70	2	X	70	1	X	70	2	X	70	2	X	70	2	X
142	69	X	71	1	X	71	2	X	70	1	X	71	2	X	71	2	X	71	2	X
143	72	X	73	1	X	73	1	X	73	1	X	73	2	X	73	2	X	73	2	X
144	72	X	73	1	X	73	2	X	73	1	X	73	2	X	73	2	X	73	1	X
145	72	X	74	1	X	74	2	X	73	1	X	74	1	X	74	1	X	74	1	X
146	73	X	74	2	X	74	2	X	74	1	X	74	1	X	74	1	X	74	1	X
147	72	X	74	1	X	74	2	X	73	1	X	74	1	X	74	1	X	73	1	X
148	73	X	74	2	X	74	2	X	73	1	X	74	1	X	74	1	X	74	1	X
149	72	X	74	2	X	74	2	X	73	1	X	73	1	X	73	1	X	73	1	X
150	70	X	72	2	X	72	2	X	71	1	X	71	1	X	71	1	X	71	1	X

Table A.4. Predicted Noise Levels (in dBA) and Noise Impacts cont.

Receiver	Existing		No-Build			Alternative A			Alternative B			Alternative Z			Alternative Z-1 (at grade)			Alternative Z-1 (depressed)		
	Noise Level	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact	Noise Level	Change vs. Existing	Impact
151	70	X	71	2	X	71	2	X	70	0	X	70	1	X	70	1	X	70	0	X
152	66	X	68	1	X	68	2	X	67	1	X	67	1	X	67	1	X	67	1	X
153	63		64	1		64	1		64	1		64	1		64	1		64	1	
155	63		64	1		64	2		64	1		64	2		64	2		64	1	
156	63		65	2		65	2		64	1		65	2		64	1		64	1	
157	64		65	1		65	2		65	1		65	1		65	1		65	1	
158	64		65	2		65	2		65	1		65	2		65	1		65	1	
159	64		66	2		66	2		65	1		66	1		65	1		65	1	
160	64		66	2		66	2		65	1		66	1		65	1		65	1	
161	63		64	1		64	1		64	1		64	1		64	1		64	1	
154	62		63	1		64	2		63	2		64	2		63	2		63	1	
129	59		61	1		64	5		64	5		64	5		61	2		58	-2	
162	60		62	1		66	5		65	5		65	4		63	3		59	-1	
163	60		61	1		65	5		64	4		64	4		63	3		59	-1	
164	58		60	1		63	5		63	4		63	5		61	2		56	-2	
165	59		61	2		61	2		61	2		62	3		61	2		60	1	
166	60		61	1		62	2		62	2		62	2		61	1		61	1	
167	61		63	2		63	2		62	1		62	1		62	1		62	1	
168	62		63	1		63	2		63	1		63	1		63	1		63	1	
169	64		65	1		displaced under this alt.			displaced under this alt.			displaced under this alt.			67	3	X	61	-3	
170	65		66	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			68	3	X	62	-3	
171	66	X	67	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			69	3	X	63	-3	
172	69	X	70	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			70	2	X	65	-3	
173	70	X	72	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			72	1	X	66	-5	
174	71	X	73	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			71	0	X	66	-6	
175	67	X	68	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			69	2	X	62	-4	
176	71	X	72	1	X	displaced under this alt.			displaced under this alt.			displaced under this alt.			70	0	X	65	-5	

Notes: 1. A noise impact is identified where the predicted 2032 noise level is 66 dBA or above or if the predicted noise level is 10 dBA greater than existing conditions.
 2. Existing noise levels shown in this table are from modeled results.

A.2.5 Noise Abatement

Consideration was given to possible noise abatement measures for the receptors that are adversely affected by traffic noise associated with the project, and the abatement measures were considered for each of the build alternatives. TDOT will consider the following noise abatement measures: (1) traffic management measures; (2) alteration of horizontal and vertical alignments; (3) creation of buffer zones; and (4) construction of noise barriers (e.g., noise walls).

Traffic management measures that can be used to modify the traffic noise source include prohibition of heavy trucks and the reduction of speed limits. The prohibition of heavy trucks would not be practical since I-55 would be a major route that serves industry, commercial developments, and interstate transportation. Lowering the speed limit would reduce the level of service and thereby increase delay, fuel consumption, air pollution emissions, and road user costs. This would also create a substantial enforcement problem, and considering the overall minor reduction in noise levels, reduction of the speed limit is not a practical approach to noise abatement in this instance.

Buffer zones are undeveloped, open spaces that border a highway. Buffer zones are created when a highway agency purchases land or development rights, in addition to the normal ROW, so that future dwellings that would otherwise have an excessive noise level from nearby highway traffic are not constructed. Creating buffer zones would require the elimination of many of the existing sensitive receptors, as well as greatly increasing the ROW costs.

Noise walls were considered for noise abatement along the west side of I-55 between Crump Boulevard and McLemore Avenue for all the build alternatives. Based on a preliminary review of this area for each alternative, a noise barrier that would be considered feasible and reasonable according to the TDOT Policy on Highway Traffic Noise Abatement could be constructed at this location. Assuming a noise barrier can be constructed for \$20 per square foot, a noise barrier with an average height of 12 feet could be constructed for approximately \$19,000 per benefited receptor. This would meet TDOT's cost-effectiveness criteria. Once a Preferred Alternative is selected, the feasibility and reasonableness of a noise barrier can be further evaluated.

A.2.6 Construction Noise

Trucks and machinery used for construction produce noise and vibration, which may affect some land uses and activities during the construction period. Individuals inhabiting homes along I-55 will at some time experience perceptible construction noise and vibration from the implementation of this project. Occupants of buildings within a radius of approximately 200 feet from some construction equipment may perceive ground vibration effects during the operation of that equipment. Although these effects are temporary and will vary from day to day based on specific construction operations, cosmetic damage is unlikely to occur to buildings situated beyond approximately 100 feet from the heaviest vibration generators. To minimize or eliminate the effects of construction noise on adjacent sensitive receptors, mitigation measures have been incorporated into the TDOT's *Standard Specifications for Road and Bridge Construction*. These measures will be implemented for this project.

A.3 Environmental Consequences – Noise Impacts

A.3.1 Affected Environment

The effects of increased noise levels that could potentially result from implementing the project have been evaluated according to the guidance in the 23 Code of Federal Regulations, Part 772, which is included in TDOT's *Guidelines on Traffic Noise Abatement*. Predicted noise levels were compared to existing levels and to the Federal Noise Abatement Criteria to determine the impact of highway-generated noise on the project area. A noise impact can occur when predicted noise levels approach or exceed the noise abatement criteria and also when there are "substantial" increases in the design year noise levels over the existing noise levels. Traffic-generated noise levels were predicted for the present year and the design year (2032) using TNM 2.5, a computer simulation model based on the FHWA Highway Traffic Noise Prediction Model. This computer model takes into account anticipated traffic volumes, vehicle types, and vehicle speeds to calculate future traffic-generated noise levels. Noise levels were predicted for the outdoor living areas using the worst-case traffic conditions likely to occur on a regular basis during the design year.

A.3.2 Potential Noise Consequences of the No-Build Alternative

Direct Impacts. Noise impacts for this project were evaluated in accordance with the FHWA Noise Assessment Guidelines. Noise modeling results for the project are shown on Table A.4. Under the No-Build Alternative, 28 noise impacts are projected.

Indirect Impacts. There are no indirect noise impacts associated with the No-Build Alternative

Cumulative Impacts. There are no cumulative noise impacts associated with the No-Build Alternative.

A.3.3 Potential Noise Consequences of Alternative A

Direct Impacts. Under Alternative A, 39 noise impacts are projected.

Indirect Impacts. There are no indirect noise impacts associated with Alternative A.

Cumulative Impacts. There are no cumulative noise impacts associated with Alternative A.

A.3.4 Potential Noise Consequences of Alternative B

Direct Impacts. Under Alternative B, 37 noise impacts are projected.

Indirect Impacts. There are no indirect noise impacts associated with Alternative B.

Cumulative Impacts. There are no cumulative noise impacts associated with Alternative B.

A.3.5 Potential Noise Consequences of Alternative Z

Direct Impacts. Under Alternative Z, 38 noise impacts are projected.

Indirect Impacts. There are no indirect noise impacts associated with Alternative Z.

Cumulative Impacts. There are no cumulative noise impacts associated with Alternative Z.

A.3.6 Potential Noise Consequences of Alternative Z-1 (at grade)

Direct Impacts. Under Alternative Z-1 (at grade), 32 noise impacts are projected.

Indirect Impacts. There are no indirect noise impacts associated with Alternative Z-1 (at grade).

Cumulative Impacts. There are no cumulative noise impacts associated with Alternative Z-1 (at grade).

A.3.7 Potential Noise Consequences of Alternative Z-1 (depressed)

Direct Impacts. Under Alternative Z-1 (depressed), 19 noise impacts are projected. By depressing the mainline I-55 traffic lanes, beneficial impacts would be expected compared to the existing or No-Build condition and the other build alternatives.

Indirect Impacts. There are no indirect noise impacts associated with Alternative Z-1 (depressed).

Cumulative Impacts. There are no cumulative noise impacts associated with Alternative Z-1 (depressed).

A.3.8 Mitigation

Based on preliminary evaluation, a noise barrier would be feasible and reasonable to provide noise abatement for residents in the French Fort Neighborhood. Once a final highway design is completed, the feasibility and reasonableness of a noise barrier can be further evaluated. The final decision on implementation of abatement measures will be made during the project design phase and after consideration of input from the public involvement process. Noise walls would be designed during the final design phase of the project with public input on the design.

Trucks and machinery used for construction produce noise and vibration, which may affect some land uses and activities during the construction period. Individuals inhabiting homes along I-55 will at some time experience perceptible construction noise and vibration from the implementation of this project. Occupants of buildings within a radius of approximately 200 feet from some construction equipment may perceive ground vibration effects during the operation of that equipment. Although these effects are temporary and will vary from day to day based on specific construction operations, cosmetic damage is unlikely to occur to buildings situated beyond approximately 100 feet from the heaviest vibration generators. To minimize or eliminate the effects of construction noise on adjacent sensitive receptors, mitigation measures have been incorporated into the TDOT's *Standard Specifications for Road and Bridge Construction*. These measures will be implemented for this project.

APPENDIX B: COORDINATION LETTERS



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240



SEP 10 2009

9043.1
PEP/NRM

ER 09/453



Ms. Suzanne B. Herron, P.E., CPESCA
Director, Environmental Division
Tennessee Department of Transportation
505 Deaderick Street, Suite 900
Nashville, Tennessee 37243

Dear Ms. Herron:

As requested, the Department of the Interior (Department) reviewed the Draft Environmental Impact Statement (DEIS) for Improvements to **I-55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard, Memphis; Shelby County, Tennessee**. The Department offers the following comments for your consideration.

General Comments

We welcome this opportunity to cooperate with the Tennessee Department of Transportation in evaluating improvements to the I-55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard, Memphis, Tennessee. The purpose of the proposed action is to provide a balanced solution for safety and capacity issues at the I-55 Interchange.

The Department processed the Draft EIS as a Section 4 (f) case due to the project's potential involvement with archaeological resources (Site 40SYP709).

Because there would be direct and indirect impact to Site 40SY709, from both build alternatives (Alternative A and Alternative B) and because the site has mixed features from the Civil War era, late nineteenth and early twentieth century residential occupation, Phase II testing will be conducted at Site 40SY709 prior to issuance of the Final EIS. The Tennessee Department of Transportation in coordination with the State Historic Preservation Office is committed to making the requisite mitigations necessary to avoid, minimize, or mitigate potential impacts to this site. If archaeological resources are encountered, a representative of the appropriate Native American Tribe(s) will be notified.

The Department recommends coordination between the Tennessee Department of Transportation and the State Historic Preservation Office to develop a Memorandum of Agreement after Phase II testing, describing mitigation measures necessary to avoid, minimize, or mitigate potential impacts to the site.

Summary Comments

The Department has a continuing interest in working with the Tennessee Department of Transportation to ensure that impacts to resources of concern to the Department are adequately addressed.

We appreciate the opportunity to provide these comments.

Sincerely,



Willie R. Taylor
Director, Office of Environmental
Policy and Compliance



United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

October 12, 2010

Mr. Tom Love
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

Subject: Concurrence Point 4. Proposal to improve the Interstate 55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard in Memphis, Shelby County, Tennessee. (Re: FWS# 10-CPA-0780).

Dear Mr. Love:

The Tennessee Department of Transportation (TDOT), in cooperation with the Federal Highway Administration, has prepared an Environmental Impact Statement (EIS) for the proposed improvements to the Interstate 55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard in Memphis, Shelby County, Tennessee. The proposed project would provide a balanced solution for safety and capacity issues at the Interstate 55 Interchange.

In accordance with TESA, TDOT has requested that the U.S. Fish and Wildlife Service (Service) review and provide concurrence (or nonconcurrence) on Concurrence Point 4, *Preferred Alternative and Preliminary Mitigation Package*.

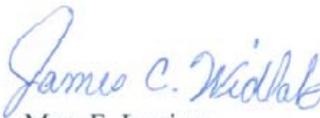
Concurrence Point 4 considered three alternatives under the NEPA process, the No-Build Alternative and two build alternatives. The No-Build Alternative would not provide for anticipated growth and increased traffic in the area and thus, would not meet the purpose and need as documented in the approved NEPA EIS. Alternative Z-1 was developed in response to comments received during the NEPA Public Hearing and has been selected as the preferred alternative. As provided in Table 1 of this document, there are no anticipated impacts to wetlands or federally listed species as a result of the project. Moreover, information available to our office does not indicate that any streams are present within the project area.

We believe that the provisions of TESA Concurrence Point 4 have been satisfied, and we concur with the *Preferred Alternative and Preliminary Mitigation Package*. Also, a review of our endangered species collection records does not indicate that federally listed or proposed

endangered or threatened species occur within the present study area at this time. We note, however, that collection records available to the Service may not be all-inclusive. Based on the best information available at this time, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled for this species. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action. The signed TESA Concurrence Point 4 for this project is attached.

Thank you for the opportunity to participate in this process. If you have any questions regarding our comments, please contact John Griffith of my staff at 931/528-6481 (ext. 228) or by email at john_griffith@fws.gov.

Sincerely,


for Mary E. Jennings
Field Supervisor

Enclosure

**TENNESSEE WILDLIFE RESOURCES AGENCY**

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

June 25, 2009



Suzanne B. Herron, P.E., CPESC
Director
Environmental Division
Department of Transportation
505 Deaderick Street, Suite 900
Nashville, TN 37243

Re: Draft Environmental Impact Statement for the Interstate 55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard in Memphis, Shelby County, Tennessee

Dear Ms. Herron:

The Tennessee Wildlife Resource Agency has received and reviewed the information your office provided to us regarding the Draft Environmental Impact Statement for the Interstate 55 Interchange at E.H. Crump Boulevard and South Riverside Boulevard in Memphis, Shelby County, Tennessee. We have no current concerns regarding potential environmental impacts associated with potential stream and wetland impacts, floodplain encroachment, and potential impacts to rare species. We have no additional comments regarding the Draft Environmental Impact Statement for this project.

We thank you for the opportunity to participate during the coordination process.

Sincerely,

A handwritten signature in cursive that reads "Robert M. Todd".

Robert M. Todd
Fish and Wildlife Environmentalist

cc: Allen Pyburn, Region I Habitat Biologist
Alan Peterson, Region I Assistant Manager

The State of Tennessee

IS AN EQUAL OPPORTUNITY, EQUAL ACCESS, AFFIRMATIVE ACTION EMPLOYER



Steve Chipman
Project Manager
Project Management Division
300 Benchmark Place
Jackson, TN. 38301

May 21, 2010

Re: Hershey's Memphis Facility

Dear Steve:

As you are aware, The Hershey Company owns the property and manufactures confections at 975 Kansas Street, Memphis, TN.

As to the contemplated Tennessee Department of Transportation I-55 at Crump Interchange Modification Project, Hershey has reviewed Alternatives, A, B, Z and Z-1. From an operational perspective - all of the scenarios are workable, and you can proceed, knowing that Hershey will be cooperative whichever alternative is chosen.

If the project proceeds, Hershey's single issue will be the "future value" of the property. By future value, what I mean is that the size of the remaining property will be materially reduced and this would impact the future flexibility and use for the site. This concern is both for Hershey's alternative use or expansion as well for the value to any purchaser of the site in the future, if Hershey were ever to sell the site. Therefore, Hershey would look to be compensated, not solely for the land which would be sold for the right-of-way, but also for the impact on valuation to the remainder of the property.

Once again, Hershey intends to be fully cooperative with your efforts and plans, as none of the options are perceived to interfere with our current operations in any material way.

Please contact me at your convenience with any questions or issues. Also, please keep us informed as the plans begin to take shape and/or are approved for implementation.

Regards,

Jeff Edleman, Sr. Director, Business Development
The Hershey Company
100 Crystal A Drive
Hershey, PA 17033
717-534-7420

100 Crystal A Drive • PO Box 810 • Hershey, Pennsylvania 17033-0810 • (717) 534-4200



TENNESSEE HISTORICAL COMMISSION
 DEPARTMENT OF ENVIRONMENT AND CONSERVATION
 2941 LEBANON ROAD
 NASHVILLE, TN 37213-0442
 (615) 532-1550

March 31, 2006

Ms. Martha Carver
 Tennessee Department of Transportation
 505 Deaderick St/900
 Nashville, Tennessee, 37243-0349

RE: FHWA, EFFECT DETERMINATION, I-55 INTERCHANGE IMPVTS/CRUMP BLVD, MEMPHIS,
 SHELBY COUNTY

Dear Ms. Carver:

Pursuant to your request, received on Thursday, March 23, 2006, this office has reviewed documentation concerning the above-referenced undertaking. This review is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739)

Based on the information provided, we find that the project area contains several cultural resources eligible for listing in the National Register of Historic Places: Memphis-Arkansas Bridge, U. S. Marine Hospital Executive Building & Laundry, Chickasaw Heritage Park, and W. T. Fawleigh/United Warehouse. We further find that the project as currently proposed will not adversely affect these resources.

Unless project plans change, this office has no objection to the implementation of this project. Should project plans change, please contact this office to determine what additional action, if any, is necessary. Questions and comments may be directed to Joe Garrison (615) 532-1550-103. Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
 Executive Director and
 Deputy State Historic
 Preservation Officer

HLH/jyg





January 29, 2007

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

Mr. Charles Bush
Tennessee Dept. of Transportation
Suite 700/J. K. Polk Bldg.
Nashville, Tennessee, 37243-0349

RE: FHWA, I-55 INTERCHANGE/EH CRUMP BLVD., MEMPHIS, SHELBY COUNTY

Dear Mr. Bush:

In response to your request, received on Thursday, January 25, 2007, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process.

Considering available information, we find that the project as currently proposed MAY AFFECT PROPERTIES THAT ARE ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. You should continue consultation with our office, designate consulting parties and invite them to participate in consultation, and provide us with appropriate survey documentation for review and comment. Please direct questions and comments to Joe Carrison (615) 532-1550-103. We appreciate your cooperation.

Sincerely,

Richard G. Tune
Interim Executive Director and
Deputy State Historic
Preservation Officer

RGT/jyg



TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

June 9, 2008

Mr. Gerald Kline
Tennessee Department of Transportation
Environmental Planning and Permits Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

RE: FHWA, PHASE I ARCHAEOLOGICAL ASSESSMENT, I-55 AT E.-I. CRUMP AND S RIVERSIDE,
MEMPHIS, SHELBY COUNTY,

Dear Mr. Kline:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 38 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we concur that the project area contains archaeological resources potentially eligible for listing in the National Register of Historic Places. Archaeological site 40SY109 should be avoided by all ground-disturbing activities or subjected to Phase II archaeological testing.

Upon receipt of the Phase II testing report or avoidance strategy, we will complete our review of this undertaking as expeditiously as possible. Please submit a minimum of two copies of each final report to this office in accordance with the Tennessee Historical Commission Review and Compliance Section Reporting Standards and Guidelines. Complete and/or updated Tennessee Site Survey Forms should be submitted to the Tennessee Division of Archaeology. Until such time as this office has rendered a final comment on this project, your Section 106 obligation under federal law has not been met. Please inform this office if this project is canceled or not funded by the federal agency. Questions and comments may be directed to Jennifer M. Barnett (615) 741-1588, ext. 105.

Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb



TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

May 4, 2009

Mr. Tom Love
TDOT Environmental Division
505 Deadrick Ave./900
Nashville, Tennessee, 37243-0334

RE: FHWA, DEIS, I-55/E.H. CRUMP BLVD./S. RIVERSIDE BLVD., MEMPHIS, SHELBY COUNTY

Dear Mr. Love:

In response to your request, received on Monday, April 27, 2009, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process. You may also find additional information concerning the Section 106 process and the Tennessee SHPO's documentation requirements at <http://www.tennessee.gov/environment/hist/federal/sect106.shtml>.

Based on available information, we find that the undertaking as currently proposed may affect historic properties eligible for listing in the National Register of Historic Places. We therefore recommend that your agency begin immediate consultation with our office to complete Section 106 review on this undertaking. This office will also need to review an archaeological resources survey report for this project before any work commences. Questions and comments may be directed to Joe Garrison (615) 532-1550-103. Your cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jyg



TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

May 24, 2011

Mr. Gerald Kline
Tennessee Department of Transportation
Environmental Division
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0334

RE: FHWA, I-55 INTERCHANGE AT CRUMP/40SY709, UNINCORPORATED,
SHELBY COUNTY

Dear Mr. Kline:

Pursuant to your request, this office has reviewed documentation concerning the above-referenced undertaking received Friday, May 13, 2011. This is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Considering available information, we find that the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Jennifer M. Barnett (615) 741-1588, ext. 105. We appreciate your cooperation.

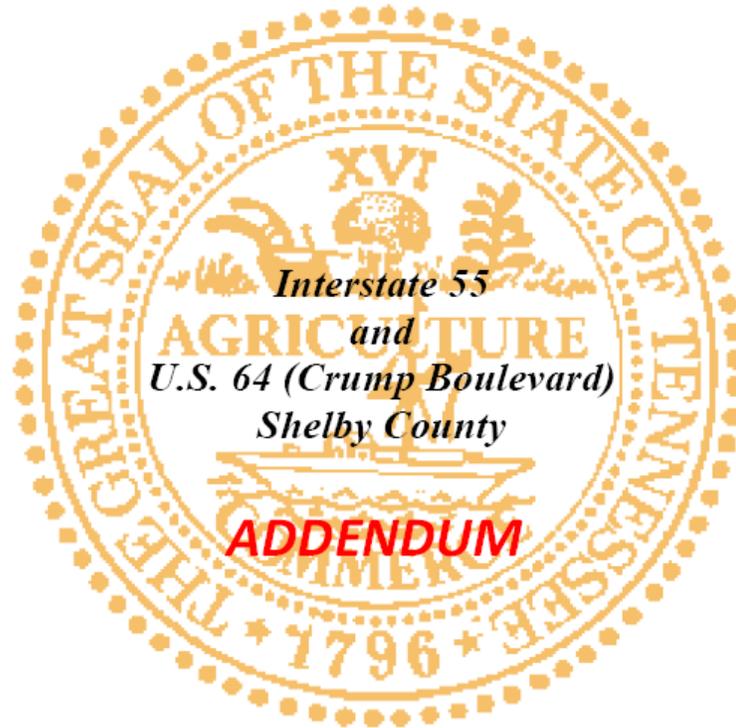
Sincerely,
E. Patrick McIntyre, Jr.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jmb

APPENDIX C: TRAFFIC OPERATIONS/CAPACITY INFORMATION

INTERCHANGE MODIFICATION STUDY



***PREPARED BY
CLINARD ENGINEERING ASSOCIATES, LLC
FOR
THE TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION***

June 2010



U.S. Department
of Transportation
**Federal Highway
Administration**

Tennessee Division

September 8, 2010

404 BNA Drive, Suite 508
Nashville, Tennessee 37217
Phone: (615) 781-5770
Fax: (615) 781-5773

In Reply Refer To:
HFO-TN

Mr. Steve Allen, Director of Project Planning
Tennessee Department of Transportation
James K. Polk Building, Suite 1000
Nashville, TN 37243-0349

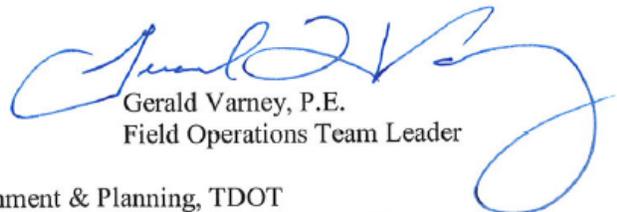
Subject: Interstate 55 at U.S. 64 Interchange Access Request

Dear Mr. Allen:

We have received the Tennessee Department of Transportation (TDOT) Interchange Access Request (IAR) for the proposed modification of Interstate 55 at U.S. 64 (Crump Boulevard), in Shelby County. After reviewing the request in accordance with Federal Highway Administration's (FHWA's) Policy on Access to the Interstate System, FHWA has determined the alternatives Z and Z1 are both engineering and operationally acceptable. Therefore the alternatives, as presented, are conceptually approved and may now proceed into the NEPA phase for environmental review and analysis. If significant engineering and operational changes occur during the course of the NEPA process, then further review will be warranted by FHWA.

To receive approval to proceed with final design, TDOT will need to notify FHWA once the NEPA process is complete, that the design studied and approved in the NEPA document is consistent with the recommended alternative from the IAR, and the project is in the current Transportation Improvement Plan/Statewide Transportation Improvement Plan and Long Range Transportation Plan. If you or your staff needs additional assistance then please contact Michael Smart or my staff at (615) 781-5775.

Sincerely,



Gerald Varney, P.E.
Field Operations Team Leader

cc: Mr. Joe Carpenter, Chief of Environment & Planning, TDOT
Mr. Ralph Comer, Assistant Chief of Environment & Planning, TDOT
Mr. Paul Degges, Chief Engineer, TDOT
Ms. Carolyn Stonecipher, Director Design Division, TDOT



I-55 & U.S. 64**Interchange Modification Study Addendum****Traffic Operations****EXISTING ROADWAY NETWORK**

An initial analysis of the existing interchange configuration was conducted by analyzing the individual ramp junctions, freeway segments, and weaving areas. The respective levels-of-service (LOS) under the existing conditions for 2012 and 2032 traffic projections are summarized in Tables 1, 2, and 3. Additionally, the existing network configuration was modeled within a simulation software in order to better assess the interactions of the existing interchange components. The resulting average network travel speed under the existing conditions for 2012 and 2032 traffic projections are presented in Table 4. The analysis reports are located within Appendix E.

TABLE 1**Capacity Analyses of Ramp Junctions within the Study Area**

Ramp Junctions	Year 2012	Year 2032
NB Metal Museum Drive Merge to NB I-55 (AM)	C	D
NB Metal Museum Drive Merge to NB I-55 (PM)	C	D
SB I-55 Diverge to SB Metal Museum Drive (AM)	C	D
SB I-55 Diverge to SB Metal Museum Drive (PM)	C	E

TABLE 2**Capacity Analyses of Freeway Segments within the Study Area**

Freeway Segments	Year 2012	Year 2032
NB I-55, South of McLemore Avenue (AM)	C	D
NB I-55, South of McLemore Avenue (PM)	B	C
SB I-55, South of McLemore Avenue (AM)	B	C
SB I-55, South of McLemore Avenue (PM)	C	D
NB I-55, Bridge across Mississippi River (AM)	C	D
NB I-55, Bridge across Mississippi River (PM)	C	D
SB I-55, Bridge across Mississippi River (AM)	C	D
SB I-55, Bridge across Mississippi River (PM)	C	E

I-55 & U.S. 64**Interchange Modification Study Addendum****TABLE 3****Capacity Analyses of Weave Areas within the Study Area**

Weave Areas	Year 2012	Year 2032
NB I-55, between McLemore Ave. and ramp to Crump Blvd. (AM)	B	C
NB I-55, between McLemore Ave. and ramp to Crump Blvd. (PM)	B	C
SB I-55, between ramp from I-55 and ramp to McLemore Ave. (AM)	C	E
SB I-55, between ramp from I-55 and ramp to McLemore Ave. (PM)	D	F
NB I-55, between Loops at Crump Blvd. (AM)	F	F
NB I-55, between Loops at Crump Blvd. (PM)	E	F
SB Riverside Drive, between Loops at Crump Blvd. (AM)	A	A
SB Riverside Drive, between Loops at Crump Blvd. (PM)	A	A
EB Crump Boulevard, between Loops at Riverside Dr. (AM)	A	A
EB Crump Boulevard, between Loops at Riverside Dr. (PM)	A	A
WB Crump Boulevard, between Loops at Riverside Dr. (AM)	F	F
WB Crump Boulevard, between Loops at Riverside Dr. (PM)	F	F
NB I-55, between Riverside Dr. and Metal Museum Dr. (AM)	B	D
NB I-55, between Riverside Dr. and Metal Museum Dr. (PM)	B	C
SB I-55, between Alston Ave. and Riverside Dr. (AM)	D	F
SB I-55, between Alston Ave. and Riverside Dr. (PM)	F	F

TABLE 4**Average Network Travel Speed within the Study Area**

Average Network Travel Speed			
2012		2032	
AM	PM	AM	PM
21 mph	22 mph	18 mph	16 mph

I-55 & U.S. 64**Interchange Modification Study Addendum****PROPOSED NETWORKS**

An initial analysis of the proposed alternates Z and Z-1 was conducted by analyzing the individual ramp junctions, freeway segments, and weaving areas. The respective levels-of-service (LOS) under the existing conditions for 2012 and 2032 traffic projections are summarized in Tables 5, 6, and 7. Additionally, the proposed Alternates Z was modeled within a simulation software in order to better assess the interactions of the existing interchange components. The resulting average network travel speed under the Alternate Z configuration for 2012 and 2032 traffic projections are presented in Table 8 as well as the average control delay of the proposed roundabout in Table 9. The analysis reports are located within Appendix F.

TABLE 5**Capacity Analyses of Ramp Junctions for Alternates Z and Z-1**

Ramp Junctions	Year 2012	Year 2032
WB from Roundabout Merge to NB I-55 (AM)	C	D
WB from Roundabout Merge to NB I-55 (PM)	C	D
SB I-55 Diverge to Roundabout (AM)	C	D
SB I-55 Diverge to Roundabout (PM)	C	E

TABLE 6**Capacity Analyses of Freeway Segments for Alternates Z and Z-1**

Freeway Segments	Year 2012	Year 2032
NB I-55, South of McLemore Avenue (AM)	C	D
NB I-55, South of McLemore Avenue (PM)	B	C
SB I-55, South of McLemore Avenue (AM)	B	C
SB I-55, South of McLemore Avenue (PM)	C	D
NB I-55, from ramp to Roundabout to ramp from Roundabout (AM)	C	D
NB I-55, from ramp to Roundabout to ramp from Roundabout (PM)	B	C
SB I-55, from ramp to Roundabout to ramp from Roundabout (AM)	B	C
SB I-55, from ramp to Roundabout to ramp from Roundabout (PM)	C	D
NB I-55, Bridge across Mississippi River (AM)	C	D
NB I-55, Bridge across Mississippi River (PM)	C	D
SB I-55, Bridge across Mississippi River (AM)	C	D
SB I-55, Bridge across Mississippi River (PM)	C	E

I-55 & U.S. 64**Interchange Modification Study Addendum****TABLE 7****Capacity Analyses of Weave Areas for Alternates Z and Z-1**

Weave Areas	Year 2012	Year 2032
NB I-55, between McLemore Ave. and ramp to Roundabout (AM)	C	D
NB I-55, between McLemore Ave. and ramp to Roundabout (PM)	B	C
SB I-55, between ramp from Roundabout to McLemore Ave. (AM)	B	D
SB I-55, between ramp from Roundabout to McLemore Ave. (PM)	C	E

TABLE 8**Average Network Travel Speed for Alternates Z and Z-1**

Average Network Travel Speed			
2012		2032	
AM	PM	AM	PM
46 mph	46 mph	42 mph	36 mph

TABLE 9**Roundabout Delay for Alternates Z and Z-1**

Delay per Vehicle (s) / LOS*			
2012		2032	
AM	PM	AM	PM
5.0 / A*	6.0 / A*	12.5 / B*	22.3 / C*

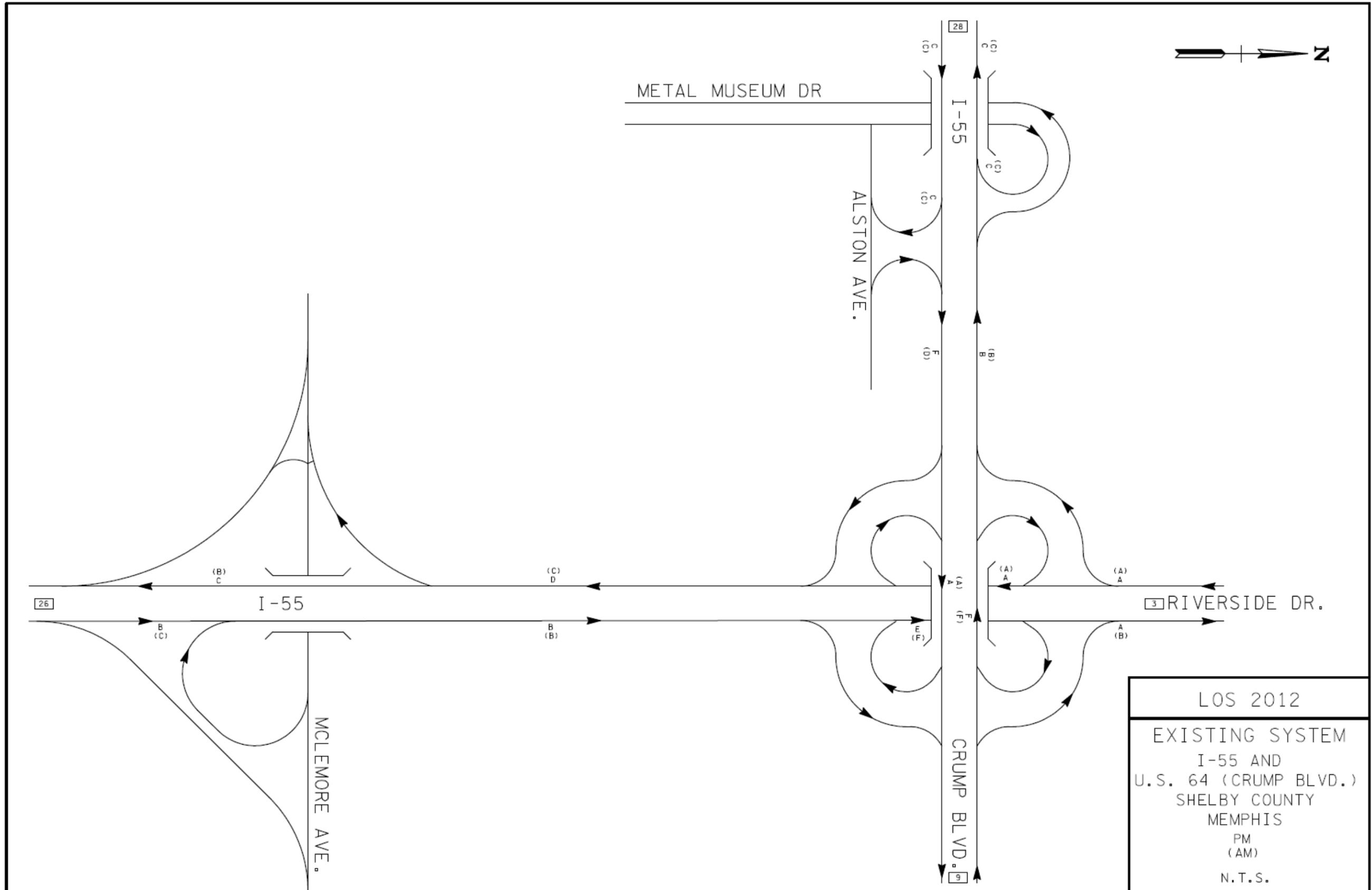
* HCM 2000 does not define roundabout LOS. Based on NCHRP 572 recommended LOS criteria.

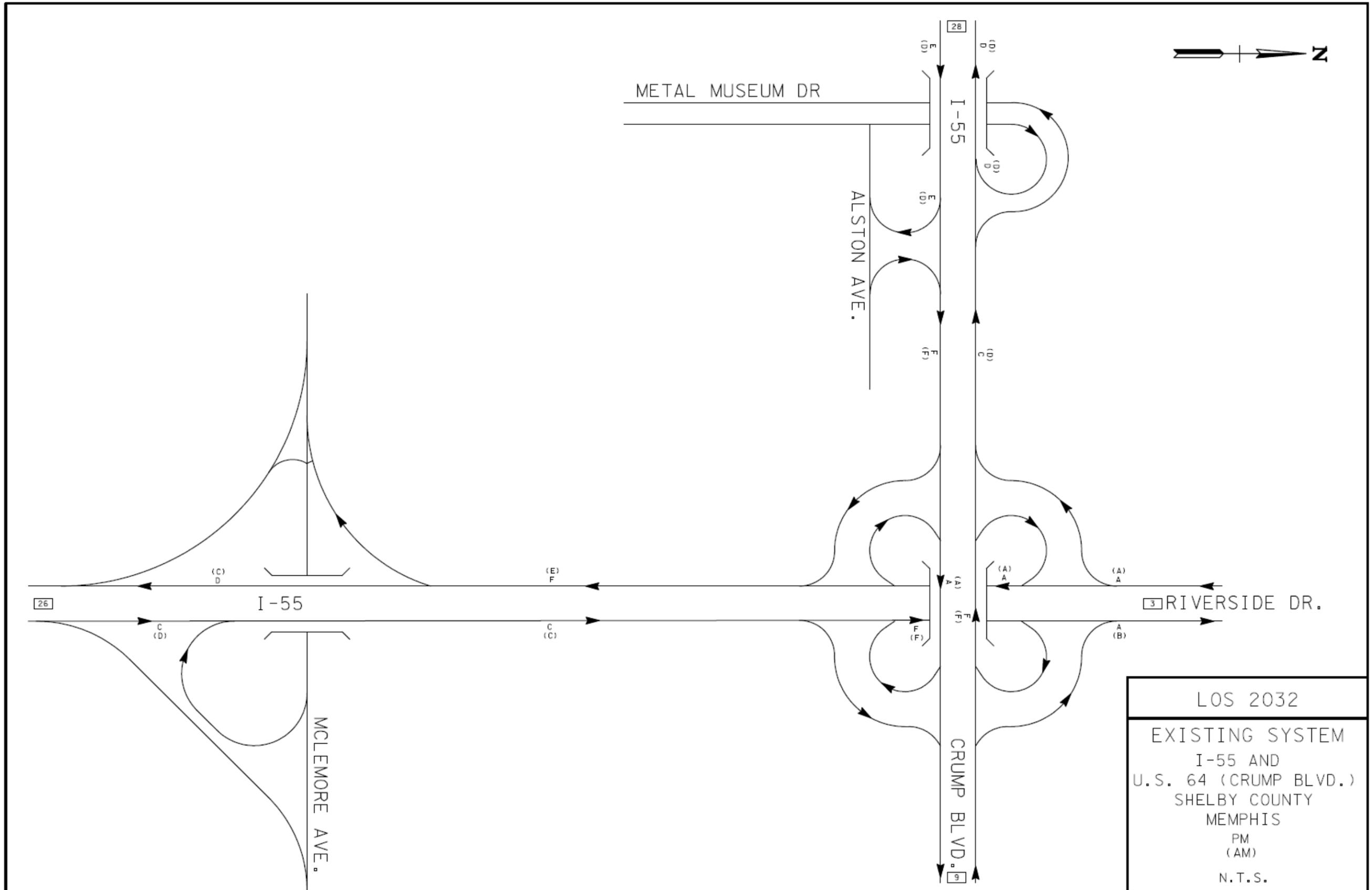
I-55 & U.S. 64**Interchange Modification Study Addendum****Summary of Findings and Conclusions**

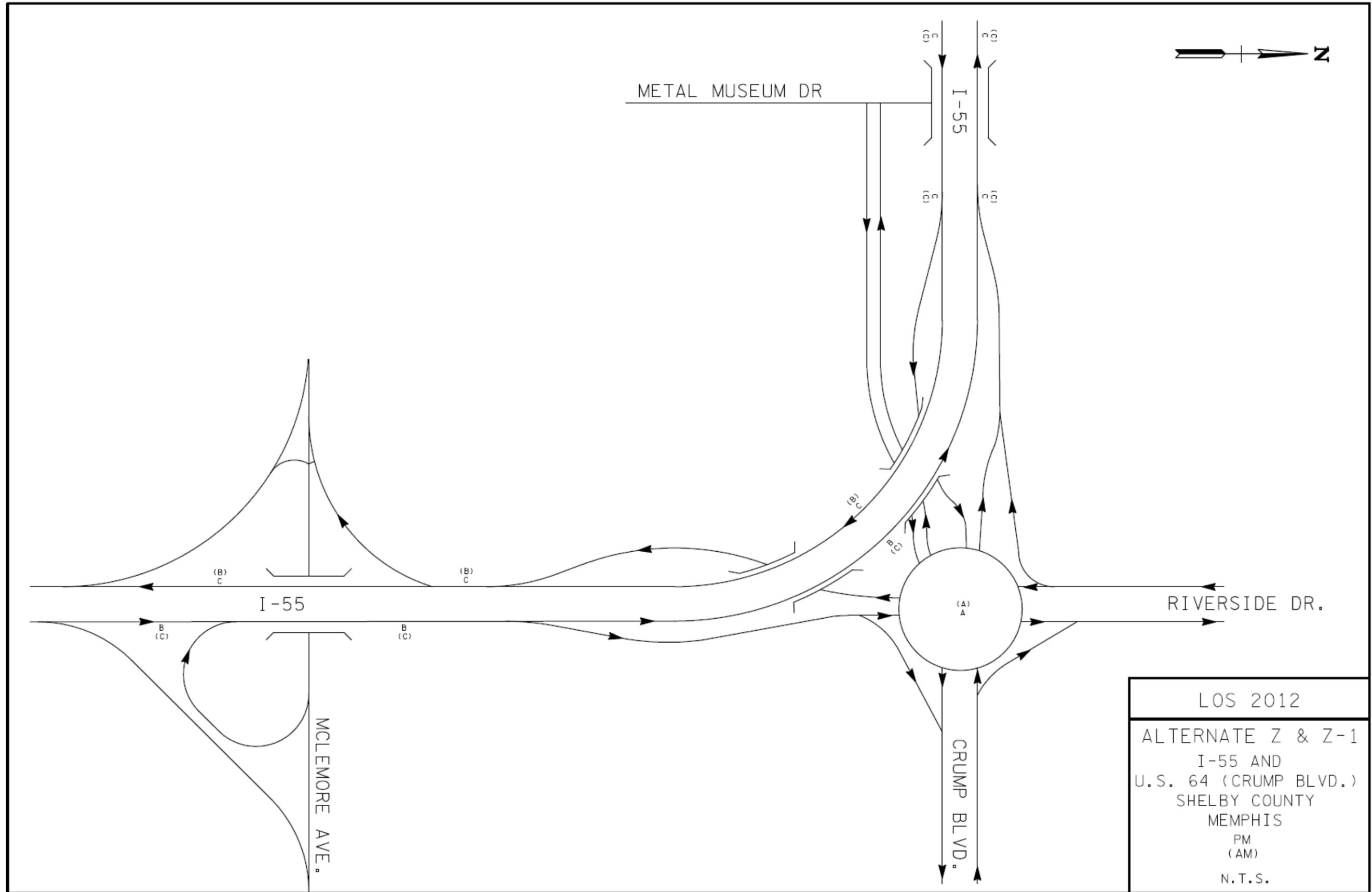
The purpose of this addendum was to develop additional alternate interchange designs in order to address the public concerns regarding access. Each of the proposed alternates operates at acceptable levels-of-service while providing the additional access requested by the citizens of the French Fort Community.

The proposed Alternates Z and Z-1 utilize a new roundabout intersection design at the existing cloverleaf location in order to provide complete access and eliminate all but two (2) weave sections. Additionally, both alternates significantly increase the experienced LOS. Alternates Z and Z-1 average network travel speeds show much better operations than the existing interchange. The roundabout intersection also operates at an acceptable equivalent design year level-of-service (B-AM, C-PM). The safety aspects of the roundabout intersection and appearance should accomplish the City of Memphis's goal to create a 'gateway' into the business district while effectively serving the traffic volumes.

The proposed alternates should effectively address the local concerns raised during the NEPA phase. With the proposed alternates, traffic operations will be improved with most movements operating at a desirable level-of-service. In order for all the movements to operate at an acceptable LOS in the design year, the mainline of I-55 would require one additional mainline travel lane in each direction. This widening would require the existing bridge over the Mississippi River to be widened, which fall outside the scope of this improvement project.







LOS 2012
ALTERNATE Z & Z-1
I-55 AND
U.S. 64 (CRUMP BLVD.)
SHELBY COUNTY
MEMPHIS
PM
(AM)
N.T.S.

