SOUTH LOOP EXTENSION PROJECT

West Memphis, Arkansas

Environmental Assessment

ARDOT JOB 110676

Prepared by:

Pickering Firm, Inc.

2001 Airport Road, Suite 201

Flowood, Mississippi 39232

Pickering Project Number: 25447.00

U.S. Department of Transportation
Federal Highway Administration

Pickering

The City of West Memphis

MAY 2019

SOUTH LOOP EXTENSION (West Memphis) (S)

F.A.P. Number STPU-9948 (42)

Environmental Assessment

Randal Looney
Environmental Specialist
Federal Highway Administration

June 3, 2019
Date of Approval

Submitted pursuant to:

The National Environmental Policy Act
42 U.S.C. §4322(2)(c) and 23 C.F.R. §771

Submitted by:

FEDERAL HIGHWAY ADMINISTRATION

and

THE CITY OF WEST MEMPHIS

U.S. Department of Transportation
Federal Highway Administration

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

Randal Looney
FHWA
700 W. Capitol, Room 3130
Little Rock, AR 72201-3298
(501) 324-6430

Amanda Hicks
City of West Memphis
205 S. Redding, P.O. Box 1728
West Memphis, AR 72303
(870) 732-7500

In compliance with the National Environmental Policy Act, this Environmental Assessment describes the proposed project to develop the South Loop Extension in the City of West Memphis, AR. The analysis did not identify any significant adverse environmental impacts and identifies Alternative C as the Preferred Alternative.

Comments should be directed to:

Mail: Pickering Firm Inc.
Attn: Marcus Hope
2001 Airport Road, Suite 201
Flowood, MS 39232

Email: mhope@pickeringfirm.com

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

Appendix A: Traffic Study

Appendix B: Alternatives Considered and Dismissed

Appendix C: Correspondence with Agencies

Appendix D: Public Involvement Records

Appendix E: Tribal and SHPO Correspondence

Appendix F: Prime Farmland Conversion Rating Form

Appendix G: Wetlands Assessment Report

Appendix H: Protected Species

Appendix I: FEMA Floodplain Map

Appendix J: Noise Study

Chapter 1 – Purpose and Need

Chapter 1 describes current transportation problems, explains how the proposed project could resolve these problems, and outlines the project's lead agency roles.

1.1 What is the South Loop Extension Project?

The City of West Memphis (West Memphis) is proposing to extend South Loop Drive in West Memphis, Arkansas. Referred to as the South Loop Extension, the Project would complete an alternative route and improve connectivity and mobility in and around the central city area. Approximately 2.5 miles of roadway on new alignment would be constructed to connect existing South Loop Drive with South Airport Drive. This intermodal connector would improve the flow of commercial traffic between West Memphis' south side and the Interstate system on the north side without using local streets through the central part of town. The Project would also provide access to currently undeveloped land for potential industrial development.

Intermodal refers to transferring shipments from one transportation mode to another as the shipments move from origin to destination (e.g., from barges to trucks or trucks to warehouses). A **connector** provides a shortcut or a connection between two routes that otherwise do not have a connection.

1.2 What are the existing road conditions?

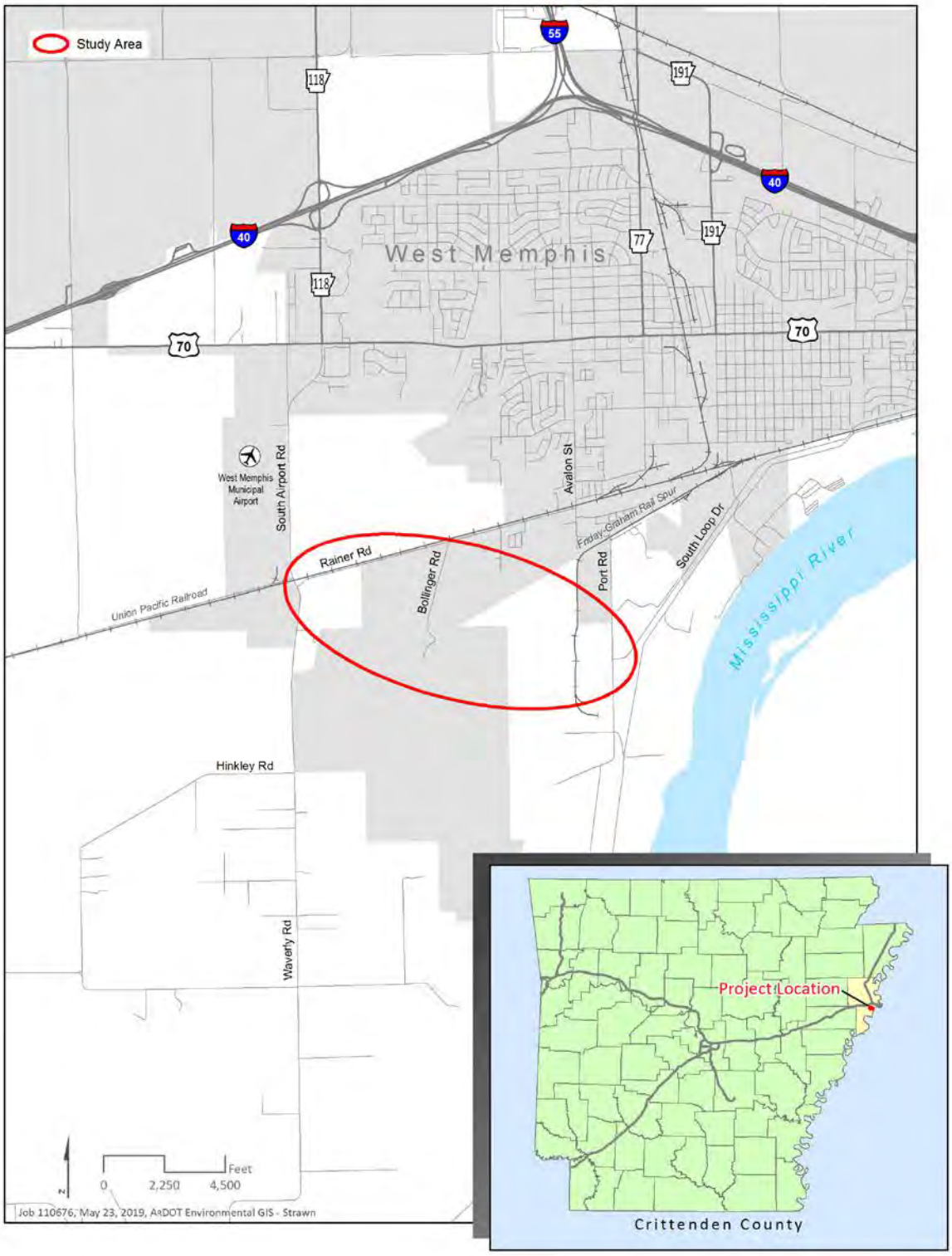
Four paved roads roads are within the proposed Project study area: South Loop Drive and Port Road to the east, South Airport Road to the west, and Rainer Road to the north. Bollinger Road is an unpaved road near the center of the study area **Figure 1** shows the Project location and study area.

Existing South Loop Drive runs northeast-southwest and consists of two 12-foot wide travel lanes with 8-foot wide shoulders. This approximately 4-mile long roadway roughly parallels the Mississippi River and provides access to businesses and industries on the south side of West Memphis. Carrying a high volume of commercial traffic, South Loop Drive serves as a connector to U.S. Highway 70/Broadway Avenue, Interstate 40 (I-40), and Interstate 55 (I-55). South Loop Drive also provides an alternative route for emergency vehicles that cannot have access to interstate travel.

Commercial traffic refers to vehicles used for transporting goods and materials, and typically includes larger and heavier vehicles than local and through traffic.

Port Road runs north-south and consists of two 11-foot wide travel lanes with 2-foot wide shoulders. Due to its proximity to the Mississippi River, various industries are located along this roadway, including Tetra Technologies, Cargill, Stateside Steel and Wire, Watco, Louis Dreyfus Company, and the Friday-Graham Railroad Spur. This railroad spur is used for loading and unloading railcars by the West Memphis Rail Port, West Memphis Transload LLC, and several other facilities. Port Road also provides access to a large Entergy substation and a flood water retention lake.

Figure 1. Project Location and Study Area



South Airport Road runs north-south and consists of two 11-foot wide travel lanes with 2-foot wide shoulders. South Airport Road provides access to several businesses and public facilities within the Project area, including the West Memphis Municipal Airport and Arkansas State University, Mid-South. Like South Loop Road, South Airport Road serves as a connector to U.S. Highway 70/Broadway Avenue, I-40, and I-55. South of its intersection with Rainer Road, South Airport Road continues as Waverly Road for approximately 6 miles.

Rainer Road runs east-west and consists of two 11-foot wide travel lanes with 1-foot wide shoulders. This road is approximately 2 miles long and terminates into South Airport Road to the west and Avalon Street to the east. Rainer Road provides access to the Pecan Bayou, Arrington Estates, and Rainer Village residential subdivisions, as well as several other single residences. Rainer Road also provides access to industrial areas located north of Drainage Ditch #20. A Coca-Cola vending supplier and the former Trinity Industries are the two major industrial facilities located along Rainer Road.

Bollinger Road runs northeast-southwest and consists of an approximately 11-foot wide single lane road providing access to agricultural land.

Mobility is the easy movement of people and goods through an area.

Connectivity refers to the number and directness of routes and roadways. Good connectivity is provided by multiple routes and connections serving the same origins and destinations.

Mobility and connectivity improvements increase traffic flow and roadway capacity.

1.3 Why is the South Loop Extension needed?

Mobility and Connectivity

Existing South Loop Drive was constructed with the long-range planning goal of being linked to South Airport Road. This South Loop Extension would complete a "loop" along West Memphis' east, west, and south perimeters and allow vehicles to avoid the more densely developed center of the city. The completion of this alternative route is particularly important for the volume of commercial vehicles traveling between the Interstates and the commercial/industrial areas, agricultural land, and river ports to the south. Providing emergency vehicles with alternative routes in and around the city also increases public safety. Mobility and connectivity throughout West Memphis would be improved by providing a more direct route for commercial vehicles, increasing mobility for noncommercial vehicles, pedestrians, and cyclists on other routes (e.g., U.S. Highway 70/Broadway Avenue), and adding an alternative route for local and through traffic.

MPOs are policy-making groups made up of representatives from local government and governmental transportation authorities.

Traffic Volumes and Delays

Traffic volumes and delays affect mobility. Field measurements by the West Memphis Metropolitan Planning Organization (MPO) and historical traffic volume counts were used to project traffic volumes at two intersections within the Project

area. The two intersections are located where Rainer Road intersects South Airport Road and where South Loop Drive intersects Port Road.

The peak morning (AM) and evening (PM) hours for travel occurred between the hours of 7:00-8:00 AM and 4:00-5:00 PM. At these commuting hours, intersections throughout the area become congested with local and commercial traffic, causing vehicle stack-ups and delays along these and other local roadways. Detailed traffic information is included in the Traffic Study provided in **Appendix A**.

Level of Service

A planning level traffic analysis was conducted on the two intersections described above using Build and No Build scenarios. The analysis was conducted for the year the most recent traffic data was obtained (2018), the Build year (2021), and the design year (2041).

Traffic volume capacity of a roadway segment is measured by the Level of Service (LOS) experienced on the roadway. The Level of Service (LOS) ratings range from LOS A to F. For example, a roadway experiences no delay or congestion at LOS rating A. A roadway is at full capacity and experiences a high level of delay and congestion at LOS Rating F. **Table 1** describes the LOS criteria as defined in the Highway Capacity Manual, "Special Report 209."

Table 1. Level of Service Criteria for Roadways

Volumes / Capacity Ratio	Level of Service
Less than 0.60	A
0.61 – 0.70	B
0.71 – 0.80	C
0.81 – 0.90	D
0.91 – 1.00	E
Greater than 1.00	F

The LOS and delay analysis was conducted using Synchro 8 software from Trafficware for the two study intersections. For purposes beyond the scope of this EA, the intersection analysis included a scenario in which traffic mitigation would be applied to the proposed alignment in future years. Traffic mitigation refers to the additions/improvements to a roadway in order to accommodate larger traffic

LOS Ratings take into account road and traffic conditions that affect traffic flow, such as:

- Traffic volume and speed
- Shoulder and lane width
- Percent of the daily traffic that consists of trucks, buses, or recreational vehicles
- Passing opportunities
- Number of traffic signals
- Terrain

Volume-to-Capacity Ratio represents the volume of traffic divided by the capacity of the roadway. If volume/capacity is <1.00, the roadway is functioning below capacity.

volumes in future projections. The LOS ratings and delay determinations are presented in **Table 2**. The existing LOS ratings are considered acceptable, although future LOS ratings would be considered unacceptable by design year 2041 without traffic mitigation.

Table 2. Level of Service (LOS) and Delay

Segment		2018	2021 No Build	2021 + Project	2041 No Build	2041 + Project	2041+ Proj. w/ Mitigation
	PM Peak Hour						
S Airport Rd/South Loop Ext. & Rainer Road	LOS	B	B	B	B	F	C
	Delay (sec/veh)	10.2	10.4	10.2	12.6	54.3	24.1
Port Road & South Loop Drive	LOS	A	A	A	A	F	C
	Delay (sec/veh)	9.0	9.1	8.3	9.6	76.9	34.1
	AM Peak Hour						
S Airport Rd/South Loop Ext. & Rainer Road	LOS	A	A	A	B	C	B
	Delay (sec/veh)	9.6	9.7	9.7	10.6	15.8	12.6
Port Road & South Loop Drive	LOS	A	A	A	A	F	C
	Delay (sec/veh)	9.2	9.2	8.2	9.8	76.3	26.3

Economic Growth and Increased Access

Several commercial/industrial areas are located along Port Road and South Loop Drive, including river ports and agricultural and industrial facilities. Multiple large tracts of undeveloped land in this vicinity are available, although currently inaccessible. This inaccessibility impedes potential development. West Memphis plans to further develop the Project area with publicly and privately owned industrial facilities and businesses. In addition to improving access to existing facilities, the proposed Project would support planned development in this area.

1.4 How is the Project related to other transportation plans and goals?

The South Loop Extension project is intended to complete a long-range planning goal. It is included in the 2019-2022 Transportation Improvement Program (TIP). In July 2018, the West Memphis-Marion Area Transportation Study (WMATS)/MPO Policy Committee approved the South Loop Drive project and included it in the *Imagine 2040 Metropolitan Transportation Plan*.

1.5 What are the Project purposes?

Given the transportation needs, goals, and objectives described above, the purposes of this Project are as follows:

- Provide a direct commercial route and divert traffic from central city areas.
- Improve mobility, connectivity, and public safety by providing an alternative route for commercial traffic and emergency response vehicles.
- Improve mobility and connectivity on existing routes for noncommercial traffic, pedestrians, and cyclists within the city.
- Promote future development and economic growth.

1.6 Who is leading the proposed project?

West Memphis is serving as the lead agency for the proposed Project. Pickering Firm, Inc. is serving as engineering and environmental consultants for West Memphis. The Federal Highway Administration (FHWA) is the lead federal agency for the proposed Project. The Arkansas Department of Transportation (ARDOT) is serving as a reviewing agency for the proposed Project.

1.7 How and why was this Environmental Assessment prepared?

This Environmental Assessment (EA) was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA).

Issues addressed in an EA include:

- Comparison of various alternatives.
- Public input in selecting a preferred alternative.
- Traffic patterns and projections.
- Analysis of environmental impacts in the Project area.
- Noise and land use assessments and impacts.

NEPA requires federal agencies to consider the potential environmental consequences of their actions, document the analysis, and provide a public involvement process before implementing projects.

- Ecological impacts such as endangered species and wetlands.
- Cultural resources and hazardous materials.
- Social and visual impacts.

Chapter 2 – Alternatives

Chapter 2 identifies the Project limits, explains how project alternatives were developed, and describes the alternatives evaluated in this EA.

2.1 What are the Project limits?

The proposed Project would start at the intersection of existing South Loop Drive and Port Road and extend west to South Airport Road.

2.2 How were the Project alternatives developed?

Federal agencies are required to evaluate a range of reasonable project alternatives under NEPA. Project alternatives may originate from the proponent agency, cooperating agencies, local government officials, or members of the public. Additionally, the alternatives must include a "No Action" or "No Build" alternative as prescribed by 40 CFR 1502.14.

A "**No Action**" alternative must be considered under NEPA. Although it is unlikely to meet the project's purpose and need, the "No Action" alternative provides a baseline against which the other alternatives can be compared.

Engineering, social, and environmental considerations were considered during alternative development. Four Build alternatives (Alternatives B, C, D, and E) were identified. Additional refinements were made in response to evolving public and stakeholder input and planning considerations. The alternatives considered and ultimately dismissed are summarized in Appendix B and agency correspondence in Appendix C includes discussion of these alternatives.

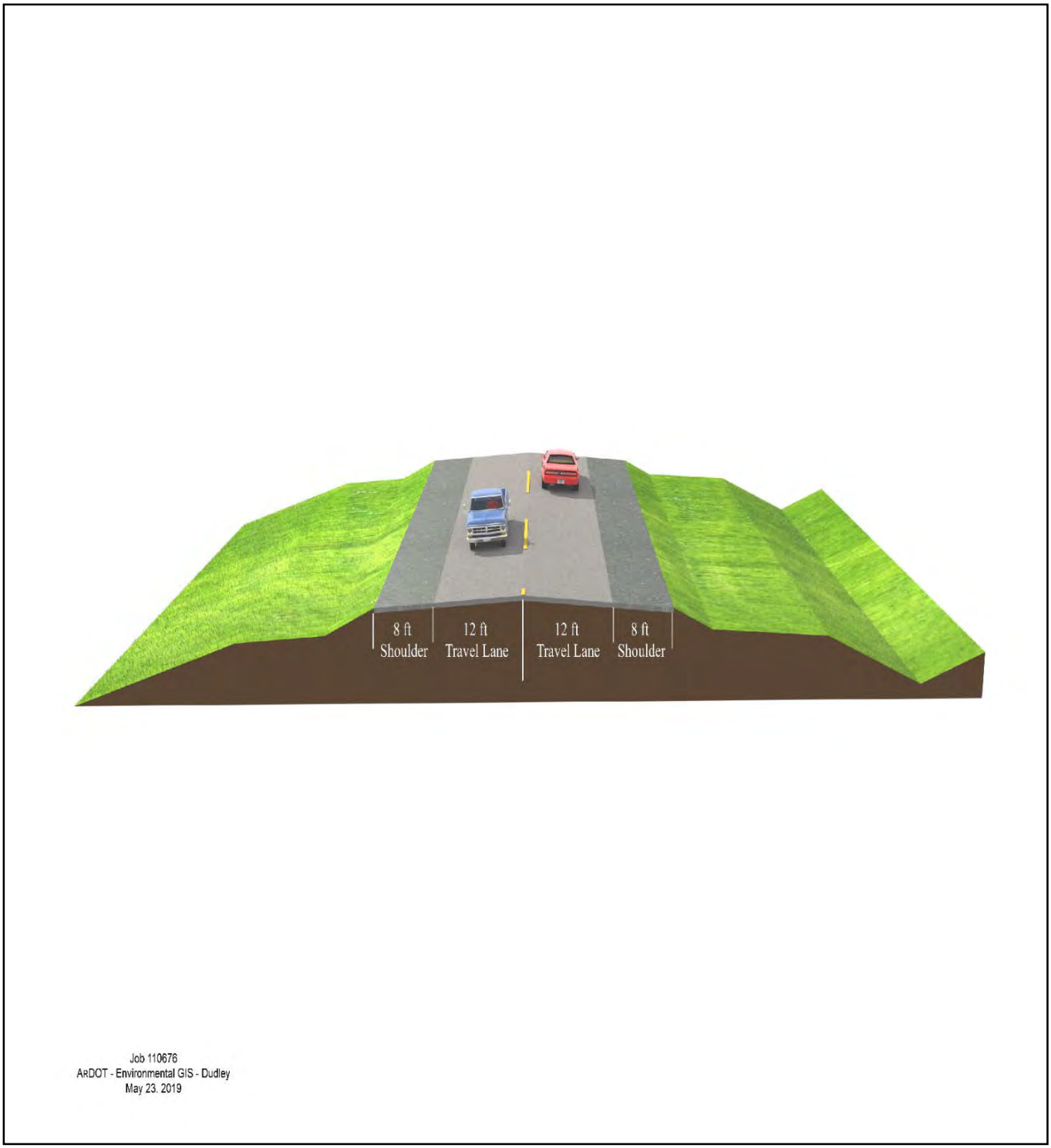
2.3 What alternatives are evaluated in this EA?

Two alternatives are being evaluated in the EA: the No Action alternative, designated as Alternative A, and the Build alternative, designated as Alternative C. **Figure 2** shows Alternative C's typical roadway cross section. These alternatives are described below.

2.3.1 Alternative A

Alternative A would provide only routine roadway maintenance in the project area. Any traffic volume increases would reduce overall mobility and connectivity.

Figure 2. Typical Roadway Cross Section



2.3.2 Alternative C

Alternative C would consist of constructing two 12-foot wide travel lanes with 8- foot wide paved shoulders along an approximately 2.5-mile long, east-to-west intermodal connector between existing South Loop Drive and South Airport Road (**Figure 3**). Alternative C would be located adjacent to and south of Drainage Ditch #20 and cross the existing railroad spur at a 90-degree angle. Bridges would be required to cross Drainage Ditch #20 and Ten Mile Bayou. Intersection improvements would be provided by widening Rainer Road at its intersection with South Airport Road. A 750-foot long road with 14-foot wide travel lanes and 4-foot wide paved shoulders would be constructed to provide an additional connection to Waverly Road.

2.4 How well would each alternative improve traffic operations and meet the Project's purpose and need?

This Section summarizes the differences between the alternatives.

Alternative A

The southern loop around West Memphis would not be completed. Commercial traffic would continue to use routes through central city areas and traffic congestion would continue. Mobility, connectivity, and public safety would not be improved. Undeveloped land with the potential for commercial/industrial uses would remain inaccessible.

Alternative C

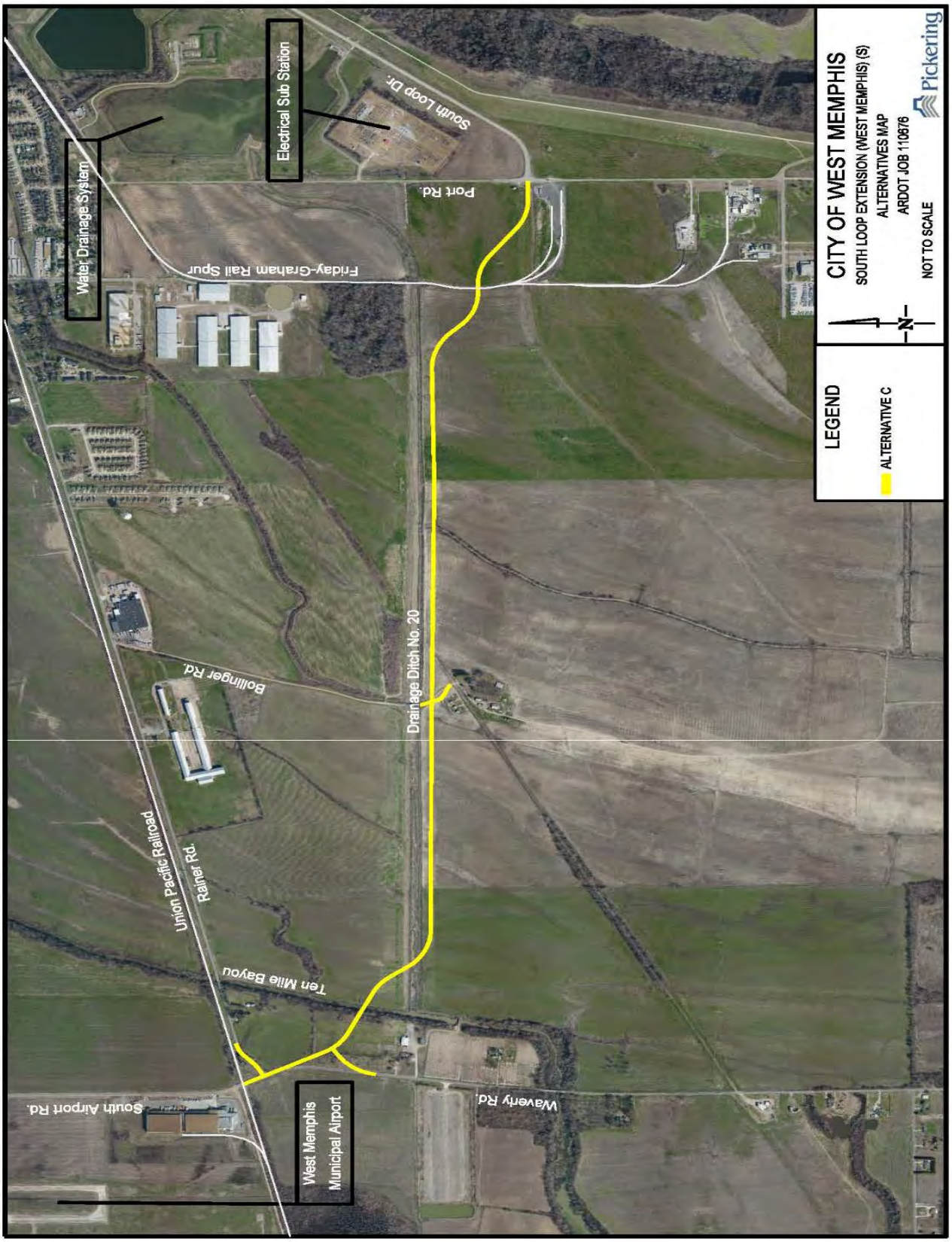
Alternative C would optimize existing South Loop Drive. An alternative route around West Memphis' perimeters would provide a more direct route for commercial traffic and improve traffic flow in central city areas. This would improve overall mobility, connectivity, and public safety.

Alternative C would have the following advantages in comparison to the alternatives considered and dismissed:

- Substantially reduced cost of utility relocation.
- Fewer and shorter bridge lengths crossing Drainage Ditch #20 and Ten Mile Bayou.
- Safer angle of existing railroad spur crossing (e.g., non-skewed) angle.
- Minimal impacts to wetlands in the area.

Relocations occur when a residence business or nonprofit organization is impacted to the extent that they cannot continue to live or do business at their current location. **Utility relocations** can cause extra expense and project delays.

Figure 3. Alternative C



- Avoidance of splitting and potentially devaluing multiple land owner's properties.

The comments received during the public involvement process indicated the majority of the public favor Alternative C. Alternative C would also facilitate the project's purpose and need and address mobility, connectivity, and public safety concerns. Alternative C was therefore identified as the Build alternative for comparison with the No Build alternative in the EA.

2.5 How would bicyclists and pedestrians be accommodated?

No sidewalks or bike lanes currently exist in the Project area. Due to the rural nature of this area, the construction of sidewalks and bike lanes may be impractical. Additionally, the presence of commercial vehicles and traffic speeds create safety concerns. However, construction of a shared-use path for pedestrians and bicyclists along the project alignment could encourage the public to walk or ride their bicycles along these rural county roads. Consideration may be given to integrating bicycle and pedestrian elements into the project during the design phase.

Shared-use paths support multiple recreation and transportation opportunities, such as walking or bicycling, and using strollers and wheelchairs.

2.6 How has the public been involved?

A public meeting was held on September 25, 2018, at the West Memphis Civic Center. Twenty-seven people attended the public involvement meeting. Efforts were made to involve minorities and the public in the Public Meeting. Five comment forms were received after the public involvement meeting, with the majority of the commenters preferring Alternative C. Furthermore, Alternative C has been identified as the preferred alternative by the West Memphis MPO and The City of West Memphis. The public involvement meeting synopsis is included in **Appendix D**.

A Location and Design Public Hearing will be held upon completion of the EA process and prior to issuing a Finding of No Significant Impact (FONSI) for the project. The FONSI will address public input resulting from the Public Hearing and included any additional recommendations from ARDOT and FWHA.

2.7 How have tribal governments been involved?

Section 106 of the National Historic Preservation Act requires federal agencies to consult with tribes where projects could affect tribal areas with historical or cultural significance.

The FHWA initiated coordination with tribes having an active cultural interest in the area. The Tribal Historic Preservation Officers were given the opportunity to comment on the proposed project. Tribal correspondence is included in **Appendix E**.

Chapter 3 – Project Impacts

This chapter summarizes potential project impacts on people and the environment.

3.1 How were potential impacts evaluated?

Pickering's team of environmental scientists and geologists conducted studies to determine the environmental, social, and economic impacts associated with this Project. Both the longevity and intensity of the effects were considered during analyses. Effects are generally described in terms such as beneficial or positive, and adverse or negative. Mitigation measures are sometimes available to minimize or neutralize negative effects, and can enhance positive effects.

Potential impacts are changes or effects that could occur as a result of a proposed action. The impacts may be social or cultural, economic, or ecological. The terms "impact" and "effect" can be used interchangeably.

3.2 How would the Project affect land uses in the Project area?

Figure 4 shows current land zoning in the Project area. Alternative C passes through both land within the city limits and land that is outside the technical limits yet within the city's planning jurisdiction and regulatory authority. As shown on Figure 4, the proposed alignment would be in the following zones:

- I-1-C and I-2-C - Limited/General Industrial Districts: Container Storage Yard/Intermodal (inside city limits).
- I-1-E and 12CE - Extraterritorial (outside technical city limits).

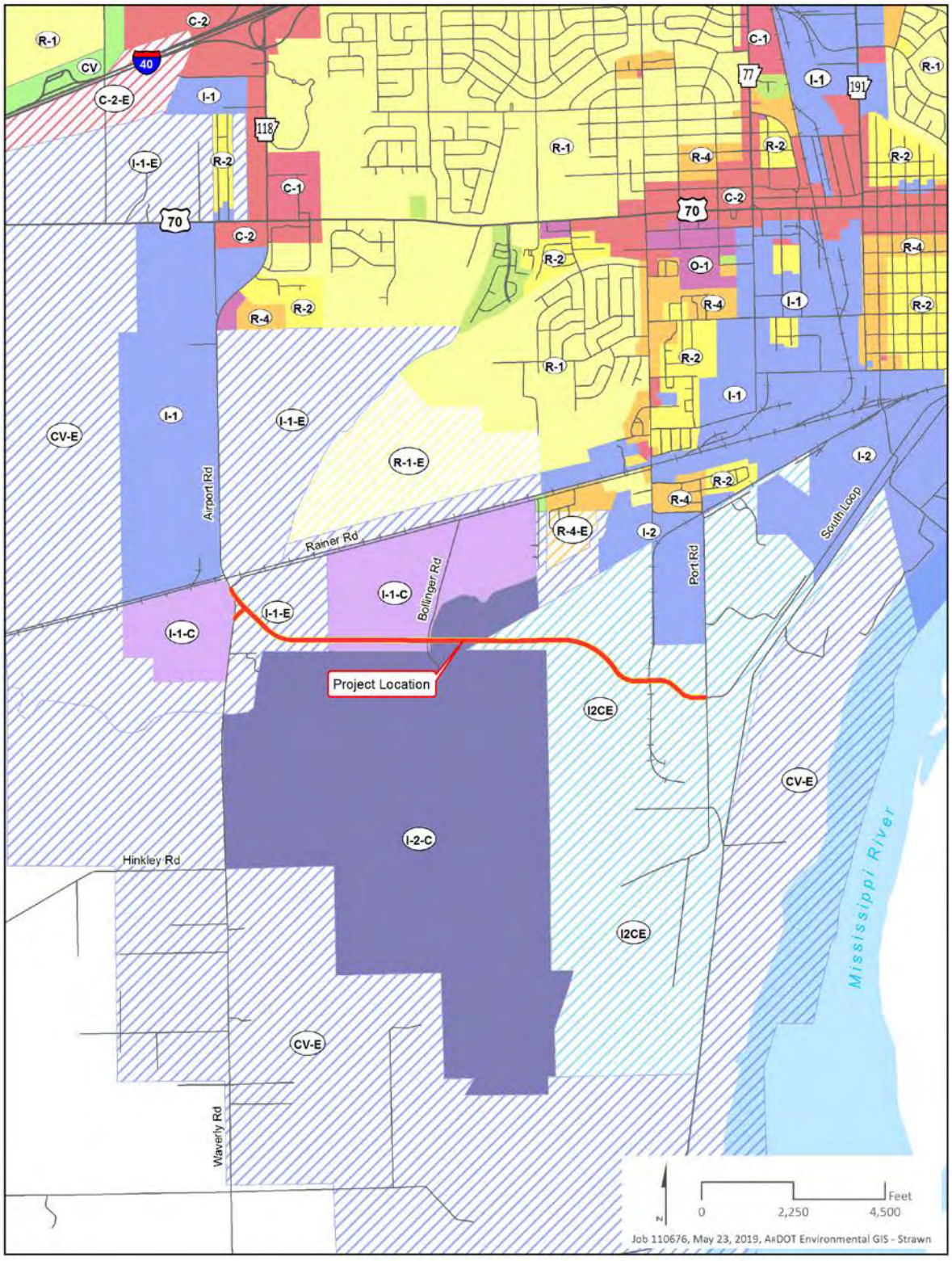
Regardless of zoning, Alternative C would be located primarily on land currently under agricultural production (as detailed in Section 3.5). The extension would cross the railroad spur near Port Road. Alternative C would run parallel to and south of Drainage Ditch #20, crossing it near South Airport Road. The existing functions of the railroad spur and ditch would not be impacted by this Project. A total of 39 acres of land would be converted to transportation use. Alternative C would be compatible with zoning codes and future land commercial/industrial development.

Alternative A would not directly impact current or future land uses because new right of way would not be acquired.

3.3 Would any properties would be displaced?

No residential or commercial/industrial relocations would occur as a result of either alternative.

Figure 4. West Memphis Zoning Map



3.4 What characterizes the community and how would the Project affect residents, services, and businesses?

West Memphis has reported populations of 27,674 and 26,245 in 2000 and 2010, respectively. The population decreased by 5% during these 10 years. The total population of West Memphis was estimated to be 24,860 in 2017. The racial mix is mainly comprised of black or African American alone (64%), followed by White alone (34%). The remaining 2% is split between Hispanic or Latino, Two or More Races, Native Hawaiian and Other Pacific Islander alone, American Indian and Alaska Native alone, or Asian alone (U. S. Census Bureau).

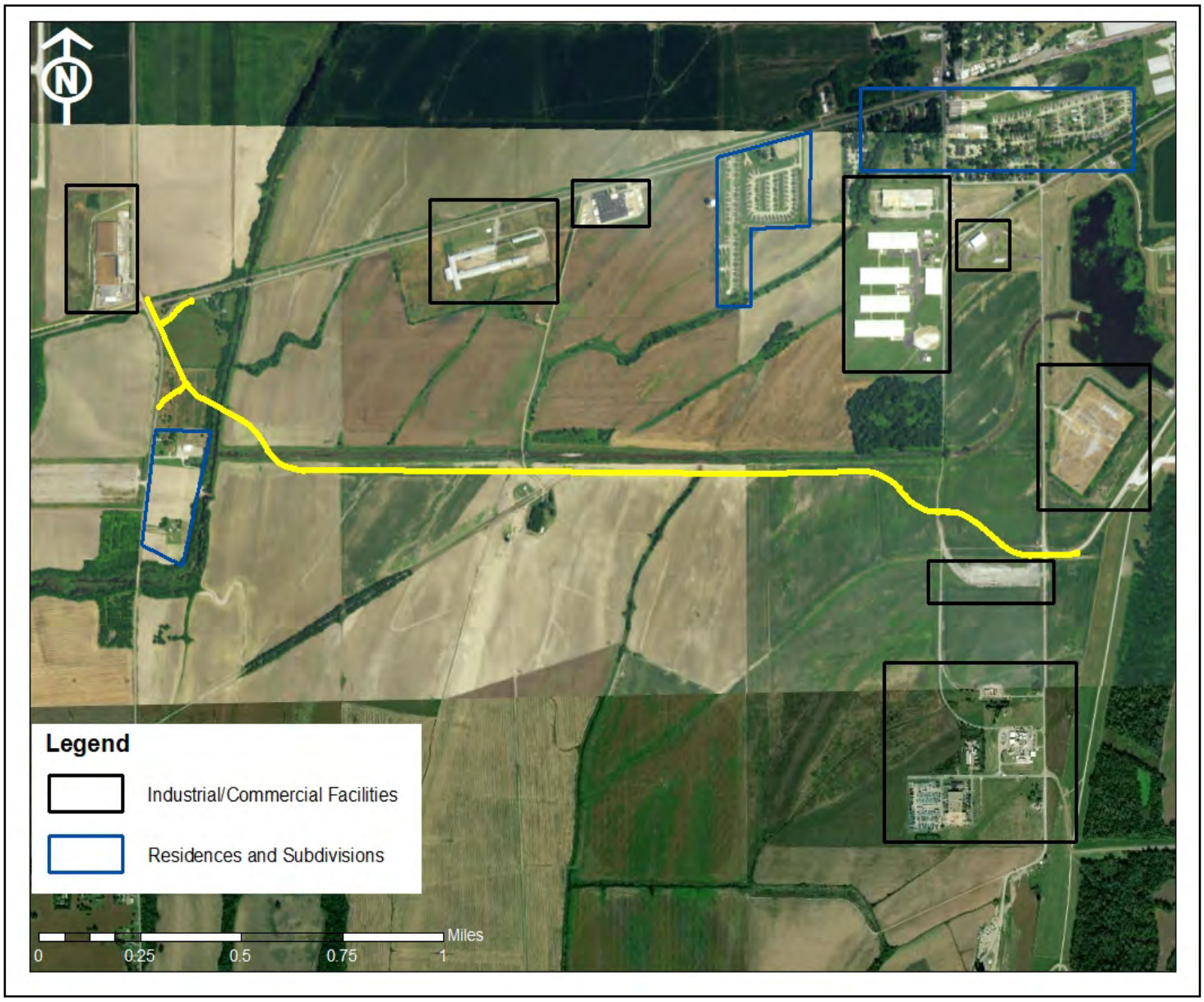
The meeting of I-55 and I-40 in West Memphis make the city a major thoroughfare for both regional and interstate commercial traffic. As the major east-west corridor within West Memphis, U.S. Highway 70/Broadway Avenue is a primary location for residences and local businesses (indicated by “R” “O” and “C” codes on Figure 4) and carries both local and through traffic.

As previously described, the Project area is on the south side of West Memphis and comprised predominately of agricultural and commercial/industrial land. As shown on **Figure 5**, individual residences and residential subdivisions are also present. A large levee separates West Memphis from the Mississippi River, which flows to the east and southeast of the city limits. Ports along the river generate commercial traffic as industrial and agricultural products are transported to and from barges.

Alternative C would provide a more direct route for commercial vehicles traveling to and from the commercial/industrial facilities and agricultural land on West Memphis’ south side. This route would allow intermodal and commercial traffic to avoid the central city area. Reducing this type of traffic would improve traffic flow on U.S. Highway 70/Broadway Avenue and benefit residents and businesses in the central city area. Anticipated future development and economic growth in the Project area would also be beneficial for the community.

Existing South Loop Drive would not be optimized under Alternative A. Mobility, connectivity, and public safety would not be improved, and any future increases in growth and/or traffic volumes would reduce traffic flow.

Figure 5. Residential Communities and Industrial/Commercial Facilities



3.5 What utilities would need to be relocated and how much would it cost?

Utilities in the Project area include the following: water, electric power, gas, phone, and cable telecommunications. These utilities are transmitted by both above- and below-ground lines.

Efforts would be made to avoid utilities to the extent feasible during construction under Alternative C. However, minor utility relocations would be necessary under Alternative C. These relocations would include relocating four AT&T telephone line segments and two above-ground electrical distribution poles along Waverly Road, and raising a total of six above-ground electrical distribution poles in the vicinity of Rainer Road, Bollinger Road, and Port Road. It is estimated that these relocations would cost approximately $210,000. Additional utilities would be crossed by Alternative C, but would not be impacted.

Alternative A would not incur utility relocation costs because new right-of-way would not be needed.

3.6 Would any Prime Farmland be impacted by the Project?

Prime Farmland is defined by the U.S. Department of Agriculture as land that has the best combination of physical and chemical characteristics for producing crops.

It is anticipated that approximately 39.27 acres of Prime and Unique Farmland would be directly converted to transportation use under Alternative C. Alternative C would displace only 0.01% of the 344,680 acres of farmland located within Crittenden County, as indicated on the Farmland Conversion Rating Form completed by the Natural Resources Conservation Service (NRCS). **Appendix F** provides a copy of the Farmland Conversion Rating Form.

Prime Farmland would not be acquired under Alternative A because new right-of-way would not be needed.

3.7 How would the Project area's visual quality be affected?

Project viewers include travelers (drivers, bicyclists, and pedestrians) with views *from* the road and neighbors with views *to* the road.

Visual impacts can be defined as change to the visual landscape. Minimal visual quality impacts generally occur when existing transportation facilities are already part of the view shed, the view shed has few or no visually sensitive resources, and/or a proposed project would introduce few, if any, noticeable changes to project viewers. Alternative C would involve minimal changes to existing roadways. The new alignment segment would introduce few noticeable changes and be located within a view shed with no visually sensitive resources and few

project neighbors. For these reasons, minimal visual quality impacts would be associated with Alternative C.

Alternative A would not have any visual quality impacts.

3.8 Would the Project increase noise for surrounding properties?

Sensitive noise receptors include residences and public places that have a special sensitivity to noise, such as schools, churches, and parks.

Two residences were identified as the only noise sensitive receptors potentially impacted by the Alternative C. Subsequent noise modeling using the FHWA Traffic Noise Model (TNM 2.5) indicated noise impacts would not result from the project. Although noise level increases from projected traffic volume increases were predicted for the 2021 build year and 2041 design year, these would not be substantial and the consideration of noise abatement measures would not be warranted. A minor increase in noise levels would temporarily occur in the Project area during the construction period. **Appendix J** provides the noise analysis prepared for the proposed Project.

Alternative A would not have any noise impacts.

3.9 How would water resources, wetlands, and protected species and their habitats be affected by the Project?

An **endangered species** is one that is in danger of extinction throughout all or a significant portion of its range. Endangered species receive the highest level of protection. A **threatened species** is one that is likely to become endangered in the near future.

Vegetation in the Project area is primarily comprised of agricultural crops. Drainage Ditch #20 and Ten Mile Bayou include vegetation types associated with riverine and wetland habitats. The displacement of wetland vegetation in the Project area would be avoided to the extent feasible. Alternative C would cross the former Drainage Ditch #20, Drainage Ditch #20, and Ten Mile Bayou. According to the National Wetland Inventory, the former Drainage Ditch #20, Drainage Ditch #20, and Ten Mile Bayou are classified as riverine wetland habitats. Bridge configurations were altered by the addition of an S-curve near South Airport Road to limit impacts to wetlands and other waters located in the project area. As shown in **Figure 6** and **Figure 7**, approximately 0.39 acres of riverine wetlands would be impacted by the proposed crossings under Alternative C. In addition, a small patch of forested/shrub wetland habitat located north of Drainage Ditch #20 in the east portion of the Project area would be avoided.

Overall, Crittenden County contains habitat for several threatened and endangered species including: the threatened Piping Plover (*Charadrius melodus*); the endangered Pallid sturgeon (*Scaphirhynchus albus*); the endangered Fat Pocketbook clam (*Portamilus capax*); the threatened Rabbitsfoot clam (*Quadrula*

Figure 7. Water Resources and Wetland Areas (Western Project Area)

Figure 8. Water Resources and Wetland Areas (Eastern Project Area)

cylindrica cylindrical); the endangered Scaleshell mussel (*Leptodea leptodon*); and the endangered Pondberry (*Lindera melissifolia*).

Upon surveying the Project area, it was determined that no threatened or endangered species would be impacted by Alternative C. In an email dated August 30, 2018, the United States Fish and Wildlife Service (USFWS) concurred with the determination that no threatened or endangered species would be impacted. The USFWS expressed no concerns or further comments regarding this Project and indicated no further action is necessary regarding Section 7 of the Endangered Species Act. A copy of this correspondence can be found in Appendix C.

Appendix G provides a preliminary wetland and other waters assessment report. A list of protected species located in the project area are included in **Appendix H**.

Water quality impacts are possible under Alternative C due to soil disturbance from land clearing, bridge and culvert construction, and the operation of construction equipment in the project area. Storm water runoff during the construction phase of the proposed project could also temporarily impact water quality. Best Management Practices will be utilized to minimize any potential water quality impacts.

Alternative A would not have any wetland, stream, protected species, or water quality impacts.

3.10 Would there be any floodplain impacts?

According to the Flood Insurance Rate Map for Crittenden County, Arkansas and Incorporated Areas (Map No. 05035C0450E, dated May 3, 2011) by the Federal Emergency Management Agency (FEMA), the majority of the proposed roadway is shown to be located in Zone X, indicating "Areas determined to be outside the 0.2% annual chance floodplain". However, two crossings of an AE Zone floodway are proposed by Alternative C. The crossing of the AE Zone floodway would be constructed in a manner to cause zero rise in the 100-year flood elevations. A copy of the FEMA Flood Insurance Rate Map can be found in **Appendix I.**

Alternative A would not have any floodplain impacts.

3.11 Are there any hazardous material, waste, or contaminated sites in the Project area?

An Environmental Site Assessment (ESA) was conducted in general conformance with ASTM Standard E 1527-13 in the Project study area. The ESA included a review of relevant documents, interviews with key site personnel and regulatory officials, and a visual inspection of the alignment. The ESA also included a

The discovery of **contaminated sites** may have an adverse impact on the timely completion of a project. Potential areas of contamination are therefore assessed during the early stages of project development.

regulatory database search report provided by Environmental Data Resources, Inc. (EDR) which included federal, state, and local records of registered sites in the vicinity of the Project area. A review of the EDR report resulted in no potential Recognized Environmental Conditions (RECs) being identified. The EDR report has been kept as part of the administrative record for this project.

The former J.R. Simplot Company was located at 1653 S. Airport Road, approximately 500 feet north-northeast of the western terminus of the Project area. A spill releasing 150 gallons of hydraulic fluid outside the facility occurred in January 2009. The release was contained with berm and a tarp to prevent runoff due to rain. The County Coordinator reviewed the leak and found it secure. Due to the distance from the Project area and its containment, this facility does not represent a REC.

Coca-Cola Refreshment is located at 1400 Rainer Road, approximately 3,000 feet north of the Project area. State records show that this site reported a petroleum product release in April 1990. The impacted soil was excavated from the site and no further action was granted by ADEQ. Furthermore, two additional spills of anhydrous ammonia have been reported at this facility. The first spill occurred in 1991 when an equipment failure of a pressure control switch caused the pressure valve to malfunction and resulted in released anhydrous ammonia. The second anhydrous ammonia spill occurred in 1999 due to the tampering of a pressure control switch. Due to its distance from the Project area, this facility does not represent a REC.

3.12 Would there be any indirect and cumulative effects?

Indirect and cumulative effects are often less predictable than direct project effects, but are still reasonably foreseeable. Such effects would mainly be the result of development induced under Alternative C, since it would provide access to previously inaccessible undeveloped areas.

Indirect effects are reasonably foreseeable effects that may be caused by the project but would occur in the future or outside of the project area.

Cumulative effects result from the total effects of a proposed project when added to other past, present, and reasonably foreseeable future projects or actions.

Increased urban development can result from this type of project. Urban development is associated with decreases in water quality, both temporarily and permanently. Temporary impacts most commonly result in increased rates of sedimentation from stormwater runoff from disturbed soils during construction. Permanent impacts include increased rates of pollutants such as fertilizer, herbicides, insecticides, and petroleum products in stormwater runoff.

Positive indirect and/or cumulative effects associated with economic growth could result under Alternative C. Conversely, future LOS ratings and delays could be adversely affected if additional traffic mitigations are not made in the 2041 design

year. No other adverse indirect and/or cumulative effects associated with the proposed project were identified.

Alternative A would not be anticipated to have indirect and/or cumulative impacts.

3.12 What resources are either not present or not affected?

Air Quality

In an email dated August 6, 2018, the ADEQ Air Division communicated that "this project has met the conformity to ADEQ's ozone State Implementation Plan/Re-designation Maintenance Plan for Crittenden County, AR.". As referenced in the statement, the proposed project is included within the WMATS/MPO Policy Committee-approved Imagine 2040 Metropolitan Transportation Plan. Therefore, air quality impacts are not anticipated.

Cultural Resources include elements of the built environment (buildings, structures, or objects) or evidence of past human activity (archeological sites). Those that are eligible for inclusion in the NRHP are defined as historic properties.

Cultural Resources

Section 106 of the National Historic Preservation Act requires agencies to consider the effects of federal actions to historic properties. In compliance with Section 106 requirements, Pickering and ARDOT cultural resource specialists consulted with the State Historic Preservation Officer (SHPO) and Native American tribes. Project-related impacts are not anticipated. A copy of these correspondences can be found in Appendix E. Appendix E also includes a summary of cultural resources work performed for this EA.

Environmental Justice at the FHWA means identifying and addressing disproportionately high and adverse effects of the agency's programs, policies, and activities on minority populations and low-income populations to achieve an equitable distribution of benefits and burdens. **Title VI** of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, sex, national origin, religion, or disability under any program or activity receiving federal financial assistance.

Environmental Justice and Title VI Populations

No environmental justice issues are anticipated as a result of this Project. This Project is being designed to create benefits such as increased mobility and connectivity that will benefit all people in the Project area, regardless of race or economic status.

Wild and Scenic Rivers

No Wild and Scenic Rivers or other federal or state regulated waterbodies would be impacted by the proposed Project.

Landforms, Geology, and Soils

A NRCS Custom Soil Resource Report determined eight soil types are underlying the Project area. Although over 50% of the land cover is occupied with hydric soil, these areas are not considered wetlands as they have been converted into farmland. A copy of the NRCS Web Soil Survey Report can be found in Appendix G.

Public and Private Water Supplies

In a letter dated August 9, 2018, the Arkansas Department of Health stated that the construction of the proposed roadway would not be in the vicinity of the six West Memphis water supply wells and would have no effect on the quality of public water.

Chapter 4 – Results and Recommendations

This chapter summarizes environmental analysis results and recommendations.

4.1 What are the results of this EA?

The enviromental analysis of the proposed project did not identify any signficant impacts to the natural and social environment as a result of either Alternative A or Alternative C. Table 4 summarizes quantitative alternative impacts for comparison purposes.

Table 4. Alternative Impact Comparison

Alternative	Total Project Cost (2019 dollars)	Construction Cost (2019 dollars)	Other* Costs (2019 dollars)	Right of Way (acres)	Relocations	Wetland Impacts (acres)	Stream Impacts (linear feet)
Alternative A (No Build)	0	0	0	0	0	0	0
Alternative C (Build)	15.2 million	14 million	1.2 million	40.0	0	0.4	412

Other includes relocation, utility, and right of way acquisition costs

As described in Chapter 2, Alternative C best suits the project's purpose and need. Additionally, stakeholders, public commenters, the West Memphis MPO, and the City of West Memphis have expressed a preference for Alternative C. Traffic modeling results indicate that Alternative C would optimize mobility.

For the reasons described above, Alternative C was identified as the Preferred Alternative.

Commitments

Commitments made regarding hazardous waste abatement, cultural resources discovery, and water quality impact controls are as follows:

- If hazardous materials, unknown illegal dumps, or USTs are identified or accidentally uncovered by ARDOT personnel or its contractors, the type and extent of the contamination will be determined according to the ARDOT's response protocol. In cooperation with the ADEQ, appropriate remediation and disposal methods will be determined.
- An intensive cultural resources survey will be conducted for the Preferred Alternative. If sites are affected, a report documenting the survey results and stating the ARDOT's recommendations will be prepared and submitted for SHPO review. If prehistoric sites are impacted, FHWA-led consultation with the appropriate Native American Tribe will be conducted and the site(s) evaluated to determine if Phase II testing is necessary. Should any of the sites be determined as eligible or potentially eligible for the National Register of Historic Places and avoidance is not possible, site-specific treatment plans will be prepared and data recovery conducted at the earliest practicable time. All borrow pits, waste areas and work roads will be surveyed for cultural resources when locations become available.
- Project construction will be in compliance with all applicable Clean Water Act, as amended, requirements. This includes obtaining the following: Section 401 Water Quality Certification; Section 402 National Pollutant Discharge Elimination Permit; and Section 404 Permit for Dredged or Fill Material.
- Stream and wetland mitigation will be offered at an approved mitigation bank site at a ratio approved during the Section 404 permitting process.
- A Water Pollution Control Special Provision would be incorporated into the contract to minimize potential water quality impacts.
- Appropriate action will be taken to mitigate any permanent impacts to private drinking water sources should they occur due to this project.

Phase II testing involves surveying and archeological testing to determine site boundaries, cultural and scientific importance, and National Register of Historic Places eligibility.

Mitigation banks are water resource areas used to provide compensation for unavoidable impacts. The banks allow many small wetland or stream mitigation projects to be consolidated into a larger, potentially more ecologically valuable site.

4.2 Is the NEPA process finished?

After this EA is approved by the FHWA for public dissemination, a Location and Design Public Hearing will be held.

After a review of comments received from citizens, public officials, and public agencies, a FONSI document will be prepared by the ARDOT and submitted to the FHWA. Approval of the FONSI by the FHWA will identify the Selected Alternative and conclude the NEPA process.

A **Finding of No Significant Impact** (FONSI) presents the reasons why an action will not have significant environmental effects and therefore does not require preparing an Environmental Impact Statement. Based on analyses and project feedback received to date, the City of West Memphis anticipates preparing a FONSI for this project.

Appendix A – Traffic Study

TRAFFIC STUDY

Job 110676

South Loop Extension (West Memphis) (S)

South Airport Road to Port Road

West Memphis, Arkansas

Prepared for:

December 17, 2018

Prepared by:

Pickering

317 S. Church Street
Jonesboro, AR 72401

Contents

I. Introduction

The purpose of this study was to evaluate traffic impacts of a potential roadway project that will extend an existing alignment known as South Loop Drive approximately 2.5 miles from Port Road on the east to South Airport Road on the west in West Memphis, Arkansas. The study covered an existing scenario, an opening year scenario with and without the construction of the Project to determine the traffic needs at the anticipated time of construction, and a design year scenario with and without the Project to determine the traffic needs 20 years after the Project is constructed. Figure 1 displays the location of the proposed alignment of South Loop Extension that was studied. This study assessed the capacity and level of service (LOS) at each study intersection, signal warrants analysis of unsignalized intersections, queue length analysis, and the need for mitigation measures based on the traffic impacts.

II. Project Area

A. Project Description

The Project is the extension of an existing alignment, named South Loop Drive, which will begin at the intersection of South Airport Road and Rainer Road and extends to the existing alignment of South Loop Drive at Port Road. This will provide approximately 13,000 feet or 2.46 miles of additional roadway to improve the circulation of the City of West Memphis and open an undeveloped area to potential industrial development. This Project will include the realignment of Waverly Road to tie perpendicular to South Loop Extension, south of Rainer Road.

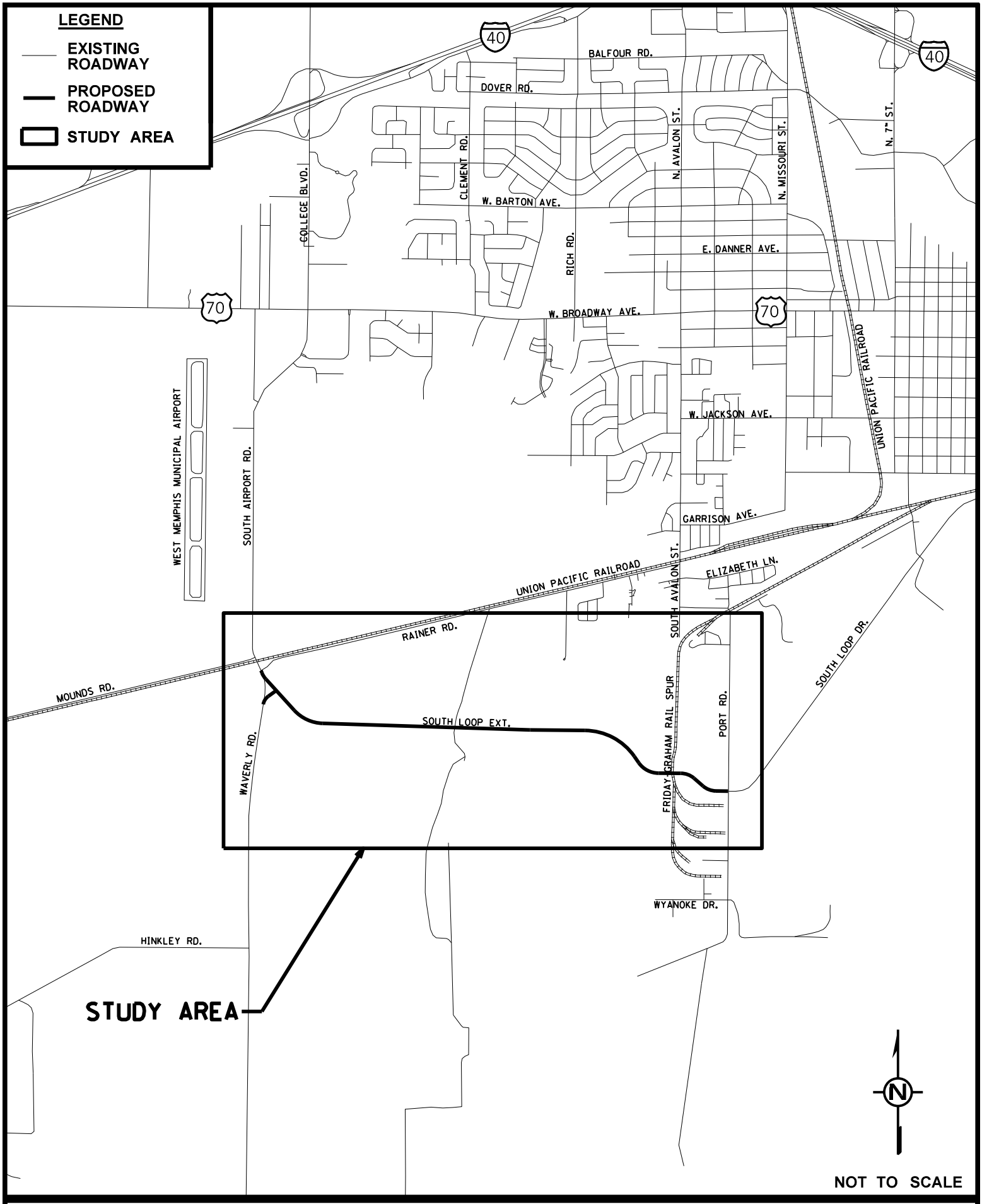
B. Existing and Proposed Streets

Airport Road is a north-south two-lane rural roadway with open shoulders. Airport Road extends north approximately 6.5 miles, while named College Boulevard, State Route 118, and Gavin Road. It provides connection with US 70 highway and has an interchange with Interstate 40. Airport Road extends approximately 6 miles south of the Project, as Waverly Road where it terminates as the Mississippi River. Within the scope of this Project, it is proposed to re-align Waverley Road to tie into South Loop Extension. Within the vicinity of the Project, it provides access to the West Memphis Municipal Airport, Arkansas State University, Mid-South and agricultural land uses.

Port Road is a north-south two-lane roadway with open shoulders. It extends approximately one mile both north and south of the Project. Within the Project area, Port Road project access to agricultural and industrial land uses, as well as, access to the existing ports along the Mississippi River.

Rainer Road is an east-west two-lane roadway with open shoulders. It extends east from South Airport Road, runs approximately 2 miles to its easterly terminus at South Avalon Street. Rainer Road provides access to mainly agricultural land uses with a small amount of industrial and residential land uses.

South Loop Drive is a two-lane roadway with widened shoulders within the Project vicinity. The purpose of this roadway is to provide an alternative route in case of emergencies along Interstate 40 that will provide circulation around the City of West Memphis instead through the middle of town. The first phase was constructed in the early 2000s and extended approximately 2.5 miles from Interstate 40 to South 8th Street. The second phase was constructed in 2009 and provided an additional 1.5 miles of roadway to Port Road. Finally, this Project is intended to complete the loop and provide an extension to South Airport Road. It also provides a truck route with direct connections on the east to Interstate 40 and Interstate 55 and to the west connection to Interstate 40. This will allow truck traffic to access the interstate system without having to travel through predominately residential areas.



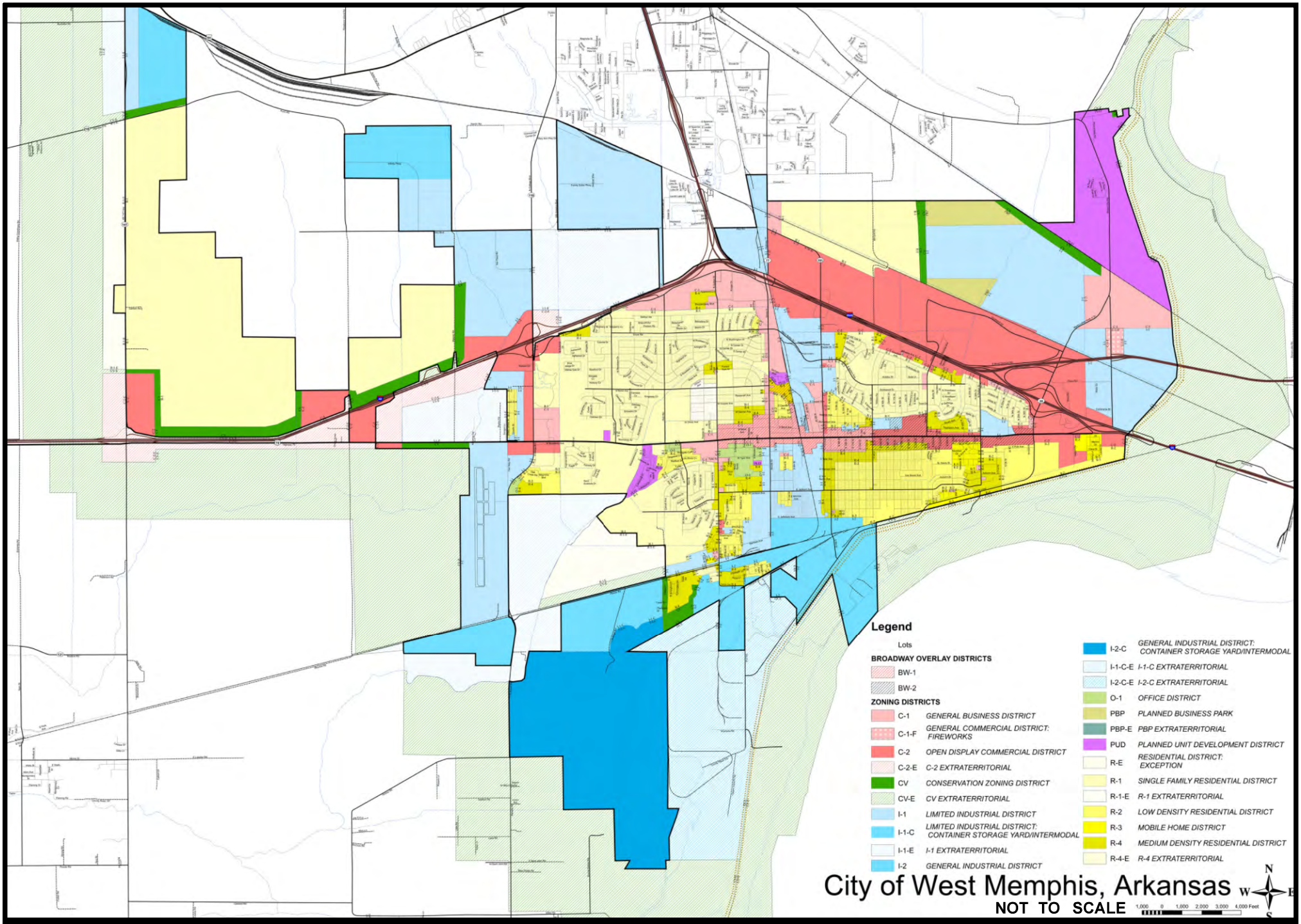
LOCATION MAP
FIGURE 1

III. Existing and Future Traffic

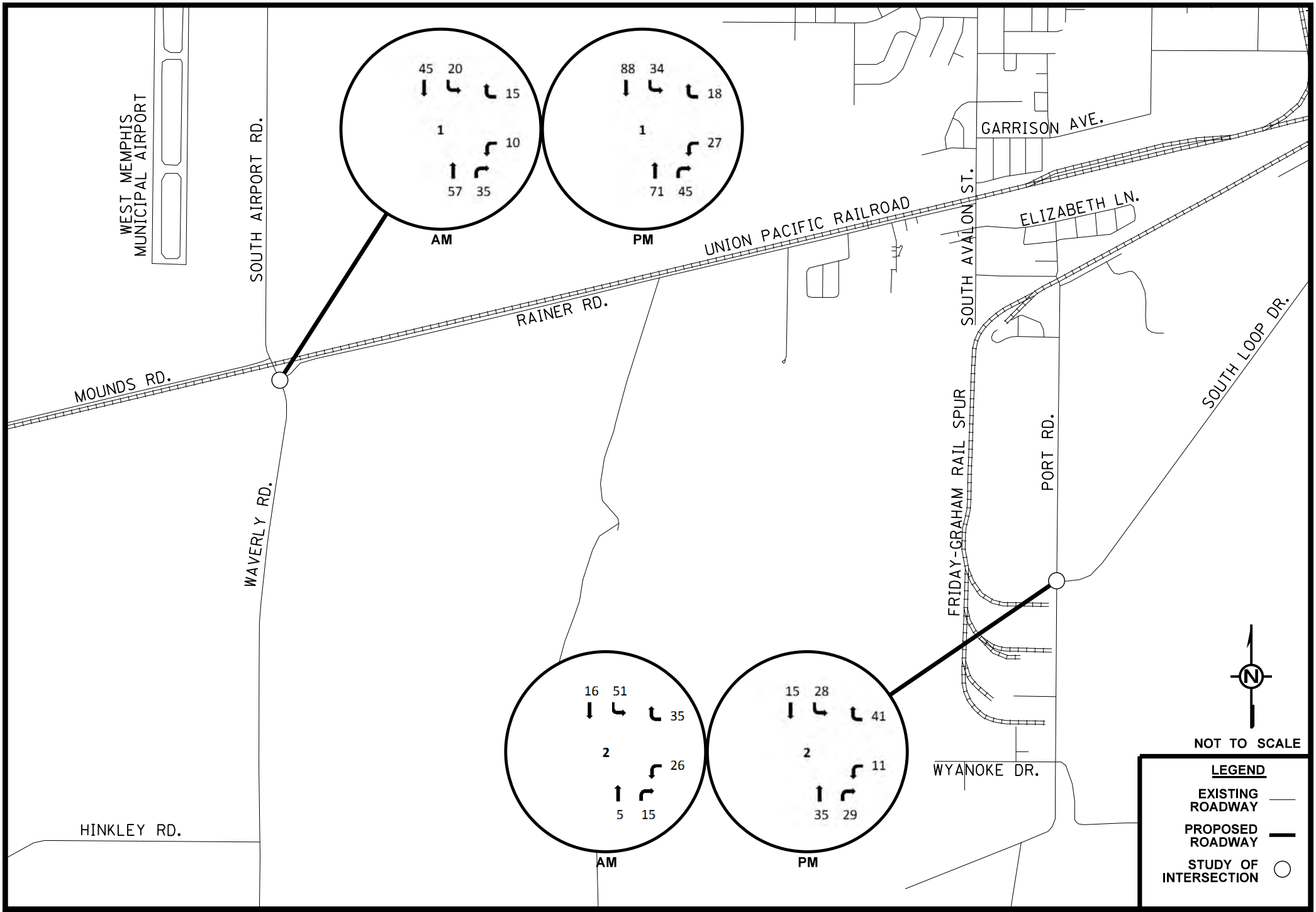
Existing volume counts for each existing study intersection were field measured by West Memphis MPO on Tuesday, May 8, 2018 and Wednesday, July 25, 2018 for purposes of this study. From the existing count data collected, AM Peak hour was determined to occur between 7:00 and 8:00 AM. PM Peak Hour was determined to occur between 4:00 and 5:00 PM. Figure 3 displays existing turning movement volumes for each peak hour.

Opening year of the South Loop Extension is estimated to be in 2021 for the purposes of this study. Existing turning movement counts were grown out at a rate of 2.0% based on average historical growth rates within the City of West Memphis. Figure 2 displays zoning for the City of West Memphis along with the Project location. As a conservative estimate, it was assumed that the industrial district within the Project vicinity would be developed 20% every 5 years until the entire area would be developed by the year 2045. Therefore, it was assumed that during the Design Year (2041) that 80% of the industrial district would be developed.

Figure 4 displays the potential turning movement volumes in 2021, assuming only an historical growth rate. Figure 5 displays the turning movement volumes in 2021 if the Project is constructed. Similarly, Figure 6 illustrates the traffic in the design year (2041) assuming that the industrial district is 20% developed, yet the Project, South Loop Extension, is not constructed. Finally, Figure 7 shows the turning movements for the scenario where the Project is in place and the industrial district is 80% developed and utilized.

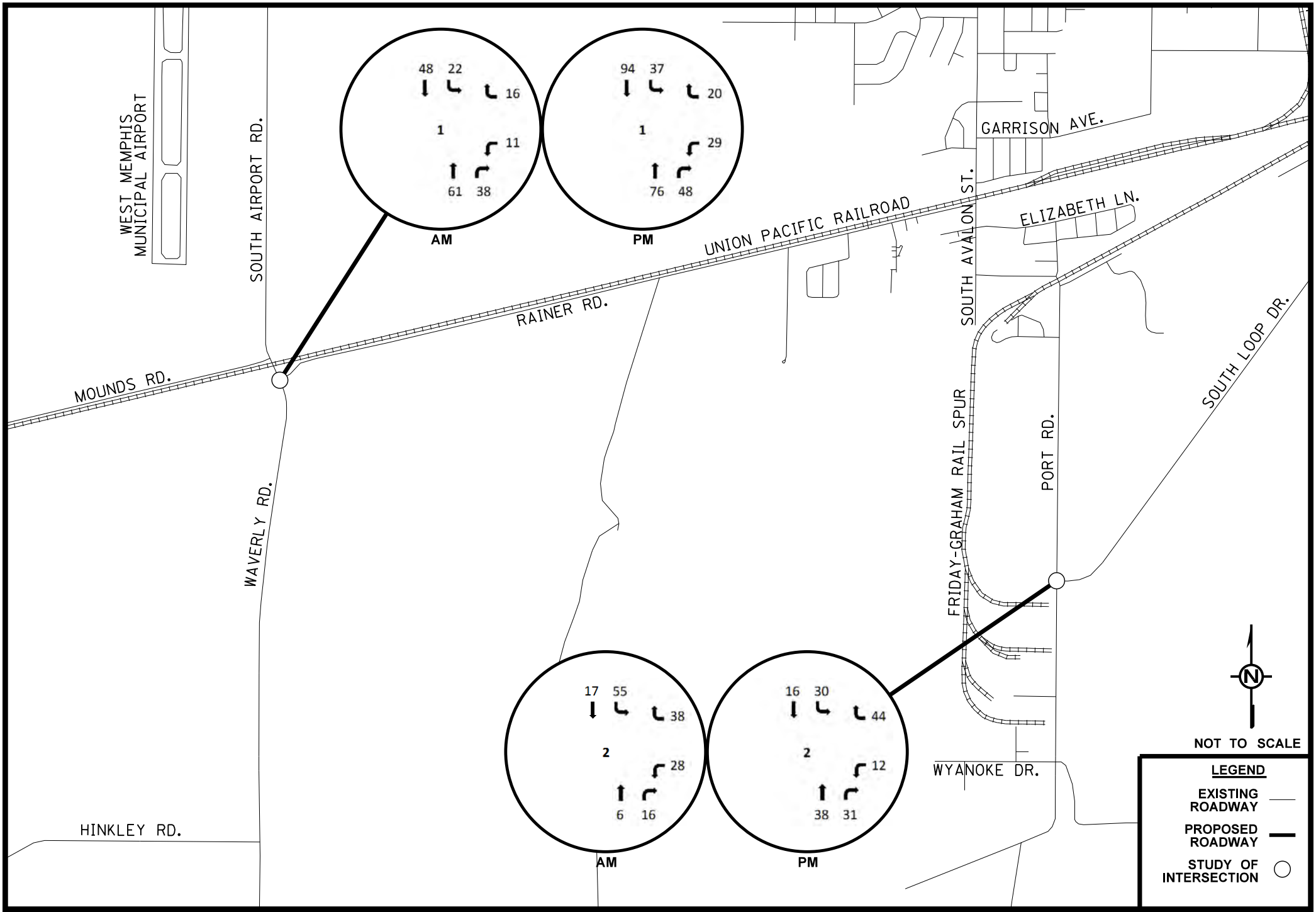


ZONING MAP
FIGURE 2



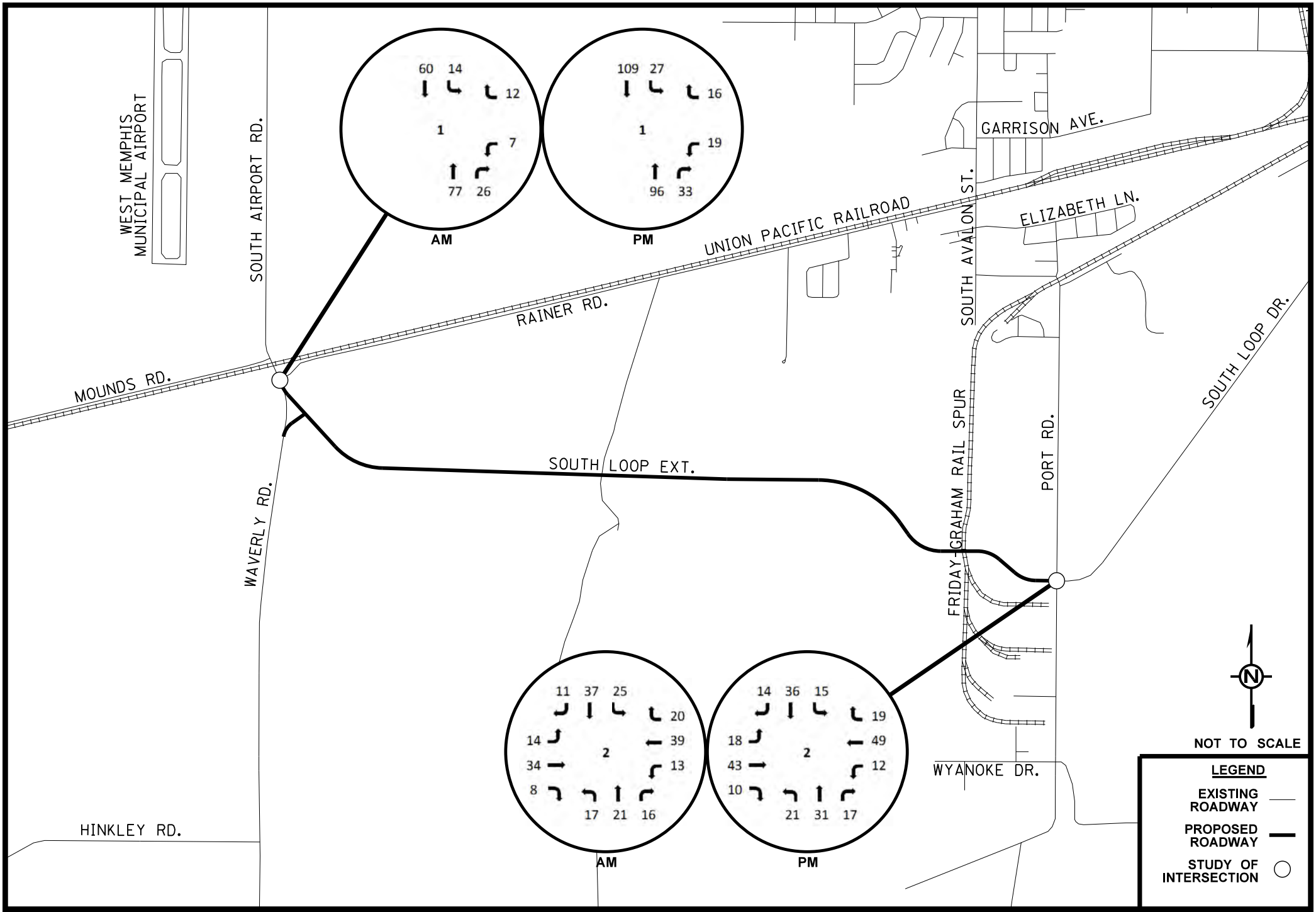
2018 PEAK HOUR TRAFFIC
FIGURE 3

Pickering



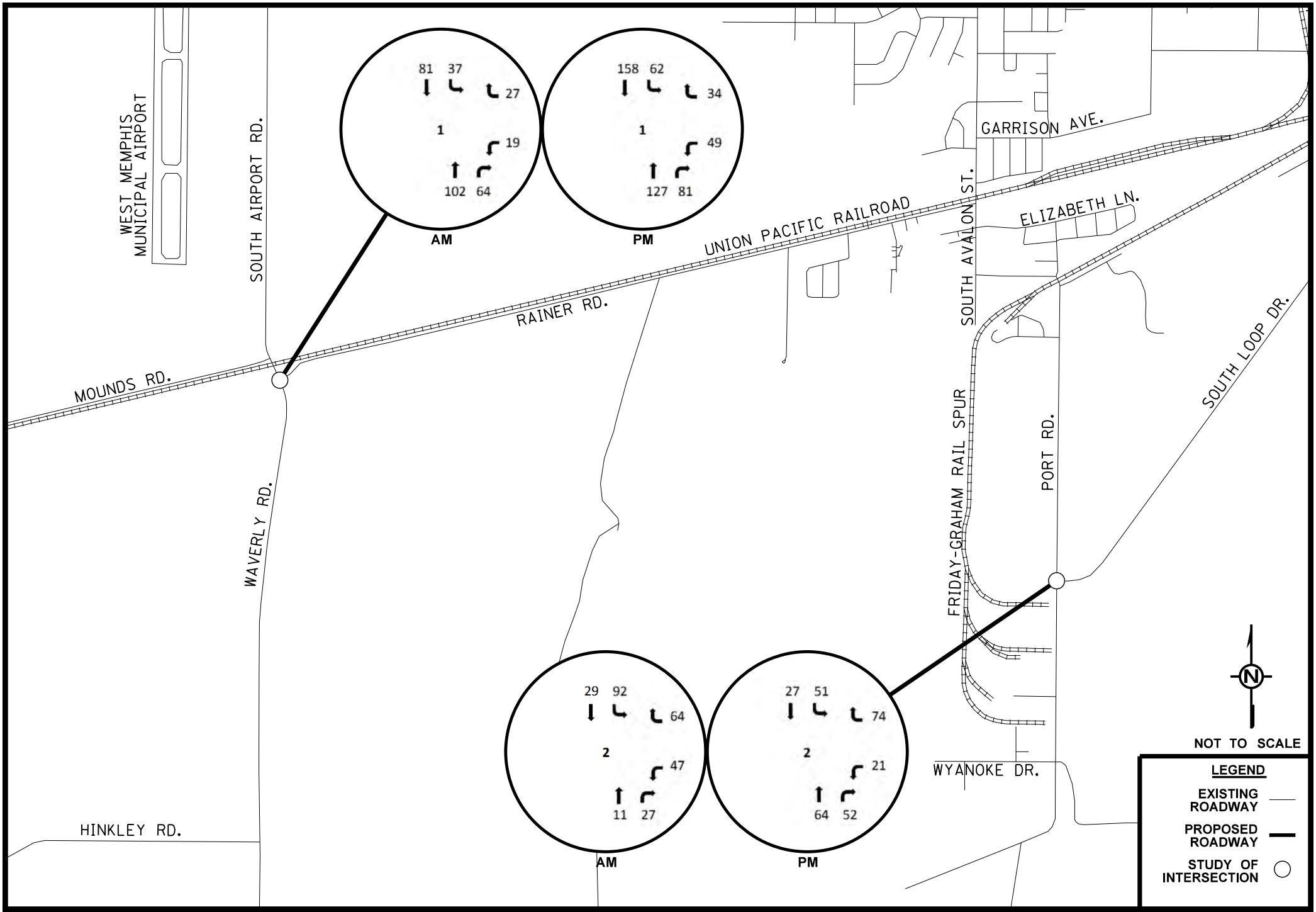
2021 PEAK HOUR TRAFFIC
FIGURE 4

Pickering



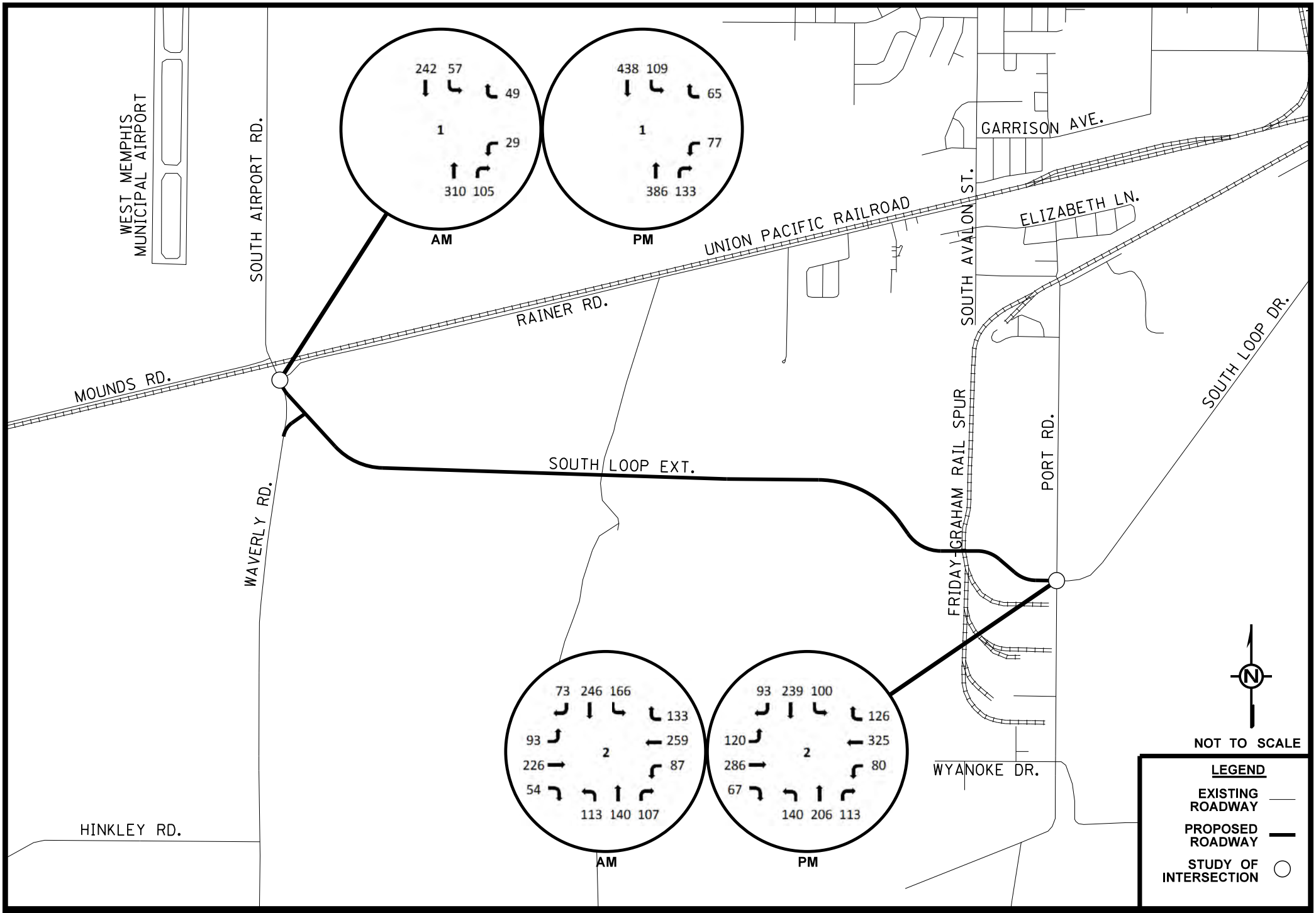
2021 + PROJECT PEAK HOUR TRAFFIC
FIGURE 5

Pickering



2041 PEAK HOUR TRAFFIC
FIGURE 6

Pickering



2041 + PROJECT PEAK HOUR TRAFFIC
FIGURE 7

Pickering

IV. Analyses

A. Intersection Analysis

An intersection level of service (LOS) and delay analysis was conducted using Synchro 8 software from Trafficware for each study intersection. This software utilizes the capacity analysis methodology in the Transportation Research Board's Highway Capacity Manual 2010. An acceptable level of service (LOS) is defined as an LOS C or better. The intersection analysis was performed for the following traffic scenarios: existing year (2018), opening year (2021), opening year (2021) with the Project, opening year (2021) with the Project with Mitigation, design year (2041), design year (2041) with the Project, and design year (2041) with the Project with Mitigation. The Project is defined in the Project Description section of this report as the extension of South Loop Drive. PM peak hour LOS and intersection delay times for the study intersections are presented in Table 1. AM peak hour LOS and intersection delay times for the study intersections are presented in Table 2. Mitigation for this Project is detailed within the Conclusion and Recommendation section of this report. Sketches of proposed improvements can be found in the appendix of this report.

PM Peak Hour
Intersection Level of Service and Delay
Table 1

#	Name	Existing Intersection Control		2018	2021	2021 + Project	2021+Project w/Mitigation	2041	2041 + Project	2041+Project w/Mitigation
				PM Peak Hour						
1	S Airport Rd/South Loop Ext & Rainer Rd	WB Stop	LOS	B	B	B	-	B	F	C
			Delay (s/veh)	10.2	10.4	10.2	-	12.6	54.3	24.1
2	Port Rd & South Loop Dr	WB Stop	LOS	A	A	A[1]	-	A	F[1]	C[2]
			Delay (s/veh)	9.0	9.1	8.3[1]	-	9.6	76.9[1]	34.1[2]

[1] All-way Stop Control

[2] Signalized

AM Peak Hour
Intersection Level of Service and Delay
Table 2

#	Name	Intersection Control		2018	2021	2021 + Project	2021+Project w/Mitigation	2041	2041 + Project	2041+Project w/Mitigation
				AM Peak Hour						
1	S Airport Rd/South Loop Ext & Rainer Rd	WB Stop	LOS	A	A	A	-	B	C	B
			Delay (s/veh)	9.6	9.7	9.7	-	10.6	15.8	12.6
2	Port Rd & South Loop Dr	WB Stop	LOS	A	A	A[1]	-	A	F[1]	C[2]
			Delay (s/veh)	9.2	9.2	8.2[1]	-	9.8	76.3[1]	26.3[2]

[1] All-way Stop Control

[2] Signalized

B. Signal Warrant Analysis

Both study intersections are currently unsignalized. To evaluate the condition of the study intersections, a peak hour signal warrant evaluation was conducted during the PM and AM peak hours for each of the following study scenarios: existing year (2018), opening year (2021), opening year (2021) with the Project, design year (2041), and design year (2041) with the Project. The analysis was conducted using Warrants 8 from Trafficware. This software utilizes the methodology in the Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition. Weekday PM and AM peak hour signal warrants for the unsignalized study intersections are presented in Table 3.

Peak Hour Signal Warrants
Table 3

		PM Peak Hour				
#	Name	2018	2021	2021 + Project	2041	2041 + Project
1	S Airport Rd/South Loop Ext	No	No	No	No	***YES***
2	Port Rd & South Loop Dr	No	No	No	No	***YES***
		AM Peak Hour				
#	Name	2018	2021	2021 + Project	2041	2041 + Project
1	S Airport Rd/South Loop Ext	No	No	No	No	No
2	Port Rd & South Loop Dr	No	No	No	No	***YES***

C. Queue Length Analysis

In order to determine the bay lengths needed at each study intersection, a queue length analysis was conducted using Synchro 8 and Sim Traffic 8 software. Peak hour average queue lengths for both Weekday PM and AM peak hours are displayed in Table 4. The results from both Synchro and Sim Traffic were compared and the greatest value was used for the design of bay lengths.

Peak Hour Intersection Queue Lengths
Table 4

#	Name	Intersection Control	Scenario	2041+Project w/ Mitigation	
				EBL	WBL
1	S Airport Rd/South Loop Ext & Rainer Rd	WB Stop	PM	-	49
			AM	-	72
2	Port Rd & South Loop Dr	Signalized	PM	155	84
			AM	153	69

V. Conclusion and Recommendation

Based on the evaluation of the study intersections, South Loop Extension between South Airport Road and Port Road will continue to operate at an acceptable Level of Service (LOS) on opening day (2021). Conversely, in the design year (2041) the corridor will need to construct specific geometry and control elements in order to maintain an acceptable LOS. The addition of this proposed corridor would be an improvement to the traffic circulation of the City of West Memphis once the proposed new alignment is constructed.

Once South Loop Extension is constructed in 2021, both study intersections will continue to operate at an acceptable LOS. Therefore, no additional improvements will be necessary except what is completed as part of this project.

In 2041, improvements will be required at both study intersections in order to maintain acceptable levels of service. At the intersection of Port Road and South Loop Drive, an eastbound left-turn will need to be constructed in addition to the installation of a traffic signal. Based on the anticipated growth in 2041, the intersection of South Airport Rd/South Loop Extension and Rainer Road will need to accommodate two northbound and two southbound through lanes, along with a northbound right-turn lane and a separate left and right turn lane. Mitigation diagrams in the appendix of this report depict the necessary improvement recommended in this report.

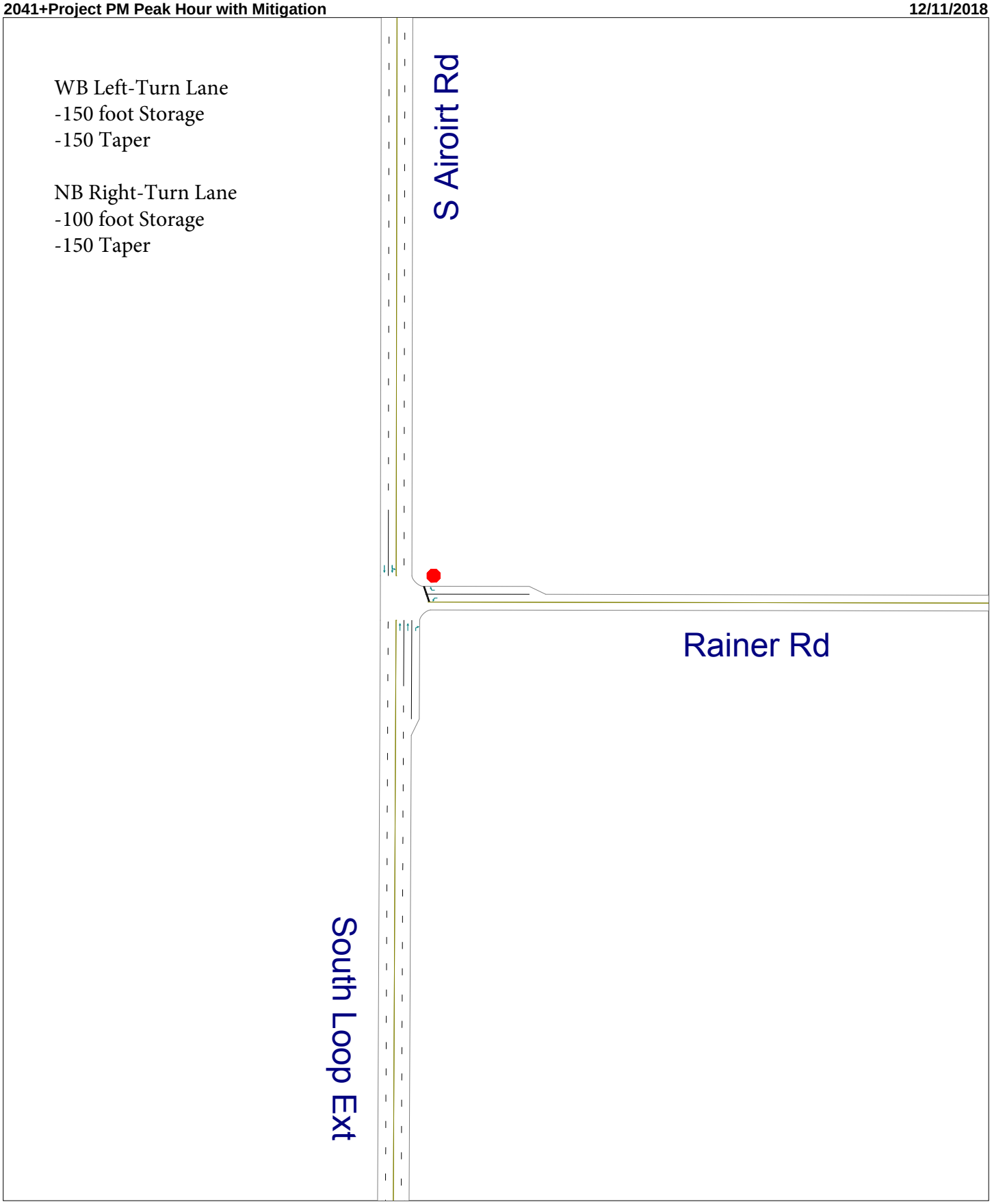
It is recommended that the corridor be constructed as a two-lane facility connecting South Airport Road on the east to Port Road on west, with no additional improvements. Once a significate amount of the industrial district is developed, it is recommended that the improvement recommendation for 2041 be constructed to maintain the LOS along this corridor.

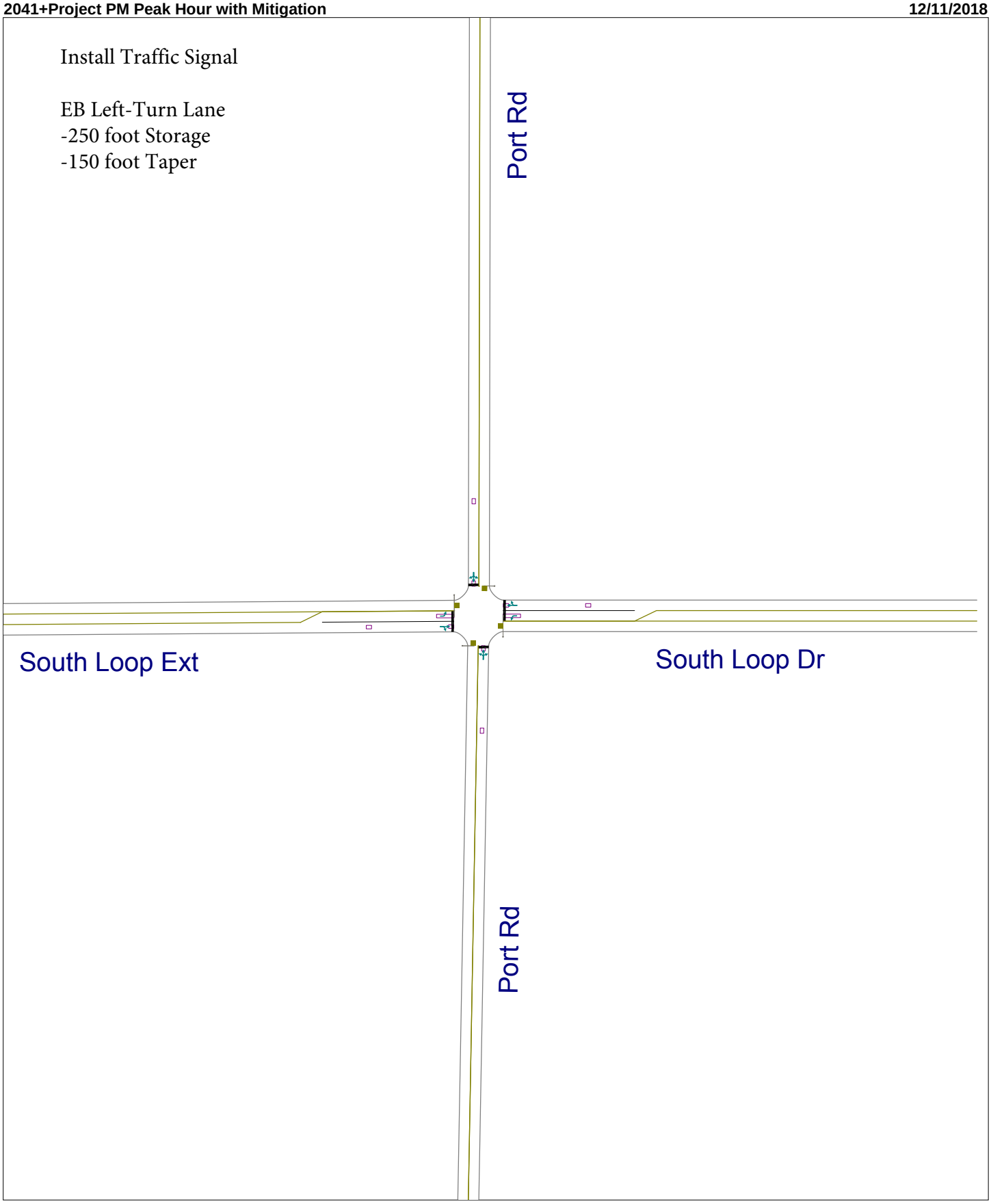
Appendix

Mitigation Diagrams

WB Left-Turn Lane
-150 foot Storage
-150 Taper

NB Right-Turn Lane
-100 foot Storage
-150 Taper




Install Traffic Signal
EB Left-Turn Lane
-250 foot Storage
-150 foot Taper
Port Rd
South Loop Ext
South Loop Dr
Port Rd

Synchro LOS Reports

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	18	71	45	34	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	30	20	79	50	38	98

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	277	104	0	0	129	0
Stage 1	104	-	-	-	-	-
Stage 2	173	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	676	904	-	-	1353	-
Stage 1	877	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	656	904	-	-	1353	-
Mov Cap-2 Maneuver	656	-	-	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	791	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	2.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	737	1353	-
HCM Lane V/C Ratio	-	-	0.068	0.028	-
HCM Control Delay (s)	-	-	10.2	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	11	41	35	29	28	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	12	46	39	32	31	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	134	55	0	0	71	0
Stage 1	55	-	-	-	-	-
Stage 2	79	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	819	963	-	-	1422	-
Stage 1	924	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	801	963	-	-	1422	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	881	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	801	963	1422	-
HCM Lane V/C Ratio	-	-	0.015	0.047	0.022	-
HCM Control Delay (s)	-	-	9.6	8.9	7.6	0
HCM Lane LOS	-	-	A	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.1	0.1	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	29	20	76	48	37	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	32	22	84	53	41	104

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	298	111	0	0	138	0
Stage 1	111	-	-	-	-	-
Stage 2	187	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	657	896	-	-	1342	-
Stage 1	871	-	-	-	-	-
Stage 2	803	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	636	896	-	-	1342	-
Mov Cap-2 Maneuver	636	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	777	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	2.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	721	1342	-
HCM Lane V/C Ratio	-	-	0.076	0.031	-
HCM Control Delay (s)	-	-	10.4	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	4.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	12	44	38	31	30	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	13	49	42	34	33	18

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	143	59	0	0	77	0
Stage 1	59	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	809	958	-	-	1415	-
Stage 1	920	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	790	958	-	-	1415	-
Mov Cap-2 Maneuver	790	-	-	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	874	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	790	958	1415	-
HCM Lane V/C Ratio	-	-	0.017	0.051	0.024	-
HCM Control Delay (s)	-	-	9.6	9	7.6	0
HCM Lane LOS	-	-	A	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.2	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	19	16	96	33	27	109
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	21	18	107	37	30	121

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	306	125	0	0	143	0
Stage 1	125	-	-	-	-	-
Stage 2	181	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	650	879	-	-	1336	-
Stage 1	858	-	-	-	-	-
Stage 2	809	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	634	879	-	-	1336	-
Mov Cap-2 Maneuver	634	-	-	-	-	-
Stage 1	858	-	-	-	-	-
Stage 2	790	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	727	1336	-
HCM Lane V/C Ratio	-	-	0.053	0.022	-
HCM Control Delay (s)	-	-	10.2	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	18	43	10	0	12	49	19	0	21	31	17
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20	2	20	20	20	2	20	20	20
Mvmt Flow	0	20	48	11	0	13	54	21	0	23	34	19
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	8.4	8.4	8.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	30%	25%	100%	0%	23%
Vol Thru, %	45%	61%	0%	72%	55%
Vol Right, %	25%	14%	0%	28%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	69	71	12	68	65
LT Vol	21	18	12	0	15
Through Vol	31	43	0	49	36
RT Vol	17	10	0	19	14
Lane Flow Rate	77	79	13	76	72
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.099	0.105	0.021	0.106	0.094
Departure Headway (Hd)	4.666	4.781	5.773	5.074	4.676
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	771	752	622	709	769
Service Time	2.68	2.797	3.489	2.79	2.688
HCM Lane V/C Ratio	0.1	0.105	0.021	0.107	0.094
HCM Control Delay	8.2	8.4	8.6	8.4	8.2
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.4	0.1	0.4	0.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	15	36	14
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20
Mvmt Flow	0	17	40	16
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	49	34	127	81	62	158
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	54	38	141	90	69	176

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	499	186	0	0	231	0
Stage 1	186	-	-	-	-	-
Stage 2	313	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	500	812	-	-	1238	-
Stage 1	804	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	469	812	-	-	1238	-
Mov Cap-2 Maneuver	469	-	-	-	-	-
Stage 1	804	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	2.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	567	1238	-
HCM Lane V/C Ratio	-	-	0.163	0.056	-
HCM Control Delay (s)	-	-	12.6	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2	-

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	21	74	64	52	51	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	23	82	71	58	57	30

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	243	100	0	0	129	0
Stage 1	100	-	-	-	-	-
Stage 2	143	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	708	909	-	-	1353	-
Stage 1	881	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	678	909	-	-	1353	-
Mov Cap-2 Maneuver	678	-	-	-	-	-
Stage 1	881	-	-	-	-	-
Stage 2	806	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	5.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	678	909	1353	-
HCM Lane V/C Ratio	-	-	0.034	0.09	0.042	-
HCM Control Delay (s)	-	-	10.5	9.4	7.8	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.3	0.1	-

Intersection	
Int Delay, s/veh	7.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	77	65	386	133	109	438
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	86	72	429	148	121	487

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1232	503	0	0	577	0
Stage 1	503	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	180	534	-	-	913	-
Stage 1	572	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	147	534	-	-	913	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	572	-	-	-	-	-
Stage 2	365	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	54.3	0	1.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	220	913	-
HCM Lane V/C Ratio	-	-	0.717	0.133	-
HCM Control Delay (s)	-	-	54.3	9.5	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	4.7	0.5	-

Intersection	
Intersection Delay, s/veh	76.9
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	120	286	67	0	80	325	126	0	140	206	113
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20	2	20	20	20	2	20	20	20
Mvmt Flow	0	133	318	74	0	89	361	140	0	156	229	126
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	80.1	69.7	79.4
HCM LOS	F	F	F

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	31%	25%	100%	0%	23%
Vol Thru, %	45%	60%	0%	72%	55%
Vol Right, %	25%	14%	0%	28%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	459	473	80	451	432
LT Vol	140	120	80	0	100
Through Vol	206	286	0	325	239
RT Vol	113	67	0	126	93
Lane Flow Rate	510	526	89	501	480
Geometry Grp	2	5	7	7	2
Degree of Util (X)	1	1	0.26	1	1
Departure Headway (Hd)	9.848	10	10.537	9.842	9.851
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	372	368	343	371	374
Service Time	7.848	8	8.237	7.542	7.851
HCM Lane V/C Ratio	1.371	1.429	0.259	1.35	1.283
HCM Control Delay	79.4	80.1	16.9	79.1	79.4
HCM Lane LOS	F	F	C	F	F
HCM 95th-tile Q	11.7	11.6	1	11.7	11.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	100	239	93
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20
Mvmt Flow	0	111	266	103
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	79.4
HCM LOS	F

Lane

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	77	65	386	133	109	438
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	86	72	429	148	121	487

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	915	214	0	0	429	0
Stage 1	429	-	-	-	-	-
Stage 2	486	-	-	-	-	-
Critical Hdwy	7.2	7.3	-	-	4.5	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	-	-	2.4	-
Pot Cap-1 Maneuver	241	738	-	-	1009	-
Stage 1	575	-	-	-	-	-
Stage 2	535	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	201	738	-	-	1009	-
Mov Cap-2 Maneuver	201	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	447	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.1	0	2.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	201	738	1009	-
HCM Lane V/C Ratio	-	-	0.426	0.098	0.12	-
HCM Control Delay (s)	-	-	35.6	10.4	9.1	0.5
HCM Lane LOS	-	-	E	B	A	A
HCM 95th %tile Q(veh)	-	-	2	0.3	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	286	67	80	325	126	140	206	113	100	239	93
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1583	1583	1900	1583	1583	1900	1900	1583	1900	1900	1583	1900
Adj Flow Rate, veh/h	133	318	74	89	361	140	156	229	126	111	266	103
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	20	20	20	20	20	20	20	20	20	20	20	20
Cap, veh/h	144	449	105	230	393	152	199	254	125	162	337	118
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	760	1243	289	840	1087	422	271	542	266	201	719	251
Grp Volume(v), veh/h	133	0	392	89	0	501	511	0	0	480	0	0
Grp Sat Flow(s),veh/h/ln	760	0	1532	840	0	1509	1079	0	0	1171	0	0
Q Serve(g_s), s	2.9	0.0	14.3	6.6	0.0	20.6	7.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	23.5	0.0	14.3	20.9	0.0	20.6	30.5	0.0	0.0	23.0	0.0	0.0
Prop In Lane	1.00		0.19	1.00		0.28	0.31		0.25	0.23		0.21
Lane Grp Cap(c), veh/h	144	0	554	230	0	546	579	0	0	617	0	0
V/C Ratio(X)	0.92	0.00	0.71	0.39	0.00	0.92	0.88	0.00	0.00	0.78	0.00	0.00
Avail Cap(c_a), veh/h	144	0	554	230	0	546	579	0	0	617	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	32.1	0.0	17.8	26.8	0.0	19.8	17.2	0.0	0.0	14.5	0.0	0.0
Incr Delay (d2), s/veh	52.0	0.0	4.1	1.1	0.0	20.7	17.6	0.0	0.0	9.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	6.6	1.6	0.0	11.6	11.9	0.0	0.0	9.1	0.0	0.0
LnGrp Delay(d),s/veh	84.1	0.0	21.9	27.8	0.0	40.5	34.8	0.0	0.0	23.9	0.0	0.0
LnGrp LOS	F		C	C		D	C			C		
Approach Vol, veh/h		525			590			511			480	
Approach Delay, s/veh		37.7			38.6			34.8			23.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		36.0		29.0		36.0		29.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		30.5		23.5		30.5		23.5
Max Q Clear Time (g_c+I1), s		32.5		25.5		25.0		22.9
Green Ext Time (p_c), s		0.0		0.0		2.8		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	34.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	15	57	35	20	45
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	11	17	63	39	22	50

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	201	113	0	0	126	0
Stage 1	107	-	-	-	-	-
Stage 2	94	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	749	893	-	-	1356	-
Stage 1	874	-	-	-	-	-
Stage 2	886	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	722	871	-	-	1349	-
Mov Cap-2 Maneuver	722	-	-	-	-	-
Stage 1	857	-	-	-	-	-
Stage 2	871	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	2.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	805	1349	-
HCM Lane V/C Ratio	-	-	0.035	0.016	-
HCM Control Delay (s)	-	-	9.6	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	6.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	26	35	5	15	51	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	29	39	6	17	57	18

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	145	14	0	0	22	0
Stage 1	14	-	-	-	-	-
Stage 2	131	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	807	1016	-	-	1484	-
Stage 1	964	-	-	-	-	-
Stage 2	853	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	776	1016	-	-	1484	-
Mov Cap-2 Maneuver	776	-	-	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	820	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	5.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	776	1016	1484	-
HCM Lane V/C Ratio	-	-	0.037	0.038	0.038	-
HCM Control Delay (s)	-	-	9.8	8.7	7.5	0
HCM Lane LOS	-	-	A	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0.1	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	11	16	61	38	22	48
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	12	18	68	42	24	53

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	215	119	0	0	134	0
Stage 1	113	-	-	-	-	-
Stage 2	102	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	735	886	-	-	1347	-
Stage 1	869	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	707	864	-	-	1340	-
Mov Cap-2 Maneuver	707	-	-	-	-	-
Stage 1	852	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	2.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	792	1340	-
HCM Lane V/C Ratio	-	-	0.038	0.018	-
HCM Control Delay (s)	-	-	9.7	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	6.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	28	38	6	16	55	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	31	42	7	18	61	19

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	157	16	0	0	24	0
Stage 1	16	-	-	-	-	-
Stage 2	141	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	794	1013	-	-	1482	-
Stage 1	962	-	-	-	-	-
Stage 2	844	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	761	1013	-	-	1482	-
Mov Cap-2 Maneuver	761	-	-	-	-	-
Stage 1	962	-	-	-	-	-
Stage 2	809	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	5.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	761	1013	1482	-
HCM Lane V/C Ratio	-	-	0.041	0.042	0.041	-
HCM Control Delay (s)	-	-	9.9	8.7	7.5	0
HCM Lane LOS	-	-	A	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	7	12	77	26	14	60
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	8	13	86	29	16	67

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	222	130	0	0	138	0
Stage 1	124	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	728	874	-	-	1342	-
Stage 1	859	-	-	-	-	-
Stage 2	883	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	705	852	-	-	1335	-
Mov Cap-2 Maneuver	705	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	872	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	791	1335	-
HCM Lane V/C Ratio	-	-	0.027	0.012	-
HCM Control Delay (s)	-	-	9.7	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	14	34	8	0	13	39	20	0	17	21	16
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20	2	20	20	20	2	20	20	20
Mvmt Flow	0	16	38	9	0	14	43	22	0	19	23	18
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	8.2	8.3	8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	31%	25%	100%	0%	34%
Vol Thru, %	39%	61%	0%	66%	51%
Vol Right, %	30%	14%	0%	34%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	54	56	13	59	73
LT Vol	17	14	13	0	25
Through Vol	21	34	0	39	37
RT Vol	16	8	0	20	11
Lane Flow Rate	60	62	14	66	81
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.076	0.082	0.023	0.091	0.105
Departure Headway (Hd)	4.583	4.748	5.738	4.998	4.65
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	785	757	626	720	774
Service Time	2.593	2.759	3.449	2.709	2.659
HCM Lane V/C Ratio	0.076	0.082	0.022	0.092	0.105
HCM Control Delay	8	8.2	8.6	8.2	8.2
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.3	0.1	0.3	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	25	37	11
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20
Mvmt Flow	0	28	41	12
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	19	27	102	64	37	81
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	21	30	113	71	41	90

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	345	179	0	0	208	0
Stage 1	173	-	-	-	-	-
Stage 2	172	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	617	820	-	-	1263	-
Stage 1	815	-	-	-	-	-
Stage 2	816	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	584	800	-	-	1257	-
Mov Cap-2 Maneuver	584	-	-	-	-	-
Stage 1	799	-	-	-	-	-
Stage 2	788	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	2.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	694	1257	-
HCM Lane V/C Ratio	-	-	0.074	0.033	-
HCM Control Delay (s)	-	-	10.6	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	47	64	11	27	92	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	150	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	52	71	12	30	102	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	264	27	0	0	42	0
Stage 1	27	-	-	-	-	-
Stage 2	237	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	688	999	-	-	1459	-
Stage 1	951	-	-	-	-	-
Stage 2	762	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	639	999	-	-	1459	-
Mov Cap-2 Maneuver	639	-	-	-	-	-
Stage 1	951	-	-	-	-	-
Stage 2	708	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	5.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	639	999	1459	-
HCM Lane V/C Ratio	-	-	0.082	0.071	0.07	-
HCM Control Delay (s)	-	-	11.1	8.9	7.7	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	0.2	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	29	49	310	105	57	242
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	32	54	344	117	63	269

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	823	433	0	0	485	0
Stage 1	427	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	320	586	-	-	991	-
Stage 1	621	-	-	-	-	-
Stage 2	642	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	290	571	-	-	986	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	594	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.8	0	1.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	420	986	-
HCM Lane V/C Ratio	-	-	0.206	0.064	-
HCM Control Delay (s)	-	-	15.8	8.9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Intersection Delay, s/veh	76.3
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	93	226	54	0	87	259	133	0	113	140	107
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20	2	20	20	20	2	20	20	20
Mvmt Flow	0	103	251	60	0	97	288	148	0	126	156	119
Number of Lanes	0	0	1	0	0	1	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	80.1	67.7	79.3
HCM LOS	F	F	F

Lane	NBLn1	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	31%	25%	100%	0%	34%
Vol Thru, %	39%	61%	0%	66%	51%
Vol Right, %	30%	14%	0%	34%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	360	373	87	392	485
LT Vol	113	93	87	0	166
Through Vol	140	226	0	259	246
RT Vol	107	54	0	133	73
Lane Flow Rate	400	414	97	436	539
Geometry Grp	2	5	7	7	2
Degree of Util (X)	1	1	0.281	1	1
Departure Headway (Hd)	9.819	9.925	10.479	9.741	9.841
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	372	365	343	375	372
Service Time	7.819	7.997	8.237	7.5	7.912
HCM Lane V/C Ratio	1.075	1.134	0.283	1.163	1.449
HCM Control Delay	79.3	80.1	17.3	78.9	79.7
HCM Lane LOS	F	F	C	F	F
HCM 95th-tile Q	11.7	11.6	1.1	11.7	11.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	166	246	73
Peak Hour Factor	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	20	20	20
Mvmt Flow	0	184	273	81
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	79.7
HCM LOS	F

Lane

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	29	49	310	105	57	242
Conflicting Peds, #/hr	0	24	0	0	6	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	32	54	344	117	63	269

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	629	202	0	0	368	0
Stage 1	368	-	-	-	-	-
Stage 2	261	-	-	-	-	-
Critical Hdwy	7.2	7.3	-	-	4.5	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	-	-	2.4	-
Pot Cap-1 Maneuver	375	752	-	-	1068	-
Stage 1	620	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	342	733	-	-	1063	-
Mov Cap-2 Maneuver	342	-	-	-	-	-
Stage 1	608	-	-	-	-	-
Stage 2	658	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.6	0	1.8
HCM LOS	B		

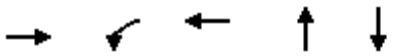
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	342	733	1063	-
HCM Lane V/C Ratio	-	-	0.094	0.074	0.06	-
HCM Control Delay (s)	-	-	16.6	10.3	8.6	0.2
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2	0.2	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	226	54	87	259	133	113	140	107	166	246	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1583	1583	1900	1583	1583	1900	1900	1583	1900	1900	1583	1900
Adj Flow Rate, veh/h	103	251	60	97	288	148	126	156	119	184	273	81
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	20	20	20	20	20	20	20	20	20	20	20	20
Cap, veh/h	155	409	98	256	326	168	217	250	166	252	329	90
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	806	1236	295	904	987	507	289	500	333	356	658	180
Grp Volume(v), veh/h	103	0	311	97	0	436	401	0	0	538	0	0
Grp Sat Flow(s),veh/h/ln	806	0	1531	904	0	1494	1122	0	0	1194	0	0
Q Serve(g_s), s	3.6	0.0	11.1	6.6	0.0	17.9	0.0	0.0	0.0	9.7	0.0	0.0
Cycle Q Clear(g_c), s	21.5	0.0	11.1	17.6	0.0	17.9	17.5	0.0	0.0	27.1	0.0	0.0
Prop In Lane	1.00		0.19	1.00		0.34	0.31		0.30	0.34		0.15
Lane Grp Cap(c), veh/h	155	0	506	256	0	494	634	0	0	671	0	0
V/C Ratio(X)	0.66	0.00	0.61	0.38	0.00	0.88	0.63	0.00	0.00	0.80	0.00	0.00
Avail Cap(c_a), veh/h	155	0	506	256	0	494	634	0	0	671	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.7	0.0	18.3	25.7	0.0	20.6	12.0	0.0	0.0	14.8	0.0	0.0
Incr Delay (d2), s/veh	10.2	0.0	2.2	0.9	0.0	16.9	4.8	0.0	0.0	9.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	5.0	1.7	0.0	9.7	6.3	0.0	0.0	10.5	0.0	0.0
LnGrp Delay(d),s/veh	41.9	0.0	20.5	26.6	0.0	37.5	16.7	0.0	0.0	24.6	0.0	0.0
LnGrp LOS	D		C	C		D	B			C		
Approach Vol, veh/h		414			533			401			538	
Approach Delay, s/veh		25.8			35.5			16.7			24.6	
Approach LOS		C			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		38.0		27.0		38.0		27.0
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s		32.5		21.5		32.5		21.5
Max Q Clear Time (g_c+I1), s		19.5		23.5		29.1		19.9
Green Ext Time (p_c), s		4.8		0.0		1.8		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Queue Length Reports



Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	486	36	451	222	239
v/c Ratio	0.75	0.11	0.65	0.48	0.56
Control Delay	19.2	7.7	14.6	8.8	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	7.7	14.6	8.8	12.0
Queue Length 50th (ft)	57	3	50	16	23
Queue Length 95th (ft)	#225	17	#193	50	63
Internal Link Dist (ft)	1450		1779	2327	3563
Turn Bay Length (ft)		150			
Base Capacity (vph)	757	395	803	698	657
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.64	0.09	0.56	0.32	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection: 1: South Loop Ext/S Airport Rd & Rainer Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	48	49
Average Queue (ft)	24	18
95th Queue (ft)	49	55
Link Distance (ft)	4716	2172
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Port Rd & South Loop Ext/South Loop Dr

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	158	49	153	160	90
Average Queue (ft)	84	30	104	95	47
95th Queue (ft)	155	60	168	156	101
Link Distance (ft)	1501		1830	2373	3608
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		150			
Storage Blk Time (%)			1		
Queuing Penalty (veh)			0		

Network Summary

Network wide Queuing Penalty: 0

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	54	580	47	586	290	314
v/c Ratio	0.30	0.83	0.26	0.84	0.53	0.65
Control Delay	12.9	23.1	11.6	23.9	12.6	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	23.1	11.6	23.9	12.6	20.8
Queue Length 50th (ft)	9	121	7	124	40	61
Queue Length 95th (ft)	29	#273	25	#279	106	#177
Internal Link Dist (ft)		1450		1779	2327	3563
Turn Bay Length (ft)	150		150			
Base Capacity (vph)	202	787	206	787	550	481
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.74	0.23	0.74	0.53	0.65

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection: 1: South Loop Ext/S Airoirt Rd & Rainer Rd

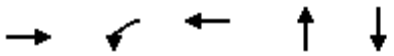
Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	49	22
Average Queue (ft)	33	4
95th Queue (ft)	50	19
Link Distance (ft)	4704	2173
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Port Rd & South Loop Ext/South Loop Dr

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	31	176	67	237	131	236
Average Queue (ft)	24	117	25	162	77	119
95th Queue (ft)	43	184	66	241	140	246
Link Distance (ft)		1502		1830	2372	3608
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	150		150			
Storage Blk Time (%)		2		4		
Queuing Penalty (veh)		1		2		

Network Summary

Network wide Queuing Penalty: 3



Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	447	53	397	27	182
v/c Ratio	0.67	0.14	0.57	0.08	0.43
Control Delay	13.6	6.5	10.0	8.5	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	6.5	10.0	8.5	9.4
Queue Length 50th (ft)	41	4	34	3	13
Queue Length 95th (ft)	#166	18	104	13	44
Internal Link Dist (ft)	1450		1779	2327	3563
Turn Bay Length (ft)		150			
Base Capacity (vph)	839	483	884	695	781
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.11	0.45	0.04	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection: 1: South Loop Ext/S Airport Rd & Rainer Rd

Movement	WB
Directions Served	LR
Maximum Queue (ft)	48
Average Queue (ft)	28
95th Queue (ft)	44
Link Distance (ft)	4716
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Port Rd & South Loop Ext/South Loop Dr

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	L	TR	LTR	LTR
Maximum Queue (ft)	91	30	98	49	71
Average Queue (ft)	76	23	50	19	52
95th Queue (ft)	90	42	106	50	68
Link Distance (ft)	1501		1830	2373	3608
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		150			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 0

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	48	534	70	516	35	238
v/c Ratio	0.17	0.73	0.26	0.70	0.10	0.54
Control Delay	8.0	15.5	9.4	14.4	10.0	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	15.5	9.4	14.4	10.0	12.4
Queue Length 50th (ft)	4	63	7	60	4	23
Queue Length 95th (ft)	22	#237	31	#200	19	72
Internal Link Dist (ft)		1450		1779	2327	3563
Turn Bay Length (ft)	150		150			
Base Capacity (vph)	391	1022	375	1023	606	702
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.52	0.19	0.50	0.06	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection: 1: South Loop Ext/S Airport rd & Rainer Rd

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	23	43
Average Queue (ft)	9	9
95th Queue (ft)	26	37
Link Distance (ft)	4704	2173
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Port Rd & South Loop Ext./South Loop Dr

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	53	116	54	94	49	92
Average Queue (ft)	23	70	31	64	32	40
95th Queue (ft)	56	132	65	93	51	83
Link Distance (ft)		1502		1830	2372	3608
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	150		150			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 0

Appendix B – Alternatives Considered and Dismissed

Alternatives Considered and Dismissed

Multiple build alternatives were initially considered, with several alternatives eventually determined to be unfeasible or not prudent, and are summarized below. Agency correspondence provided in **Appendix B** includes documentation supporting the alternative dismissals.

Alternative B

Alternative B would consist of constructing two 12-foot wide travel lanes with 8-foot wide paved shoulders along an approximate 2.9 mile long, east to west intermodal connector route between existing South Loop Drive and South Airport Road. Implementing Alternative B by constructing a roadway to the north of Drainage Ditch number 20 was not considered a viable alternative due to the alternative not providing access to a large inaccessible area to the south of Drainage Ditch number 20, as well as increased impacts to wetlands. The cost of utility relocation would not be feasible for this alternative. In addition, the alternative splits multiple land owners' properties, thus devaluing their property value. Furthermore, Alternative B would need additional bridges to be constructed to access areas south of Drainage Ditch number 20, which would increase construction costs and make it more difficult to provide economic growth to the surrounding industrial zoned areas.

Access is already provided to the area north of Drainage Ditch number 20 via Rainer Road. There are currently no public roads that access properties to the south of Drainage Ditch number 20. The only road giving access to these properties to the south of Drainage Ditch number 20 is a private gravel road and a bridge that is in poor condition and in need of rehabilitation. Furthermore, Alternative B would require the construction of additional bridges. Additional bridge constructions would be costly and would incur greater impact on wetlands located along Drainage Ditch number 20. In addition, according to the USFWS National Wetlands Inventory and on-site observations, there is a palustrine forested wetland located along the northeastern portion of Drainage Ditch number 20 within the Project area. A build alternative north of Drainage Ditch number 20 would impact this area of wetlands substantially and would need to be mitigated to offset impacts. While one public comment received was in support of Alternative B by a non-landowner along the alternative alignment, multiple landowners voiced their concerns over the splitting and devaluing of their property by the implementation of Alternative B. Furthermore, the comment in support of Alternative B equally applies to the preferred Alternative C. Implementing Alternative B would also require the relocation of a major petroleum pipeline currently located on the north side of Drainage Ditch number 20. Alternative B does not fit the purpose and need of this Project and will not provide access to areas which are zoned industrial where economic growth is anticipated to occur. Due to the reasons discussed above, this alternative was removed from consideration.

FIGURE 1. ALTERNATIVE B

Alternative D

Alternative D would consist of constructing two 12-foot wide travel lanes with 8-foot wide paved shoulders along an approximate 2.8 mile long, east to west intermodal connector route between existing South Loop Drive and South Airport Road. This alternative would provide access to a large inaccessible area to the south of Drainage Ditch number 20 and would have less impacts to wetlands in the area. The cost of utility relocation would be substantially reduced and this alternative would avoid splitting and reducing the value of multiple land owner's properties. It also limits the need for additional bridges to be constructed to access areas south of Drainage Ditch number 20, and has the opportunity to provide economic growth to the surrounding industrial zoned areas. However, Alternative D crosses a railroad grade at a 45 degree angle. Pursuant to the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), crossing a railroad grade at this angle is deemed unsafe and is considered highly undesirable by the owner of the rail line as well as ARDOT. Due to safety concerns associated with Alternative D crossing a railroad line at a 45 degree angle, this alternative was removed from consideration.

Figure 2. ALTERNATIVE D

Alternative E

Alternative E would consist of constructing two 12-foot wide travel lanes with 8- foot wide paved shoulders along an approximate 3.0 mile long, east to west intermodal connector route between existing South Loop Drive and South Airport Road. This alternative would provide access to a large inaccessible area to the south of Drainage Ditch number 20 and would have less impacts to wetlands in the area. The cost of utility relocation would also be substantially reduced. This alternative would limit the need for additional bridges to be constructed to access areas south of Drainage Ditch number 20, as well as provide the opportunity for economic growth to the surrounding industrial zoned areas. However, Alternative E crosses three consecutive railroad lines. Pursuant to the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), the crossing of three consecutive railroad lines is deemed unsafe and not recommend by the railroad line owner as well as ARDOT. Furthermore, Alternative E splits a large tract of agricultural land owned by Bollinger Brothers Inc. in half, thus making this prime farmland less functional. Comments received from Bollinger Brothers Inc. are in favor of Alternative C, although it still transverses their property but does not impact the land currently being farmed with corn and soybeans. Due to railroad safety concerns and no public support, Alternative E has been removed from consideration.

Figure 3. ALTERNATIVE E

Appendix C – Correspondence with Agencies

Arkansas Department of Health

4815 West Markham Street • Little Rock, Arkansas 72205-3867 • Telephone (501) 661-2000
Governor Asa Hutchinson
Nathaniel Smith, MD, MPH, Director and State Health Officer

Engineering Section, Slot 37 Ph 501-661-2623 Fax 501-661-2032
www.Healthy.Arkansas.gov/eng/ After Hours Emergency 501-661-2136

August 9, 2018

Lauren McWhorter
Pickering Firm, Inc.
317 South Church Street
Jonesboro, Arkansas 72401

RE: South Loop Drive Extension
West Memphis, Arkansas

Dear Ms. McWhorter,

The proposed roadway alternatives are not in the vicinity of the 6 wells that supply water for the city of West Memphis. The construction of the road extension should not affect water quality of the wells.

If you have any questions or comments, please coordinate them through Jake Chatman at 501-661-2892 or jake.chatman@arkansas.gov.

Sincerely,

Jake Chatman, E.I.
District 4 Engineer
ADH Engineering Section

GAG:jtc

cc: West Memphis Waterworks

Lauren McWhorter

From: Clark, David <CLARKD@adeq.state.ar.us>
Sent: Monday, August 06, 2018 2:36 PM
To: Lauren McWhorter
Cc: Spencer, Stuart; Montgomery, William
Subject: RE: South Loop Extension Project

Ms. McWhorter,
Thank you for your letter. We recognize that this project was included in the adopted 2019-2022 TIP and is included in the WMATS/MPO Policy Committee-approved (July 2018) *Imagine 2040 Metropolitan Transportation Plan* and therefore, meeting conformity to ADEQ's ozone State Implementation Plan/Re-designation Maintenance Plan for Crittenden County, AR. If we can assist you in the future, do not hesitate to contact Stuart Spencer, Will Montgomery or myself.

David

David W. Clark, M.S.
Technical Section Supervisor, Policy & Planning Branch
Office of Air Quality
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR. 72118
U.S.A.
Voice: 501 682-0070
Fax: 501 682-0753

From: Spencer, Stuart
Sent: Thursday, August 02, 2018 1:48 PM
To: Montgomery, William; Clark, David
Subject: FW: South Loop Extension Project

Let's talk about this.

From: Lauren McWhorter [mailto:lmcwhorter@pickeringfirm.com]
Sent: Thursday, August 02, 2018 1:32 PM
To: Spencer, Stuart
Subject: South Loop Extension Project

Hello Mr. Spencer,

Please see the attached letter about the South Loop Extension Project in West Memphis, AR.

Thank you,

Lauren McWhorter
Natural Resources Scientist

ADEQ
ARKANSAS
Department of Environmental Quality

August 7, 2018

Lauren McWhorter
Pickering Firm, Inc.
317 South Church St.
Jonesboro, AR 72401

RE: Environmental Assessment Comments for Proposed South Loop Drive extension in Crittenden County, Arkansas

Dear Lauren:

The Office of Water Quality at the Arkansas Department of Environmental Quality (ADEQ) has completed its review of the above request and has the following comments:

Based on the map that was provided, it appears that the project may cross or impact Ditch #20 and other unnamed waterbodies, during the course of this project. The applicant should contact ADEQ to obtain a Short Term Activity Authorization (STAA) from the Office of Water Quality. The STAA allows for a one-time exceedance of the water quality standards for an activity that is "essential to the protection or promotion of the public interest and where no permanent or long-term impairment of beneficial uses is likely to result (Reg. 2.305, Regulation No. 2, ADEQ)."

In addition, the applicant must also comply with all provisions of the NPDES General Stormwater Construction Permit and submit a Pollution Prevention Plan to the Office of Water Quality of ADEQ. This information can be obtained by contacting ADEQ at 501 682-0621. Section 404 permitting maybe required if any of the proposed project areas are considered to be jurisdictional by the U.S. Army Corp of Engineers, Memphis District.

Sincerely,

Mary Barnett
Ecologist Coordinator
Office of Water Quality, ADEQ

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Stuart Spencer
Air Quality, Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: Air Quality Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Spencer:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding air quality impacts within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist
Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Charles Johnson
Hazardous Waste, Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: Hazardous Waste Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Johnson:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding the presence of hazardous materials and waste within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Caleb Osborne
Water Quality, Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: Water Quality Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Osborne:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding water quality impacts within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 3, 2018

Wade Hamilton, District Conservationist
Marion Field Service Center, Team 8
1 National Resource Drive
Marion, AR 72364-2059

RE: Farmland Impact Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Hamilton:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus. The right of way will be 135ft for this project. According to the most recent zoning map of West Memphis, AR, the majority of the project area is zoned General Industrial District: Container Storage Yard/Intermodal with the eastern portion of the project is contained within the Extraterritorial zone.

We are seeking your comments and concurrence regarding negative impacts to farmland within the proposed study area. Please find enclosed an aerial map of the study area map and a West Memphis zoning map to aid in your review.

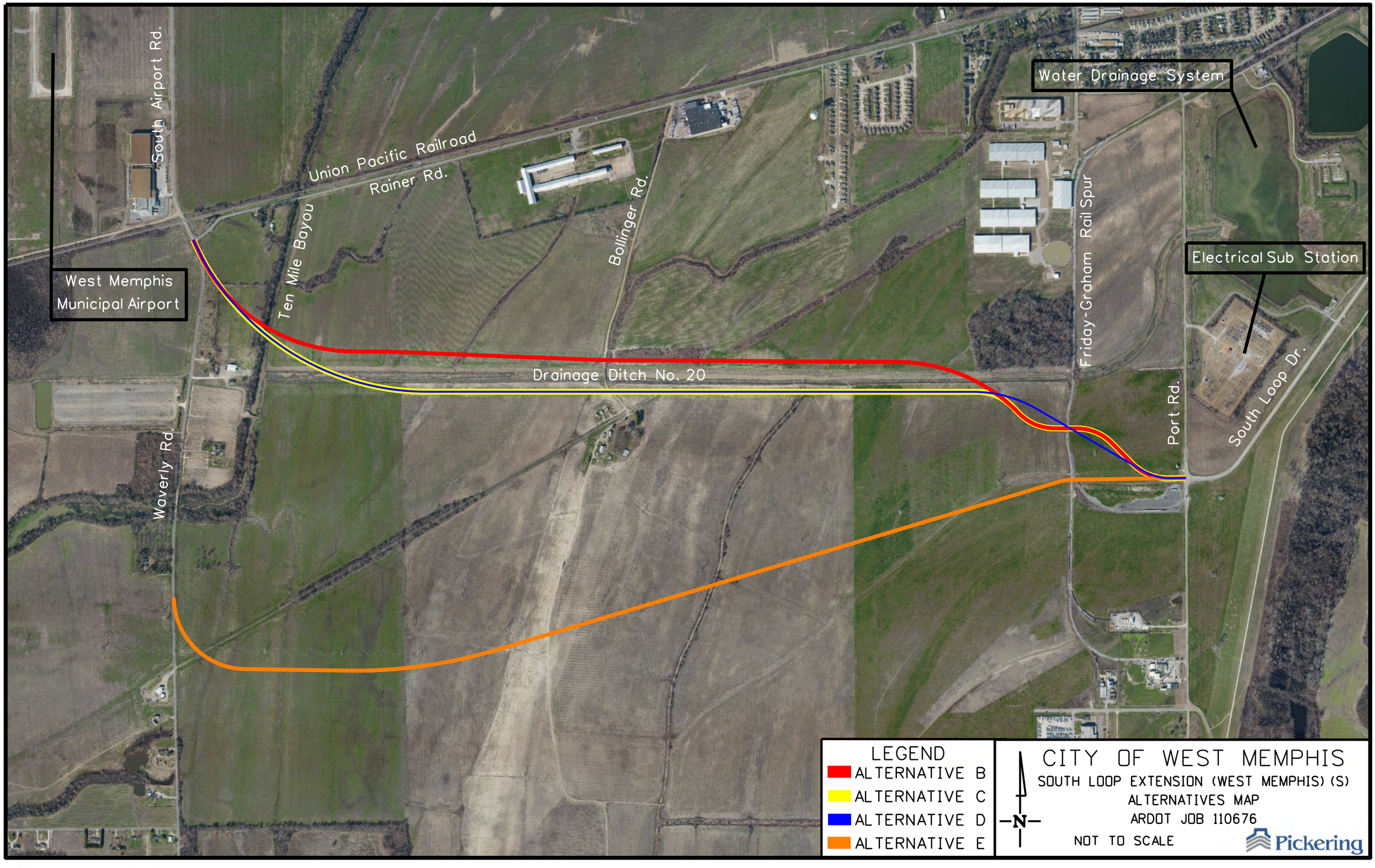
If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:

-Proposed Alternatives on Aerial Photograph
-West Memphis Zoning Map
-Farmland Conversion Impact Rating form


South Airport Rd.
Union Pacific Railroad
Rainer Rd.
Ten Mile Bayou
Bollinger Rd.
Water Drainage System
Friday-Graham Rail Spur
Electrical Sub Station
West Memphis
Municipal Airport
Drainage Ditch No. 20
Waverly Rd.
Port Rd.
South Loop Dr.
LEGEND
ALTERNATIVE B
ALTERNATIVE C
ALTERNATIVE D
ALTERNATIVE E
N
CITY OF WEST MEMPHIS
SOUTH LOOP EXTENSION (WEST MEMPHIS) (S)
ALTERNATIVES MAP
ARDOT JOB 110676
NOT TO SCALE
Pickering

Legend

Lots

BROADWAY OVERLAY DISTRICTS

- BW-1
- BW-2

ZONING DISTRICTS

- C-1 *GENERAL BUSINESS DISTRICT*
- C-1-F *GENERAL COMMERCIAL DISTRICT: FIREWORKS*
- C-2 *OPEN DISPLAY COMMERCIAL DISTRICT*
- C-2-E *C-2 EXTRATERRITORIAL*
- CV *CONSERVATION ZONING DISTRICT*
- CV-E *CV EXTRATERRITORIAL*
- I-1 *LIMITED INDUSTRIAL DISTRICT*
- I-1-C *LIMITED INDUSTRIAL DISTRICT: CONTAINER STORAGE YARD/INTERMODAL*
- I-1-E *I-1 EXTRATERRITORIAL*
- I-2 *GENERAL INDUSTRIAL DISTRICT*
- I-2-C *GENERAL INDUSTRIAL DISTRICT: CONTAINER STORAGE YARD/INTERMODAL*
- I-1-C-E *I-1-C EXTRATERRITORIAL*
- I-2-C-E *I-2-C EXTRATERRITORIAL*
- O-1 *OFFICE DISTRICT*
- PBP *PLANNED BUSINESS PARK*
- PBP-E *PBP EXTRATERRITORIAL*
- PUD *PLANNED UNIT DEVELOPMENT DISTRICT*
- R-E *RESIDENTIAL DISTRICT: EXCEPTION*
- R-1 *SINGLE FAMILY RESIDENTIAL DISTRICT*
- R-1-E *R-1 EXTRATERRITORIAL*
- R-2 *LOW DENSITY RESIDENTIAL DISTRICT*
- R-3 *MOBILE HOME DISTRICT*
- R-4 *MEDIUM DENSITY RESIDENTIAL DISTRICT*
- R-4-E *R-4 EXTRATERRITORIAL*

City of West Memphis, Arkansas

N W E S

1,000 0 1,000 2,000 3,000 4,000 Feet

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 8/3/2018		
Name of Project South Loop Extension Project	Federal Agency Involved FHWA		
Proposed Land Use Extension Roadway Project	County and State Crittenden County, Arkansas		
PART II *(To be completed by NRCS)*	Date Request Received By NRCS	Person Completing Form:	
Does the site contain Prime, Unique, Statewide or Local Important Farmland? YES ☐ NO ☐ *(If no, the FPPA does not apply - do not complete additional parts of this form)*		Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: %	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Alternative B	Alternative C	Alternative D	Alternative E
A. Total Acres To Be Converted Directly	39.27	39.27	39.27	47.45
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	39.27	39.27	39.27	47.45
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide Important or Local Important Farmland				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Alternative B	Alternative C	Alternative D	Alternative E
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	0	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: Pickering Firm, Inc. | Date: 8/3/2018

(See Instructions on reverse side) **Form AD-1006 (03-02)**

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Lance Jones
Engineering Section, Arkansas Department of Health
4815 West Markham
Little Rock, AR 72205-3867

RE: Water Quality Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Jones:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding water quality impacts within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Jennifer Sheehan
Arkansas Game and Fish Commission

RE: Wetland and Threatened and Endangered Species Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Ms. Sheehan:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to wetlands and threatened and endangered species within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Roger Allan
Regulatory Department, United States Army Corps of Engineers
167 N. Main Street Room B-202
Memphis, TN 38103-1894

RE: Water Resources and Wetland Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Allan:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to water resources and wetlands within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Lieutenant Ryan Thomas
United States Coast Guard

RE: Mississippi River Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Lt Thomas:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to the Mississippi River within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Robert Houston, Chief Special Projects Section
Compliance Assurance and Enforcement Division
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202

RE: Water Resources, Wetlands, and Environmental Justice Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Houston:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to water resources, wetlands, and environmental justice within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Melvin Tobin
U.S. Fish and Wildlife Service
110 South Amity Suite 300
Conway, AR 72032-8975

RE: Threatened and Endangered Species Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Tobin:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to threatened and endangered species within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Pickering
Service and Good Work...
Our Foundation, Our Future
Since 1946

August 2, 2018

Scott Blackburn, Supervisor of Environmental Protection
Midwest Region, National Park Service
601 Riverfront Drive
Omaha, NE 68102-4226

RE: National Park Review
South Loop Extension
City of West Memphis
Crittenden County, AR

Dear Mr. Blackburn:

The City of West Memphis has proposed the constructing an extension of existing South Loop Drive, which will connect Port Road to Airport Road. Pickering has begun the National Environmental Policy Act (NEPA) evaluation process in support of this new roadway, the South Loop Extension Project, in the City of West Memphis in Crittenden County, Arkansas. This new road would relieve congestion on other roadways by providing an alternative route around the city and diverting industrial vehicular traffic off inner-city streets.

The Project includes the construction of an approximate 2.4 mile roadway south of West Memphis, AR, with the majority of the project within the city limits. Currently four alterative alignments (Alternatives B, C, D and E) are being considered for this Project. Alternatives B, C and D begin at the intersection of Airport Road and Rainer Road and extend to the east terminating at the intersection of Port Road and existing South Loop Drive. All alternatives will cross an existing railroad spur located near the eastern portion of the Project and terminate on Port Road at the intersection with existing South Loop Drive. Alternative A is a no-build option which is required to be studied in accordance with NEPA. Alternative B runs adjacent to and north of drainage ditch #20, with an S-curve near the eastern terminus. Alternative C runs adjacent to and south of drainage ditch #20, with an S-curve near the eastern terminus. Alternative D runs the same path as alternative C with a single curve at the eastern terminus. Alternative E begins at Waverly Road approximately 0.8 mile to the south of the Airport Road-Rainer Road intersection and extends across cultivated-agricultural land, with a single curve at the eastern terminus.

We are seeking your comments and concurrence regarding negative impacts to National Parks within the proposed study area. Please find enclosed an aerial map of the study area map to aid in your review.

If you need additional information, you may contact me by phone at (601) 956-3663 or by email at lmcwhorter@pickeringfirm.com.

Sincerely,
PICKERING FIRM, INC.

Lauren McWhorter
Natural Resources Scientist

Enclosure:
-Proposed Alternatives on Aerial Photograph

Appendix D – Public Involvement Records

LOCATION PUBLIC HEARING SYNOPSIS

Job Number 110676
South Loop Extension- Port Road to South Airport Road
Crittenden County
Tuesday, September 25, 2018

A Location Public Involvement Meeting for the proposed project was held on Tuesday, September 25, 2018 at the West Memphis Civic Center (East Room) in West Memphis. The Public Meeting was held from 4:00 – 7:00 p.m. Efforts to involve minorities and the public in the Public Meeting included:

- A public service announcement advertised twice daily on The *Delta Force 3 Radio Network* on Friday, September 21, 2018 thru Tuesday September 25, 2018.
- A public service announcement advertised twice daily on The *Radio Ambiente 1030AM* on Friday, September 21, 2018 thru Tuesday September 25, 2018.
- Display advertisements placed in the *Evening Times* on Wednesday, September 19 and Monday, September 24, 2018.
- Distribution of two sets of flyers in the project area.

The following information was available at the meetings for review and comment:

- Aerial-based map displays showing the project alternatives (scale: 1 centimeter = 160 meters).
- Topographic map displays showing the project alternatives (scale: 1 centimeter = 160 meters).

Handouts for the Public Meeting included an informational packet describing the project alternatives; a comment form; and a small-scale (1 inch = 12,000 feet) project map. Copies of the handouts are attached to this synopsis.

Tables 1 summarize meeting participation.

TABLE 1

Public Meeting	Totals
Meeting Attendance (including ArDOT & Pickering staff)	27
Comment Forms received	5

Table 2 totals the alternative preferences indicated in the comments. Not all of the comments identified a distinct preference.

TABLE 2	
Alternative Preference	**Totals**
No Action- Alternative A	0
Alternative B	1
Alternative C	4
Alternative D	0
Alternative E	0

Pickering Firm, INC. staff reviewed and evaluated all comments received. The summary below reflects the personal perception or opinion of the person or organization making the comment(s). The order in which the comments are listed is random and does not reflect importance or the number of times the comment was made. Some of the comments were combined and/or paraphrased to simplify this synopsis.

Comments supporting Alternative B included:

- Most direct route

Comments supporting Alternative C included:

- Major assets for economic development
- Better route for traffic
- Does not split property
- Limited effect on BBI farmland
- Allows for quality access to properties south of ditch #20

General comments included:

- Concerns over any alternative that limits access to properties.
- Ensure permanent fencing along any new road construction.
- Property will be split in half by alternatives north of ditch #20 and decrease property value
- Road construction to be completed as soon as possible
- Needed route for truck traffic to grain port.

Attachments:

Public Hearing Information Packet
Blank Comment Form
Small-Scale Project Location Map

Frequently Asked Questions

- **What is an Environmental Assessment (EA)?**

An Environmental Assessment identifies the potential environmental impacts of a project, to disclose those impacts, and use the information gathered to guide planners, engineers, and local officials in determining the best location and design alternatives for the road.

Issues addressed in an Environmental Assessment include:

- Comparison of various alignments, including public input
- Traffic patterns and projections
- Analysis of impacts to properties along the project area
- Noise and Land Use assessments and impacts
- Ecological impacts such as endangered species and wetland
- Cultural resources and hazardous materials analysis
- Visual aesthetics of centerline adjustment and widening
- Identifying "best scenario" alternative

PROPOSED ALTERNATIVES

Alternative A – the No Build Option. Every NEPA project is required to study a "do nothing" option that outlines what would happen in the project area should the project NOT be undertaken.

All build alternatives begin at Airport Road and extend approximately two miles to the east connecting to Port Road. All alternatives will cross an existing railroad spur located near the eastern portion of the roadway. Four proposed build alternatives are being studied. Some alternatives to be eliminated following this meeting.

Alternative B – roadway adjacent to and north of drainage ditch #20 with S-curve near the eastern terminus.

Alternative C – roadway adjacent to and south of drainage ditch #20 with S-curve near the eastern terminus.

Alternative D – roadway adjacent to and south of drainage ditch #20 with one curve near the eastern terminus.

Alternative E – roadway located approximately half a mile south of drainage ditch #20, which crosses a three-spur junction near the eastern terminus.

Frequently Asked Questions (cont'd)

- **How can the public participate during an EA?**

Opportunities exist during an EA where members of the public can contribute. Location and Design Public Hearings will be held upon completion of the EA process and prior to issuing a Finding of No Significant Impact (FONSI). The FONSI will address public input resulting from the hearings. At all public participation stages, notices will be published in newspapers, inviting the comments on the development under review at that time.

- **How is the public notified about an EA?**

The proponent is required to publish a public notification when they have registered their undertaking for an EA. The notice must be published in one newspaper having general circulation in the locality in which the undertaking is to be located.

- **What is an NEPA?**

On January 1, 1970, the National Environmental Policy Act (NEPA) was signed into Law. NEPA established a national environmental policy intentionally focused on Federal activities and the desire for a sustainable environment balanced with other essential needs of present and future generations of Americans. The City of West Memphis is committed to the examination and avoidance of potential impacts to the social and natural environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, the City must also take into account the transportation needs of the public in reaching a decision that is in the best overall public interest. This project development process is an approach to balanced transportation decision making that takes into account the potential impacts on the human and natural environment and the public's need for safe and efficient transportation.

YOUR COMMENTS ARE IMPORTANT

We welcome your opinions. You can email your comments or fill out the comment sheet and mail to:

Pickering Firm, Inc.
ATTN: Mike Foster, P.E.
mfoster@pickeringfirm.com
870-336-0117
317 S. Church Street
Jonesboro, AR 72401

SOUTH LOOP EXTENSION

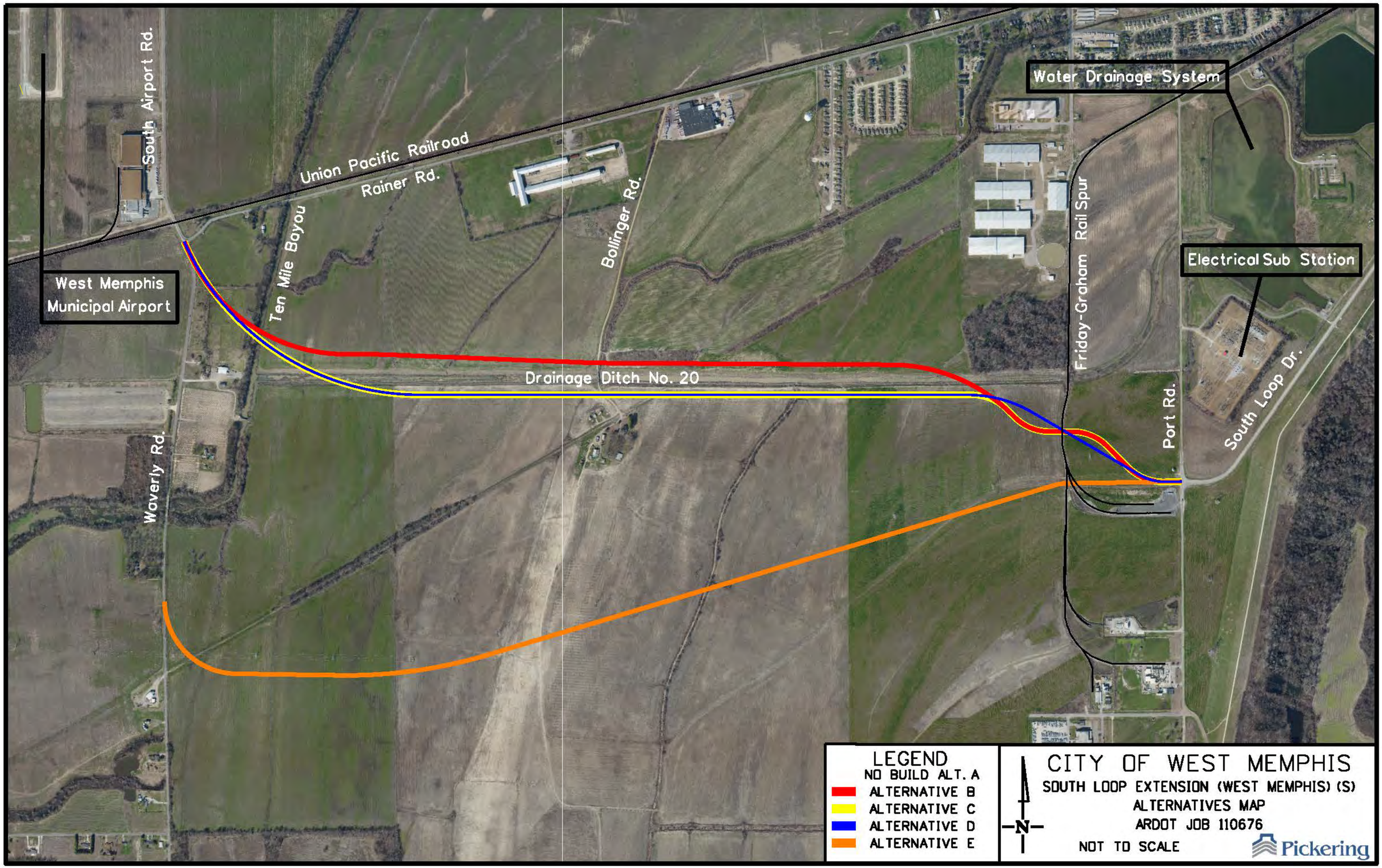
On behalf of the City of West Memphis, Welcome! Thank you for your interest in this project and your dedication to making this a better process! We are here tonight to let you know about a potential project the Council is considering and to listen to your comments and concerns before any decisions are made. The team of professionals and City leaders involved in this project are here tonight and we invite you to discuss any issues with us.

The Project we are discussing tonight is the first step in the process of extending South Loop Drive to the west connecting Port Road to Airport Road. This initial phase is an Environmental Assessment, which will address issues that could arise during the future phases of the project.

PROJECT PURPOSE AND NEED

The South Loop Extension would provide better distribution and provide more direct access of large vehicular traffic traveling to and from industrial areas and Interstates 40 and 55. An alternate route around the city would relieve congestion on existing roadways and keep heavy traffic out of residential areas in the heart of West Memphis, making these streets safer and more efficient.

Due to close vicinity to the Mississippi River, several publicly owned facilities, including the nearby airport, ports as well as agricultural and industrial facilities are located along Port Road and existing South Loop Drive. The City of West Memphis has planned to develop this area further with more publicly owned industrial and commercial areas. This new roadway would support future development and improve access to existing businesses. Overall, this project would enhance the quality of life and boost economic growth in this area.


South Airport Rd.
Union Pacific Railroad
Rainer Rd.
Ten Mile Bayou
Bollinger Rd.
Water Drainage System
Friday-Graham Rail Spur
Electrical Sub Station
West Memphis
Municipal Airport
Drainage Ditch No. 20
Waverly Rd.
Port Rd.
South Loop Dr.
LEGEND
NO BUILD ALT. A
ALTERNATIVE B
ALTERNATIVE C
ALTERNATIVE D
ALTERNATIVE E
CITY OF WEST MEMPHIS
SOUTH LOOP EXTENSION (WEST MEMPHIS) (S)
ALTERNATIVES MAP
ARDOT JOB 110676
NOT TO SCALE
N
Pickering

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name _____ Telephone _____

Address _____

City _____ State _____ ZIP _____

Which best describes your primary interest in the project?

- o **Affected**
- o **Concerned**
- o **Other _____**
- o **Resident**
- o **Business**
- o **Landowner**
- o **Other_____**

What are the major issues?

- o **Relocations**
- o **Wetlands**
- o **Wildlife**
- o **Traffic Volume**
- o **Other _____**
- o **Noise**
- o **Safety**
- o **Social**
- o **Economics**

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why: _____

_____

_____

_____

_____

_____

What comments and/or concerns do you have relating to the project: _____

_____

_____

_____

_____

_____

Recommendations for the project: _____

_____

_____

_____

_____

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

The City of West Memphis and Pickering are interested in your comments about the proposed project. On the reverse side, please indicate your comments and submit them at the Public Meeting or mail to the address below within 30 days of this Public Meeting.

Pickering Firm, Inc.
2001 Airport Road, Suite 201
Flowood, MS 39232

Place Stamp Here

PICKERING FIRM, INC.
Attn: Marcus Hope
2001 AIRPORT ROAD, SUITE 201
FLOWOOD, MS 39232

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name Ramona Taylor Telephone 870-636-2299

Address 124 Ross Ave

City West Memphis State AR ZIP 72301

Which best describes your primary interest in the project?

- ○ Affected
- ● Concerned
- ○ Other _____
- ○ Resident
- ○ Business
- ○ Landowner
- ● Other Council Member

What are the major issues?

- ○ Relocations
- ○ Wetlands
- ○ Wildlife
- ● Traffic Volume
- ○ Other _____
- ○ Noise
- ○ Safety
- ○ Social
- ● Economics

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why: yellow route

What comments and/or concerns do you have relating to the project: major asset for economic development

Recommendations for the project: bid + complete as one project

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

(Bollinger Bros, Inc)

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name Richard K. Bollinger Jr Telephone 901-628-6399

Address 221 W. Goodwyn St.

City Memphis State TN ZIP 38111

Which best describes your primary interest in the project?

- ✓ Affected
- ✓ Concerned
- ○ Other _____
- ○ Resident
- ○ Business
- ✓ Landowner
- ○ Other _____

What are the major issues?

- ○ Relocations
- ○ Wetlands
- ○ Wildlife
- ✓ Traffic Volume
- ○ Other _____
- ✓ Noise
- ✓ Safety
- ○ Social
- ✓ Economics

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why: Alternative C or Alternative D...as they have the same effect on BBI property.

What comments and/or concerns do you have relating to the project:
Concerns over any alternative that prohibits or limits access to BBI property. Also concerned about taking any farmland out of production or crop damage.

Recommendations for the project:
Ensure permanent fencing along any new road...while still allowing quality access to property. Also assurance that any property needed for purchase be priced at similar value to adjoining property to the east.

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name STEPHEN GARNER Telephone 870-733-8765

Address 9158 WHEELER Rd

City MARION State Ark ZIP 72364

Which best describes your primary interest in the project?

- ○ Affected
- ○ Concerned
- ○ Other _____
- ○ Resident
- ○ Business
- ● Landowner
- ○ Other _____

What are the major issues?

- ○ Relocations
- ○ Wetlands
- ○ Wildlife
- ○ Traffic Volume
- ○ Other _____
- ○ Noise
- ○ Safety
- ○ Social
- ○ Economics

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why: Alternative B most Direct

What comments and/or concerns do you have relating to the project: [redacted] Road connector from South Loop to Airport Roads to be done soon as Possible for Truck Traffic to Drain Ports

Recommendations for the project: Choose Alternative B

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name Thorton Ginn Telephone 870-732-1749

Address 2426 Rainer

City Proctor State AR ZIP 72376

Which best describes your primary interest in the project?

- ○ Affected
- ○ Concerned
- ○ Other _____
- ✓ Resident
- ○ Business
- ○ Landowner
- ○ Other _____

What are the major issues?

- ✓ Relocations
- ○ Wetlands
- ○ Wildlife
- ✓ Traffic Volume
- ○ Other _____
- ✓ Noise
- ○ Safety
- ○ Social
- ○ Economics

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why: _____

Prefer C so it doesn't split property

Better traffic Route

What comments and/or concerns do you have relating to the project: _____

Recommendations for the project: _____

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

Pickering

Public Meeting

COMMENT SHEET

September 25, 2018

PROJECT:

South Loop Extension
Port Rd. to S. Airport Rd
West Memphis, Arkansas

Name Patricia Waggener Telephone 870-732-1249

Address 2426 Palmer Rd

City Proctor State AR ZIP 72376

Which best describes your primary interest in the project?

- ○ Affected
- ○ Concerned
- ○ Other _____
- ○ Resident
- ○ Business
- ✓ Landowner
- ○ Other _____

What are the major issues?

- ✓ Relocations
- ○ Wetlands
- ✓ Wildlife
- ✓ Traffic Volume
- ○ Other _____
- ✓ Noise
- ○ Safety
- ○ Social
- ○ Economics

We are interested in your comments about the project. Please indicate:
The Alternative you prefer and why:

Prefer C

Others Takes property — Splits it in half — [redacted] + takes property + devalues half of property

What comments and/or concerns do you have relating to the project:

Recommendations for the project: do C

PLEASE SEND YOUR COMMENTS VIA EMAIL TO mhope@pickeringfirm.com
OR MAIL TO ADDRESS ON REVERSE SIDE BY OCTOBER 10, 2018.

OPEN HOUSE
NOTICE OF PUBLIC MEETING

WHAT: Public Involvement Meeting to discuss the proposed extension of South Loop Rd. between Port Rd. and South Airport Rd.

WHEN: Tuesday, September 25, 2018
4:00 p.m. to 7:00 p.m.

WHERE: West Memphis Civic Center
(East Room)
212 Polk Ave.
West Memphis, AR

****

Sponsor: The City of West Memphis and the Pickering Firm, Inc.

Anyone needing project information or special accommodations under the Americans with Disabilities Act (ADA) is encouraged to write to Marcus Hope, 2001 Airport Rd Suite 201, Flowood, MS 39232, call (601)956-3663, fax (601)956-7817 or email mhope@pickeringfirm.com. The hearing or speech impaired, may contact the Arkansas Relay System at (Voice/TTY 711). Requests should be made at least 4 days prior to the public meeting.

NOTICE OF NONDISCRIMINATION: The City of West Memphis (City) complies with all civil rights provisions of federal statutes and related authorities that prohibit discrimination in programs and activities receiving federal financial assistance. Therefore, the City does not discriminate on the basis of race, sex, color, age, national origin, religion or disability, in the admission, access to and treatment in the City's programs and activities, as well as the City's hiring or employment practices. Complaints of alleged discrimination and inquiries regarding the City's nondiscrimination policies may be directed to Janice Coleman, Personnel Director, Paul Luker, ADA Coordinator, or Eddie Brawley, MPO Study Director at 796 West Broadway, West Memphis, AR 72301 (870)735-8148 or wm.mpo@sbcglobal.net.

Free language assistance for Limited English Proficient individuals is available upon request.

This notice is available from the ADA/504/Title VI Coordinator in large print, on audiotape and in Braille.

Job No. 110676

Public Meeting Notice

(60 Seconds)

The City of West Memphis and The Pickering Firm, Inc. will conduct a public involvement meeting in West Memphis to present and discuss the proposed extension of South Loop Road between Port Road and Airport Road/Waverly Road.

The meeting will be held on Tuesday, September 25, 2018 from 4:00 p.m. to 7:00 p.m. at the West Memphis Civic Center---East Room, 212 West Polk Ave., West Memphis, AR.

This will be an “open house” meeting with no formal presentations. The public is invited to visit anytime during the scheduled hours to view exhibits, ask questions, and offer comments.

This has been a message from KAKJ 105.3 FM Force 3 Radio Network and the City of West Memphis and The Pickering Firm, Inc.

You're invited!

OPEN HOUSE
PUBLIC INVOLVEMENT MEETING NOTICE

WHAT: **Public Involvement Meeting to discuss the proposed extension of South Loop Rd. between Port Rd. and South Airport Rd.**

WHEN: **Tuesday, September 25, 2018**
4:00 p.m. – 7:00 p.m.

WHERE: **West Memphis Civic Center—**
(East Room)
212 Polk Ave
West Memphis, AR.

Pickering Firm, Inc. & the City of West Memphis will conduct a public involvement meeting to present and discuss the proposed extension of South Loop Rd. between Port Rd. and South Airport Rd.

This will be an "open house" meeting with no formal presentations. The public is invited to visit anytime during the scheduled hours to view exhibits, ask questions, and offer comments.

Anyone needing project information or special accommodations under the Americans with Disabilities Act (ADA) is encouraged to write to Marcus Hope, 2001 Airport Rd Suite 201, Flowood, MS 39232, call (601)956-3663, fax (601)956-7817 or email mhope@pickeringfirm.com . Hearing or speech impaired, please contact the Arkansas Relay System at (Voice/TTY 711). Requests should be made at least four days prior to the public meeting.

NOTICE OF NONDISCRIMINATION: The City of West Memphis (City) complies with all civil rights provisions of federal statutes and related authorities that prohibit discrimination in programs and activities receiving federal financial assistance. Therefore, the City does not discriminate on the basis of race, sex, color, age, national origin, religion or disability, in the admission, access to and treatment in the City's programs and activities, as well as the City's hiring or employment practices. Complaints of alleged discrimination and inquiries regarding the City's nondiscrimination policies may be directed to Janice Coleman, Personnel Director, Paul Luker, ADA Coordinator, or Eddie Brawley, MPO Study Director at 796 West Broadway, West Memphis, AR 72301 (870)735-8148 or wm.mpo@sbcglobal.net.

Free language assistance for Limited English Proficient individuals is available upon request. This notice is available from the ADA/504/Title VI Coordinator in large print, on audiotape and in Braille.

Job Number 110676

A Friendly Reminder!

OPEN HOUSE
PUBLIC INVOLVEMENT MEETING NOTICE

WHAT: **Public Involvement Meeting to discuss the proposed extension of South Loop Rd. between Port Rd. and South Airport Rd.**

WHEN: **Tuesday, September 25, 2018**
4:00 p.m. – 7:00 p.m.

WHERE: **West Memphis Civic Center—**
(East Room)
212 Polk Ave
West Memphis, AR.

Pickering Firm, Inc. & the City of West Memphis will conduct a public involvement meeting to present and discuss the proposed extension of South Loop Rd. between Port Rd. and South Airport Rd.

This will be an "open house" meeting with no formal presentations. The public is invited to visit anytime during the scheduled hours to view exhibits, ask questions, and offer comments.

Anyone needing project information or special accommodations under the Americans with Disabilities Act (ADA) is encouraged to write to Marcus Hope, 2001 Airport Rd Suite 201, Flowood, MS 39232, call (601)956-3663, fax (601)956-7817 or email mhope@pickeringfirm.com . Hearing or speech impaired, please contact the Arkansas Relay System at (Voice/TTY 711). Requests should be made at least four days prior to the public meeting.

NOTICE OF NONDISCRIMINATION: The City of West Memphis (City) complies with all civil rights provisions of federal statutes and related authorities that prohibit discrimination in programs and activities receiving federal financial assistance. Therefore, the City does not discriminate on the basis of race, sex, color, age, national origin, religion or disability, in the admission, access to and treatment in the City's programs and activities, as well as the City's hiring or employment practices. Complaints of alleged discrimination and inquiries regarding the City's nondiscrimination policies may be directed to Janice Coleman, Personnel Director, Paul Luker, ADA Coordinator, or Eddie Brawley, MPO Study Director at 796 West Broadway, West Memphis, AR 72301 (870)735-8148 or wm.mpo@sbcglobal.net.

Free language assistance for Limited English Proficient individuals is available upon request. This notice is available from the ADA/504/Title VI Coordinator in large print, on audiotape and in Braille.

Job Number 110676

THE CITY OF WEST MEMPHIS AND

PICKERING FIRM, INC.

Marcus Hope

Telephone: (601) 956-3663

2001 Airport Road,

Flowood, MS, 39232

September 6, 2018

KAKJ 105.3 FM- Force 3 Radio Network

700 Martin Luther King Jr Dr.

West Helena, AR 72390

Email: force2@sbcglobal.net

Attn: Delta Force 3 Radio Network

Delta Force 3 Radio Network,

Your assistance is requested in publicizing a Public Involvement Meeting that will be held in West Memphis for the purpose of discussing the proposed extension of South Loop Road between Port Road and Airport Road / Waverly Road in West Memphis, Arkansas. In compliance with Title VI regulations, it is important that we reach as many minority listeners as possible. We have identified KAKJ 105.3 FM Force 3 Radio as the station capable of addressing our announcement needs.

Enclosed please find a paid service announcement with general information about the scheduled meeting that will be held on Tuesday, September 25, 2018 from 4:00 p.m. to 7:00 p.m. We request that two 60 second PSAs run daily starting on Friday, September 21 thru Tuesday, September 25, 2018.

Send invoice for payment to:

The City of West Memphis

Attention: City Engineer/ Amanda Hicks

PO # 45704

P.O. Box 1728

West Memphis, Arkansas, 72303

Phone: 870-702-5109

If you have any questions regarding the written announcement or need additional information, please contact Marcus Hope at 601-956-3663.

Sincerely,

Marcus D. Hope

Environmental Scientist

Public Meeting Notice

(60 Seconds)

The City of West Memphis and The Pickering Firm, Inc. will conduct a public involvement meeting in West Memphis to present and discuss the proposed extension of South Loop Road between Port Road and Airport Road/Waverly Road.

The meeting will be held on Tuesday, September 25, 2018 from 4:00 p.m. to 7:00 p.m. at the West Memphis Civic Center---East Room, 212 West Polk Ave., West Memphis, AR.

This will be an “open house” meeting with no formal presentations. The public is invited to visit anytime during the scheduled hours to view exhibits, ask questions, and offer comments.

This has been a message from KAKJ 105.3 FM Force 3 Radio Network and the City of West Memphis and The Pickering Firm, Inc.

THE CITY OF WEST MEMPHIS AND

PICKERING FIRM, INC.

Marcus Hope

Telephone: (601) 956-3663

2001 Airport Road,

Flowood, MS, 39232

September 6, 2018

Radio Ambiente 1030AM

3654 Park Ave.

Memphis, TN, 38111

Email: Luis1030am@gmail.com

Attn: Luis Anaya

Dear Mr. Luis Anaya,

Your assistance is requested in publicizing a Public Involvement Meeting that will be held in West Memphis for the purpose of discussing the proposed extension of South Loop Road between Port Road and Airport Road / Waverly Road in West Memphis, Arkansas. In compliance with Title VI regulations, it is important that we reach as many minority listeners as possible. We have identified Ambiente 1030AM as the station capable of addressing our announcement needs.

Enclosed please find a paid service announcement with general information about the scheduled meeting that will be held on Tuesday, September 25, 2018 from 4:00 p.m. to 7:00 p.m. We request that two 60 second PSAs run daily starting on Friday, September 21 thru Tuesday, September 25, 2018.

Send invoice for payment to:

The City of West Memphis

Attention: City Engineer/ Amanda Hicks

PO # 45697

P.O. Box 1728

West Memphis, Arkansas, 72303

Phone: 870-702-5109

If you have any questions regarding the written announcement or need additional information, please contact Marcus Hope at 601-956-3663.

Sincerely,

Marcus D. Hope

Environmental Scientist

Aviso de Reunión Pública

(60 segundos)

La ciudad de West Memphis y Pickering Firm Inc. llevará a cabo una reunión pública en West Memphis para presentar y discutir las propuestas de la extensión de South Loop Road entre Port Road y Airport Road.

La reunión pública se llevará a cabo el martes, 25 de septiembre del 2018, de las 4:00 p.m. a las 7:00 p.m. en el Centro Cívico de West Memphis -Sala Este, 212 West Polk Ave., West Memphis, AR.

Esta será una reunión de foro abierto sin presentación oficial. El público está invitado a visitar en cualquier momento durante las horas programadas para ver las exposiciones, hacer preguntas y ofrecer comentarios.

Este ha sido un mensaje de Ambiente 1030AM y La ciudad de West Memphis y Pickering Firm Inc.

Aviso de Reunión Pública

(60 segundos)

La ciudad de West Memphis y Pickering Firm Inc. llevará a cabo una reunión pública en West Memphis para presentar y discutir las propuestas de la extensión de South Loop Road entre Port Road y Airport Road.

La reunión pública se llevará a cabo el martes, 25 de septiembre del 2018, de las 4:00 p.m. a las 7:00 p.m. en el Centro Cívico de West Memphis -Sala Este, 212 West Polk Ave., West Memphis, AR.

Esta será una reunión de foro abierto sin presentación oficial. El público está invitado a visitar en cualquier momento durante las horas programadas para ver las exposiciones, hacer preguntas y ofrecer comentarios.

Este ha sido un mensaje de Ambiente 1030AM y La ciudad de West Memphis y Pickering Firm Inc.

Appendix E – Tribal and SHPO Correspondence

TRIBAL HISTORIC PRESERVATION OFFICE

Date: **August 21, 2017** **File: 1617-3115AR-7**

RE: **AHTD Job 110676 South Loop Extension (West Memphis)(S) in Crittenden County, Arkansas**

Arkansas Highway & Transportation Department
Randal Looney
700 West Capitol Ave, Suite 3130
Little Rock, AR 72201

Dear Mr. Looney,

The Osage Nation Historic Preservation Office has received notification and accompanying information for the proposed project **AHTD Job 110676 South Loop Extension (West Memphis)(S) in Crittenden County, Arkansas**. The eastern terminus of the proposed undertaking is located adjacent to the Osage Mississippi River Trail. Expedient graves and temporary hunting camps may be located along these trails. I understand that the cultural resources survey is scheduled to be performed in the near future. This office looks forward to reviewing the final report.

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S.C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d) (6) (A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Osage Nation has a vital interest in protecting its historic and ancestral cultural resources, which are protected under the NHPA, NEPA, the Native American Graves Protection and Repatriation Act, and Osage law, and appreciates your consideration of the provided information in the planning process.

Should you have any questions or need any additional information, please feel free to contact me at the number listed below. Thank you for consulting with the Osage Nation on this matter.

Sincerely,

James Munkres
Archaeologist

RECEIVED
AUG 25 2017
FHWA
ARKANSAS

627 Grandview, Pawhuska, OK 74056, (918) 287-5328, Fax (918) 287-5376

Mendoza, Yulissa M.

From: Looney, Randal
Sent: Monday, August 28, 2017 7:56 AM
To: Wilks, Diana
Subject: FW: AHTD Job 110676, South Loop Extension (West Memphis) (S), Crittenden Co., AR

From: Lindsey Bilyeu [mailto:lbilyeu@choctawnation.com]
Sent: Friday, August 25, 2017 1:21 PM
To: Looney, Randal (FHWA) <Randal.Looney@dot.gov>
Subject: RE: AHTD Job 110676, South Loop Extension (West Memphis) (S), Crittenden Co., AR

Randal,

The Choctaw Nation of Oklahoma thanks the FHWA, Arkansas Division, for the correspondence regarding the above referenced project. This project lies in our Trail of Tears Removal Route. We ask that you please send a copy of the cultural resources survey once it is available.

If you have any questions, please contact me.

Thank you,

Lindsey D. Bilyeu, M.S.
Senior Compliance Review Officer
Historic Preservation Department
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702
580-924-8280 ext. 2631

Choctaw Nation
Faith•Family•Culture

U.S. Department of Transportation
Federal Highway Administration

Arkansas Division

700 West Capitol Ave
Suite 3130
Little Rock AR 72201
(501) 324-6430

July 13, 2017

In Reply Refer To:
AHTD Job 110676
South Loop Extension
(West Memphis) (S)
Crittenden County
HDA-AR

Mr. Joey Barbry, Jr.
Tunica-Biloxi Tribe of Louisiana, Inc.
150 Melacon Road
Marksville, LA 71351

Dear Mr. Barbry:

This letter is written in order to initiate consultation between the Federal Highway Administration, Arkansas Division Office and the Tunica-Biloxi Tribe of Louisiana, Inc. regarding a federal-aid highway project that may potentially affect ancestral lands or properties that may be of religious or cultural significance to your Tribe.

The Arkansas State Highway and Transportation Department (AHTD) plans to extend an existing bypass located south of West Memphis in Crittenden County (see project location map). The extension will be constructed on new location. To date, a survey of existing records regarding previously recorded archeological sites has been conducted and two previously recorded Native American sites – 3CT0067 and 3CT0068 – have been recorded near the western end of the project. In an effort to determine whether or not these sites are located within the project and to identify any additional unknown archeological sites within the proposed project area, a cultural resources survey of the project area will be conducted by a qualified archeological consultant firm.

Please review this information and notify us of any constraints or concerns that you may have regarding this undertaking. We would greatly appreciate your input regarding not only this project but also sites or properties in the immediate area that might be of cultural or religious significance to your Tribe. If you have any questions or need additional information, please contact me at (501) 324-6430.

Sincerely,

Randal Looney
Environmental Coordinator

Enclosure

U.S. Department of Transportation
Federal Highway Administration

Arkansas Division

700 West Capitol Ave
Suite 3130
Little Rock AR 72201
(501) 324-6430

July 13, 2017

In Reply Refer To:
AHTD Job 110676
South Loop Extension
(West Memphis) (S)
Crittenden County
HDA-AR

Mr. Everett Bandy
Tribal Historic Preservation Officer
Quapaw Tribe of Oklahoma (O-Gah-Pah)
P.O. Box 765
Quapaw, OK 74363-0765

Dear Mr. Bandy:

This letter is written in order to initiate consultation between the Federal Highway Administration, Arkansas Division Office and the Quapaw Tribe of Oklahoma regarding a federal-aid highway project that may potentially affect ancestral lands or properties that may be of religious or cultural significance to your Tribe.

The Arkansas State Highway and Transportation Department (AHTD) plans to extend an existing bypass located south of West Memphis in Crittenden County (see project location map). The extension will be constructed on new location. To date, a survey of existing records regarding previously recorded archeological sites has been conducted and two previously recorded Native American sites – 3CT0067 and 3CT0068 – have been recorded near the western end of the project. In an effort to determine whether or not these sites are located within the project and to identify any additional unknown archeological sites within the proposed project area, a cultural resources survey of the project area will be conducted by a qualified archeological consultant firm.

Please review this information and notify us of any constraints or concerns that you may have regarding this undertaking. We would greatly appreciate your input regarding not only this project but also sites or properties in the immediate area that might be of cultural or religious significance to your Tribe. If you have any questions or need additional information, please contact me at (501) 324-6430.

Sincerely,

Randal Looney
Environmental Coordinator

Enclosure

U.S. Department of Transportation
Federal Highway Administration

Arkansas Division

700 West Capitol Ave
Suite 3130
Little Rock AR 72201
(501) 324-6430

July 13, 2017

In Reply Refer To:
AHTD Job 110676
South Loop Extension
(West Memphis) (S)
Crittenden County
HDA-AR

Dr. Andrea Hunter
Tribal Historic Preservation Officer
The Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Dear Dr. Hunter:

This letter is written in order to initiate consultation between the Federal Highway Administration, Arkansas Division Office and the Osage Nation regarding a federal-aid highway project that may potentially affect ancestral lands or properties that may be of religious or cultural significance to your Tribe.

The Arkansas State Highway and Transportation Department (AHTD) plans to extend an existing bypass located south of West Memphis in Crittenden County (see project location map). The extension will be constructed on new location. To date, a survey of existing records regarding previously recorded archeological sites has been conducted and two previously recorded Native American sites – 3CT0067 and 3CT0068 – have been recorded near the western end of the project. In an effort to determine whether or not these sites are located within the project and to identify any additional unknown archeological sites within the proposed project area, a cultural resources survey of the project area will be conducted by a qualified archeological consultant firm.

Please review this information and notify us of any constraints or concerns that you may have regarding this undertaking. We would greatly appreciate your input regarding not only this project but also sites or properties in the immediate area that might be of cultural or religious significance to your Tribe. If you have any questions or need additional information, please contact me at (501) 324-6430.

Sincerely,

Randal Looney
Environmental Coordinator

Enclosure

U.S. Department of Transportation
Federal Highway Administration

Arkansas Division

700 West Capitol Ave
Suite 3130
Little Rock AR 72201
(501) 324-6430

July 13 2017

In Reply Refer To:
AHTD Job 110676
South Loop Extension
(West Memphis) (S)
Crittenden County
HDA-AR

Mr. Eric Oosahwee-Voss
Tribal Historic Preservation Officer
United Keetoowah Band of Cherokee Indians
P.O. Box 1245
Tahlequah, OK 74465

Dear Mr. Oosahwee-Voss:

This letter is written in order to initiate consultation between the Federal Highway Administration, Arkansas Division Office and the United Keetoowah Band of Cherokee Indians regarding a federal-aid highway project that may potentially affect ancestral lands or properties that may be of religious or cultural significance to your Tribe.

The Arkansas State Highway and Transportation Department (AHTD) plans to extend an existing bypass located south of West Memphis in Crittenden County (see project location map). The extension will be constructed on new location. To date, a survey of existing records regarding previously recorded archeological sites has been conducted and two previously recorded Native American sites – 3CT0067 and 3CT0068 – have been recorded near the western end of the project. In an effort to determine whether or not these sites are located within the project and to identify any additional unknown archeological sites within the proposed project area, a cultural resources survey of the project area will be conducted by a qualified archeological consultant firm.

Please review this information and notify us of any constraints or concerns that you may have regarding this undertaking. We would greatly appreciate your input regarding not only this project but also sites or properties in the immediate area that might be of cultural or religious significance to your Tribe. If you have any questions or need additional information, please contact me at (501) 324-6430.

Sincerely,

Randal Looney
Environmental Coordinator

Enclosure

U.S. Department of Transportation
Federal Highway Administration

Arkansas Division

700 West Capitol Ave
Suite 3130
Little Rock AR 72201
(501) 324-6430

July 13, 2017

In Reply Refer To:
AHTD Job 110676
South Loop Extension
(West Memphis) (S)
Crittenden County
HDA-AR

Dr. Ian Thompson
Tribal Historic Preservation Officer &
NAGPRA Program Coordinator
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Dr. Thompson:

This letter is written in order to initiate consultation between the Federal Highway Administration, Arkansas Division Office and the Choctaw Nation of Oklahoma regarding a federal-aid highway project that may potentially affect ancestral lands or properties that may be of religious or cultural significance to your Tribe.

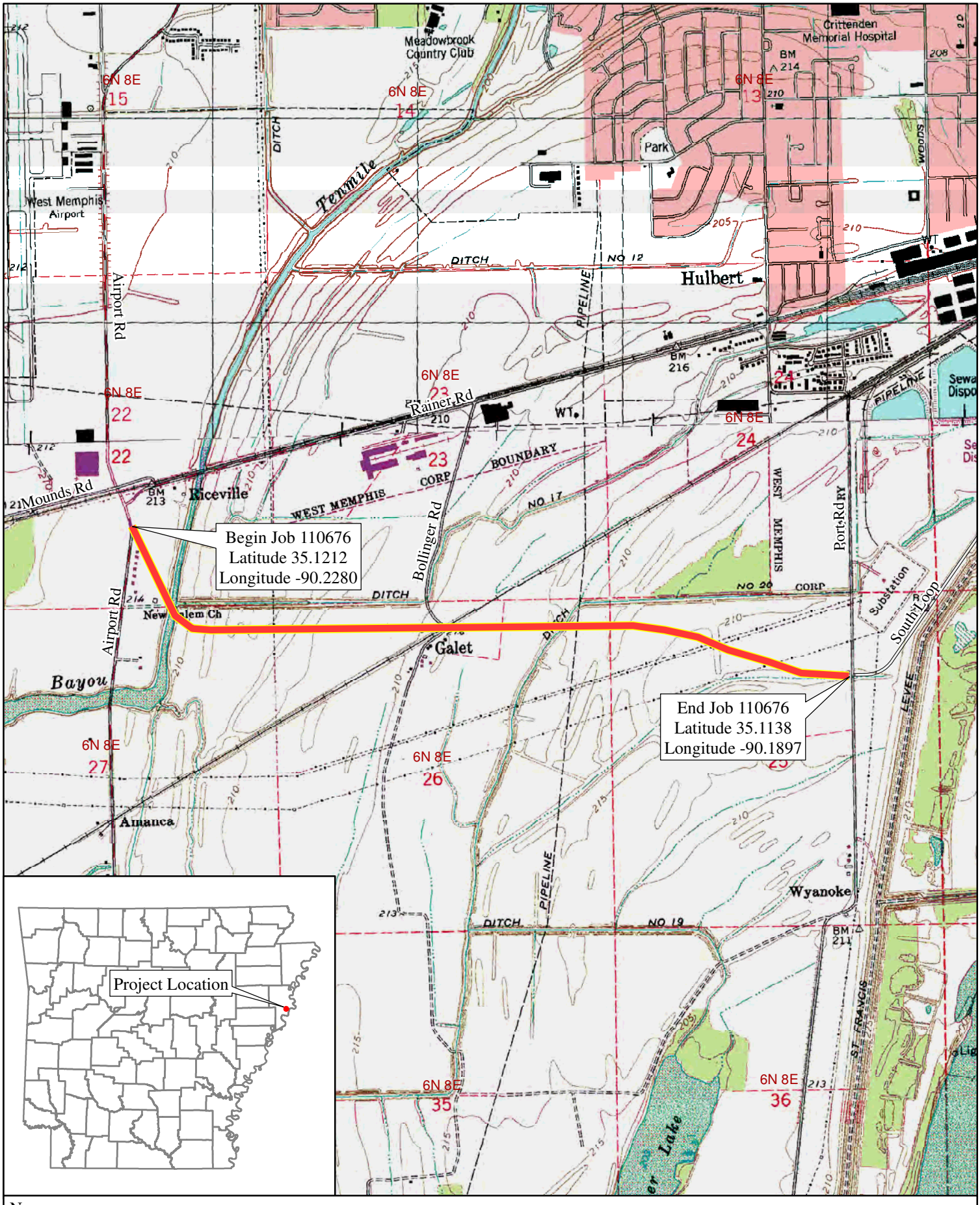
The Arkansas State Highway and Transportation Department (AHTD) plans to extend an existing bypass located south of West Memphis in Crittenden County (see project location map). The extension will be constructed on new location. To date, a survey of existing records regarding previously recorded archeological sites has been conducted and two previously recorded Native American sites – 3CT0067 and 3CT0068 – have been recorded near the western end of the project. In an effort to determine whether or not these sites are located within the project and to identify any additional unknown archeological sites within the proposed project area, a cultural resources survey of the project area will be conducted by a qualified archeological consultant firm.

Please review this information and notify us of any constraints or concerns that you may have regarding this undertaking. We would greatly appreciate your input regarding not only this project but also sites or properties in the immediate area that might be of cultural or religious significance to your Tribe. If you have any questions or need additional information, please contact me at (501) 324-6430.

Sincerely,

Randal Looney
Environmental Coordinator

Enclosure



N

Scale - 1:24,000

AHTD Environmental GIS - Dudley
July 5, 2017

Job 110676.
South Loop Extension
(West Memphis).
Crittenden County.

Project Location

USGS Topographic Map:
Fletcher Lake 1993

Cultural Resources Assessment Summary

In a letter dated August 9, 2018, the Arkansas Historic Preservation Program indicated that there are reports of several cultural resources in the vicinity of the Project area. Therefore, a cultural resource survey was recommended. The Pickering Firm, Inc. contracted Panamerican Consultants, Inc. to conduct a Phase I Cultural Resources Survey along Alternative C. The Panamerican Consultants, Inc. survey resulted in the identification of one early- to mid-twentieth century domestic tenant home site (Site 3CCT538). However, this site was determined to be ineligible for the National Register of Historic Places (NRHP) list. Additional investigations at this location would be unlikely to yield any additional significant archaeological data. Panamerican Consultants, Inc. concluded there are no NRHP listed, eligible, or potentially significant cultural resources within the Alternative C corridor, and no further cultural resources work was recommended.

In a letter dated February 25, 2019, the Arkansas Historic Preservation Program (AHPP) indicated concurrence that Site 3CCT538 was ineligible for the NRHP list. However, the AHPP determined that insufficient documentation was provided to support a pedestrian survey in lieu of subsurface investigation. Responding to this determination, Panamerican Consultants, Inc. conducted additional fieldwork and submitted a revised report on March 29, 2019. In a letter dated April 2, 2019 the AHPP concurred with the findings that the proposed undertaking will have no adverse impact on cultural resources.

THE DEPARTMENT OF ARKANSAS
HERITAGE

Asa Hutchinson
Governor

Stacy Hurst
Director

Arkansas Arts Council

Arkansas Historic Preservation Program

Arkansas Natural Heritage Commission

Arkansas State Archives

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars Cultural Center

Old State House Museum

ARKANSAS HISTORIC PRESERVATION PROGRAM

1100 North Street
Little Rock, AR 72201

(501) 324-9880
fax: (501) 324-9184

info@arkansaspreservation.org
www.arkansaspreservation.com

An Equal Opportunity Employer

February 25, 2019

Mr. John Fleming
Division Head
Environmental Division
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, AR 72203-2261

RE: Crittenden County — General
Section 106 Review — FHWA
Draft Report, Phase I Cultural Resources Survey for the South Loop Extension (West Memphis) (S) ARDOT Job No. 110676, Crittenden County, Arkansas
ARDOT Job Number 110676
AHPP Tracking Number 101859.02

Dear Mr. Fleming:

The staff of the Arkansas Historic Preservation Program (AHPP) reviewed the above-referenced draft cultural resources report for the South Loop Extension in West Memphis, Crittenden County, Arkansas. Thank you for the well-researched report. Please note the following comments.

1) Page 35 - Table 4-01: Sites 3CT531 and 3CT532 were recorded in 2016 by Open Range Archeology rather than 2015 as shown in the table. Open Range worked as archeological monitors for the Diamond Pipeline construction rather than SWCA. However, AMASDA No. 6616 (p. 37) does reference the 2014 SWCA archeological survey for the Diamond Pipeline. Please correct the entry for *Diamond Pipeline (AMASDA No. 6616)* on page 37.
2) Page 45 - V. Field Investigations, Methods: For the current project, we do not agree with the use of pedestrian survey in lieu of subsurface investigation. The investigation did not undertake subsurface testing in the majority of the Area of Potential Effects (APE). Section II. E. of Appendix B of the *Arkansas State Plan* states, "Because environmental conditions (ground cover, season of year, amount of rainfall, the nature of alluvial deposits) and modern disturbances may obscure the surface evidence, some technique of subsurface investigation (e.g. shovel tests) should be part of *every* (emphasis in the text) survey conducted." We understand the position that the areas subjected to pedestrian survey are agricultural fields. However, any plan to defer subsurface investigation should be accompanied by data sufficient to support the decision. Such information may include documentation of the soil stratigraphy in areas marked for exclusion, documentation of the depth of pre-Holocene and/or culturally sterile soils, and noting the depth of previous disturbance relative to the estimated depth of disturbance from the proposed undertaking.
3) Page 47 - Figure 5-02: the scale of the map is too small to adequately portray the shovel test intervals. We recommend additional maps of a scale large enough to discern shovel test intervals and locations within the APE
4) Page 50 - Delineation of Site 3CT538 was at 10-meter (m) intervals. Intervals may be at the discretion of the investigator. However, please note the AHPP position is that 5-m intervals executed in cardinal directions (or

otherwise if applicable) and continuing until achieving two consecutive negative tests (or extending beyond the direct APE) on each respective transect, is the expected level of effort. The investigation did meet this standard, albeit at 10-m intervals. For large sites, it is acceptable to excavate in greater intervals such as 10 m as long at the site is bounded, when possible, by two negative shovel tests at 5-m intervals.

5) Include photos of representative shovel test profiles with a scale.
6) Page 51 - Figure 5-05: As a best practice, and in accordance with the *State Plan*, site maps should not include information that imparts exact locations, such as the road name on this figure.

We concur that Site 3CT538 is not eligible for inclusion in the National Register of Historic Places as per the criteria found in 36 CFR § 60.4. However, absent advance coordination with the AHPP and other consulting parties, or documentation sufficient to support employing a pedestrian survey in lieu of subsurface investigation, we cannot concur that the fieldwork detailed in this report constitutes a reasonable effort to identify historic properties as per 36 CFR § 800.4(b)(1). Therefore, at this time, the AHPP does not concur with the finding of No Adverse Effect. Please consider the comments above and submit a revised draft for our expedited review and comment regarding the effect determination.

Tribes that have expressed an interest in the area include the Cherokee Nation (Ms. Elizabeth Toombs), the Chickasaw Nation (Ms. Karen Brunso), the Choctaw Nation of Oklahoma (Dr. Ian Thompson), the Muscogee (Creek) Nation (Ms. Corain Lowe-Zepeda), the Osage Nation (Dr. Andrea Hunter), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy), and the Shawnee Tribe of Oklahoma (Ms. Tonya Tipton). We recommend federal agency consultation with tribal governments in accordance with 36 CFR § 800.2(c)(2).

Thank you for the opportunity to review this report. Please refer to the AHPP Tracking Number in all correspondence. If you have any questions, please contact Eric Mills of my staff at 501-324-9784 or eric.mills@arkansas .gov.

Sincerely,

Scott Kaufman
Director, AHPP

cc: Mr. Randall Looney, Federal Highway Administration
Ms. Lauren McWhorter, Pickering Firm, Inc.
Mr. C. Andrew Buchner, Panamerican Consultants, Inc.
Dr. Ann Early, Arkansas Archeological Survey

THE DEPARTMENT OF ARKANSAS
HERITAGE

Asa Hutchinson
Governor

Stacy Hurst
Director

Arkansas Arts Council

Arkansas Historic Preservation Program

Arkansas Natural Heritage Commission

Arkansas State Archives

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars Cultural Center

Old State House Museum

ARKANSAS HISTORIC PRESERVATION PROGRAM

1100 North Street
Little Rock, AR 72201

(501) 324-9880
fax: (501) 324-9184

info@arkansaspreservation.org
www.arkansaspreservation.com

An Equal Opportunity Employer

April 2, 2019

Mr. John Fleming
Division Head
Environmental Division
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, AR 72203-2261

RE: Crittenden County — General
Section 106 Review — FHWA
Revised Draft Report, Phase I Cultural Resources Survey for the South Loop Extension (West Memphis) (S) ARDOT Job No. 110676, Crittenden County, Arkansas
ARDOT Job Number 110676
AHPP Tracking Number 101859.03

Dear Mr. Fleming:

The staff of the Arkansas Historic Preservation Program (AHPP) reviewed the above-referenced revised draft cultural resources report for the South Loop Extension in West Memphis, Crittenden County, Arkansas. Thank you for conducting the additional shovel testing requested by the AHPP

Based on the information presented in the report, the AHPP agrees that Site 3CT0583 is not eligible for inclusion in the National Register of Historic Places. Likewise, we concur with the No Historic Properties Affected finding for the proposed undertaking pursuant to 36 CFR § 800.4(d)(1).

Tribes that have expressed an interest in the area include the Cherokee Nation (Ms. Elizabeth Toombs), the Chickasaw Nation (Ms. Karen Brunso), the Choctaw Nation of Oklahoma (Dr. Ian Thompson), the Muscogee (Creek) Nation (Ms. Corain Lowe-Zepeda), the Osage Nation (Dr. Andrea Hunter), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy), and the Shawnee Tribe of Oklahoma (Ms. Tonya Tipton). We recommend federal agency consultation with tribal governments in accordance with 36 CFR § 800.2(c)(2).

Thank you for the opportunity to review this report. Please refer to the AHPP Tracking Number in all correspondence. If you have any questions, please contact Eric Mills of my staff at 501-324-9784 or eric.mills@arkansas .gov.

Sincerely,

FOR Eric Mills

Scott Kaufman
Director, AHPP

cc: Mr. Randall Looney, Federal Highway Administration
Ms. Lauren McWhorter, Pickering Firm, Inc.
Mr. C. Andrew Buchner, Panamerican Consultants, Inc.
Dr. Ann Early, Arkansas Archeological Survey

THE DEPARTMENT OF ARKANSAS
HERITAGE

Asa Hutchinson
Governor

Stacy Hurst
Director

Arkansas Arts Council

Arkansas Natural
Heritage Commission

Arkansas State Archives

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars
Cultural Center

Old State House Museum

ARKANSAS HISTORIC
PRESERVATION PROGRAM

1100 North Street
Little Rock, AR 72201

(501) 324-9880
fax: (501) 324-9184
tdd: 711

e-mail:
info@arkansaspreservation.org
website:
www.arkansaspreservation.com

An Equal Opportunity Employer

August 9, 2018

Ms. Lauren McWhorter
Natural Resources Scientist
Pickering Firm, Inc.
2001 Airport Road, Suite 201
Flowood, MS 39232

RE: Crittenden County – West Memphis
Section 106 Review – NRCS
Proposed Construction of Extension of South Loop Drive
ARDOT 110676
AHPP Tracking Number 101859

Dear Ms. McWhorter:

This letter is in response to your inquiry regarding properties of archeological, historical, or architectural significance in the area of the proposed referenced project. The staff of the Arkansas Historic Preservation Program has reviewed records pertaining to the area in question.

Our records check found several previously recorded cultural resources near this undertaking. Due to this and because there is a high potential for cultural resources in the area, we recommend that a cultural resources survey be conducted in the areas of potential effect (APE) once a final route has been determined.

Tribes that have expressed an interest in the area include the Cherokee Nation (Ms. Elizabeth Toombs), the Chickasaw Nation (Ms. Karen Brunso), the Choctaw Nation of Oklahoma (Dr. Ian Thompson), the Muscogee (Creek) Nation (Ms. Corain Lowe-Zepeda), the Osage Nation (Dr. Andrea Hunter), the Quapaw Tribe of Oklahoma (Mr. Everett Bandy), and the Shawnee Tribe of Oklahoma (Ms. Tonya Tipton). We recommend that they be consulted in accordance with 36 CFR § 800.2 (c) (2).

Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, please call Tim Dodson of my staff at 501-324-9784.

Sincerely,

Scott Kaufman
Director, AHPP

cc: Mr. Randal Looney, FHWA
Mr. John Fleming, ARDOT
Dr. Ann Early, Arkansas Archeological Survey

TD:tr

Appendix F – Prime Farmland Conversion Rating Form

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3407 S. Caraway Rd.
Jonesboro, AR 72404

August 6, 2018

Lauren McWhorter
Pickering Firm
317 South Church Street
Jonesboro, AR 72401

Re: South Loop Drive

Dear: Ms. McWhorter

Enclosed is a completed AD-1006 Farmland Conversion Impact Rating for the above-mentioned projects. I have found that prime farmland would be impacted with this project.

If you have any additional questions, please contact me at 870-972-4671 ext. 141

Sincerely,

David Hargis
Resource Soil Scientist

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 8/3/2018
Name of Project South Loop Extension Project	Federal Agency Involved FHWA
Proposed Land Use Extension Roadway Project	County and State Crittenden County, Arkansas
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 8-6-2018 / Person Completing Form: David Harris

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES	NO	Acres Irrigated	Average Farm Size
	X			

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount of Farmland As Defined in FPPA	Date Land Evaluation Returned by NRCS
Corn, Soybeans	Acres: 375,870 92.2	Acres: 344,680 84.6	8-7-2018
Name of Land Evaluation System Used: LESA	Name of State or Local Site Assessment System: LESA		

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Alternative B	Alternative C	Alternative D	Alternative E
A. Total Acres To Be Converted Directly	39.27	39.27	39.27	47.45
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	39.27	39.27	39.27	47.45
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	39.27	39.27	39.27	47.45
B. Total Acres Statewide Important or Local Important Farmland	0	0	0	0
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	.01	.01	.01	.01
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	71	71	71	71
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	86	86	86	83

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Alternative B	Alternative C	Alternative D	Alternative E
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	0	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	0	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: Pickering Firm, Inc. Date: 8/3/2018

(See Instructions on reverse side)

Form AD-1006 (03-02)

Appendix G – Wetland Assessment Report

PRELIMINARY WETLAND AND OTHER WATERS ASSESSMENT REPORT

South Loop Drive Extension from Port Road to South Airport Road

Crittenden County, AR

Project Number STPU-9948 (42)

Prepared by
Marcus Hope
Pickering Firm, Inc.

Other Contributors
Camille Salters, RPG
Pickering Firm, Inc.

February 18, 2019

Table of Contents

Figures

Tables

Appendices

Executive Summary

The city of West Memphis is proposing to extend South Loop Drive from Port Road to South Airport Road. The project is located approximately 2.5 miles south of the city of West Memphis (Sections 22- Township 6 N- Range 8 E, Sections 27 -Township-6 N-Range 8 E, and Sections 26 -Township-6 N-Range 8 E). Following completion of the project, a new east to west corridor between Port Road and South Airport Road will exist through a currently undeveloped area.

A total of four wetlands (.39 acres total) and three other waters (553 linear feet total) are found in the study corridor. Wetlands are classified as riverine. Other waters are classified as perennial. These areas should be considered potentially jurisdictional until concurrence is given by a representative of the US Army Corps of Engineers. Per a conversation with Mr. Joe Brougher of the US Army Corps of Engineers, it was determined that Ten Mile Bayou has already been determined as jurisdictional, so no data points were collected in this location.

Proposed work will result in **0.39 acres of wetland permanent fill**. Hydrology at wetlands 1 and 2 is likely the result of manmade obstructions. Bridge construction will result in **430 additional feet of other water bridging**. In addition a channel crossing will result in a **123 linear feet of R.C. pipe culvert being placed.**

Potential impacts to threatened and endangered species were assessed as a part of the initial project planning. Species accounts and habitat requirements were collected and reviewed from the U.S. Fish and Wildlife Service (USFWS). In an email dated August 30, 2018, Mr. Lindsey Lewis of the USFWS stated “the service has reviewed the project information you provided along with your determination, the location of the project, and our records and we agree with the determination”. He further stated that the service has no concerns or comments and that no further action was required in regarding Section 7 of the Endangered Species Act.

The scope of work for this project included a wetlands and other waters assessment report as well as coordination for threatened and endangered species, The Department of Arkansas Heritage (DAH), U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), Environmental Protection Agency (EPA), and Arkansas Department of Environmental Quality (ADEQ) for their comments regarding the project.

Chapter 1. Introduction

The purpose of this report is to identify and describe potentially jurisdictional areas such as wetlands, other waters and other waters of the US within the project corridor and to assess impacts from preliminary plans for the purposes of regulation under Section 404 of the Clean Water Act (CWA) and/ or Section 10 of the Safe Rivers and Harbors Act of 1899 (RHA). The delineation was conducted by Marcus Hope and Camille Salters of Pickering Firm, Inc. Field work was performed during a site visit on February 12, 2019 and February 13, 2019. This report facilitates Pickering Firm, Inc. efforts to document wetland and other waters boundary determinations for review by regulatory authorities and to avoid or minimize impacts to wetlands and other waters during the design process.

The project is located approximately 2.5 miles south of the city of West Memphis between Port Road and South Airport Road in Crittenden County, Arkansas (Section 22- Township 6 N-Range 8 E, Section 27 -Township-6 N-Range 8 E, and Section 26 –Township-6 N-Range 8 E). See Figures 1, 2, 3 for more detailed location information. Work in potentially jurisdictional areas is related to the construction of the South Loop Extension corridor between Port Road and South Airport Road.

Figure 1. Project Location Map.

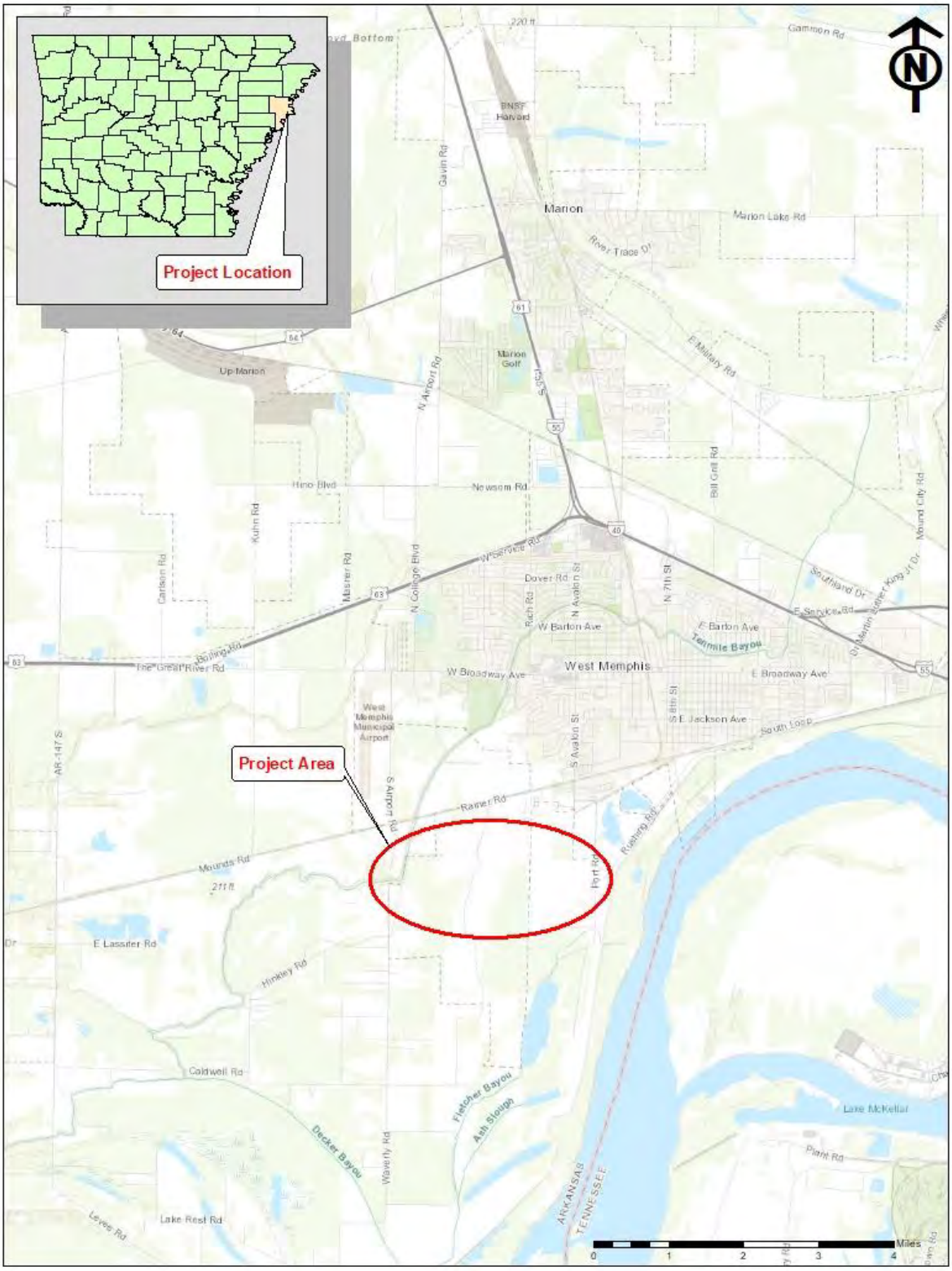
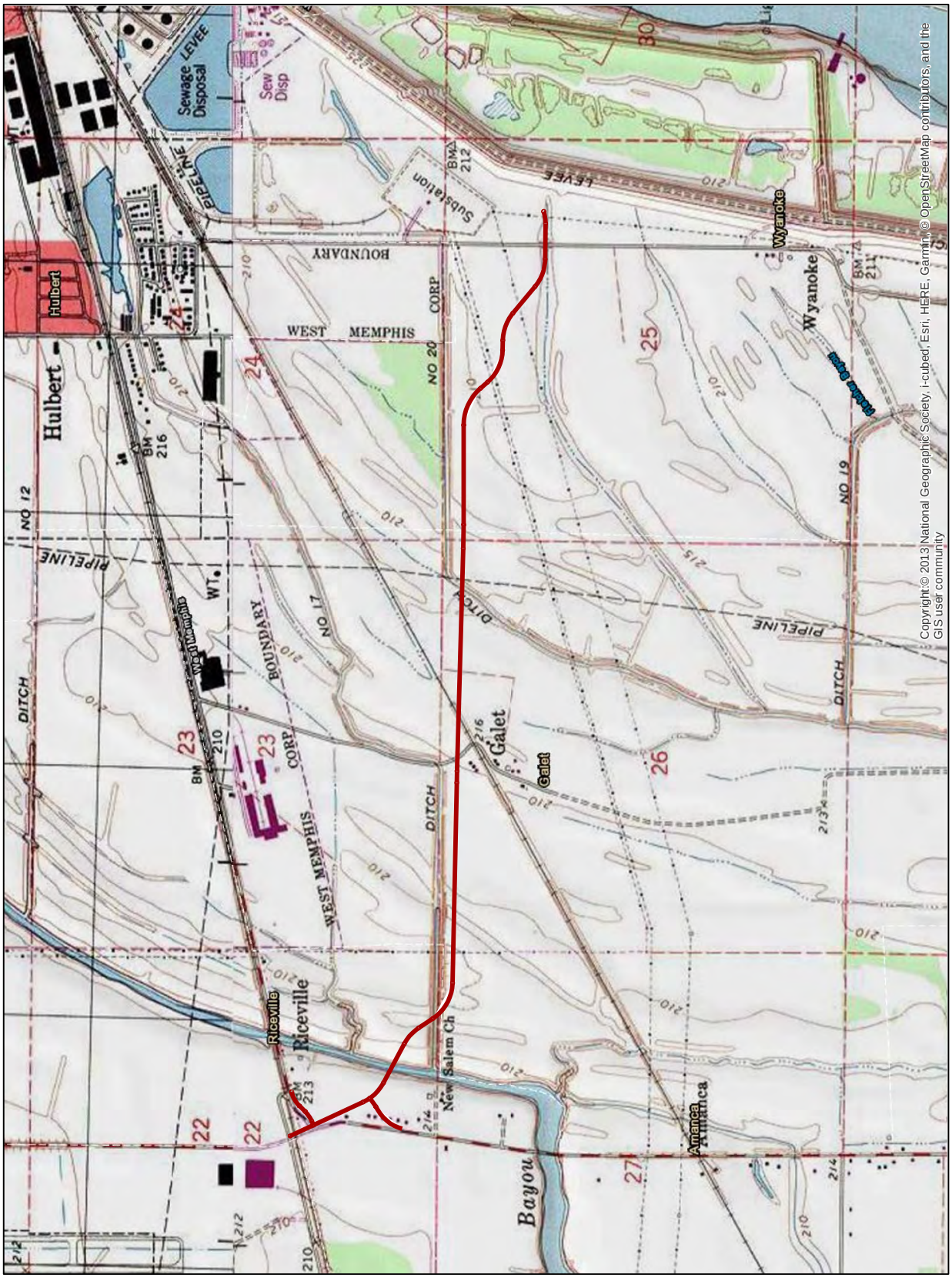


Figure 2. 2017 Aerial Photography for project area.

Figure 3. USGS Topographic Map for project area



Chapter 2. Methods

This chapter summarizes the methods used to comply with ARDOT, federal, state, and local guidance. Please see Appendix A for further details of methods used in this report.

Prior to initiation of field work, geographic information system (GIS- ArcMap 10) software was used to compile known hydrologic, geologic and other relevant information on the study area. Information was gathered from U.S. Fish and Wildlife Service National Wetland Inventory Maps, the U.S. Department of Agriculture- Natural Resource Conservation Service Web Soil Survey Maps, and US Geological Survey Digital Elevation Model. See Appendix C for maps showing soils, topography, and the wetland inventory. A site visit was conducted on February 12, 2019 and February 13, 2019 to record relevant data on potentially jurisdictional areas for the purposes of CWA and/or RHA permitting purposes.

An undivided two lane roadway with 8 foot wide paved shoulders will be constructed along the proposed work areas. Potentially jurisdictional areas near proposed work were assessed during the site visit and are described in this document. Wetland determinations were made using observable vegetation, hydrology, and soils in accordance with the routine approach described in the USACE Wetland Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (2010). Details of wetland and upland areas are described in detail on attached regional supplement datasheets. Other waters are described on Other Waters of the US Field Datasheet forms found in Attachment B. Wetland boundaries and locations were not professionally surveyed, but were located by a hand-held GPS device (Garmin 64s).

Regional supplement datasheets were completed at each data point (DP) location. Areas which met all three hydric criteria are labeled with a "W". At each data point location, soils, vegetation, and hydrology were described and representative photographs were taken. Other Water Field Data sheets were completed for each tributary reach from project right-of-way to right-of-way and not a true channel reach length. Tributary assessment locations are marked with a "CA" (Channel Assessment). Photographs were taken up-gradient and down-gradient at each other water assessment site.

After field work was completed, data was entered into GIS software (ArcMap 10), potentially jurisdictional areas were mapped, and areas and lengths were calculated. Preliminary plans were then overlain on maps to calculate impacts to potentially jurisdictional areas. Impacts were then calculated for each wetland or other water impacts.

Chapter 3. Existing Conditions

Based upon the site inspection, a total of four wetlands (0.39 acres) and three other waters (553 linear feet) are found in the study corridor. Furthermore, potential work area boundaries have yet to be defined and therefore not all of the potential wetland and tributaries will be impacted by the project. All potential jurisdictional areas should be considered preliminary prior to confirmation by the US Army Corps of Engineers Regulatory Branch. Findings are discussed in Tables 1, 2 and 3.

Landscape Setting

Terrain in the project area is mostly level agricultural fields. The project is part of the Lower St. Francis sub-basin (USGS HUC # 08020203). The project is located in the Southern Mississippi Valley River Alluvium (131a) Major Land Resource Area portion of the Mississippi Alluvial Valley (LRR O) as described by the Natural Resource Conservation Service. Dominant land use in the area is agriculture with soybean and corn fields immediately surrounding the project area. Appendix C includes Soil Survey Data, Elevation Maps, and Land Use Maps.

Hydrology

Conditions in the project area were just below average. Rainfall amounts for West Memphis, AR totaled 4.30 inches for the month of February 2019. The average rainfall total for West Memphis for the month of February is 4.48 inches (see Appendix D for rainfall information). The most recent recorded rainfall prior to the site visit was in West Memphis which recorded 2.35 inches on February 12, 2019.

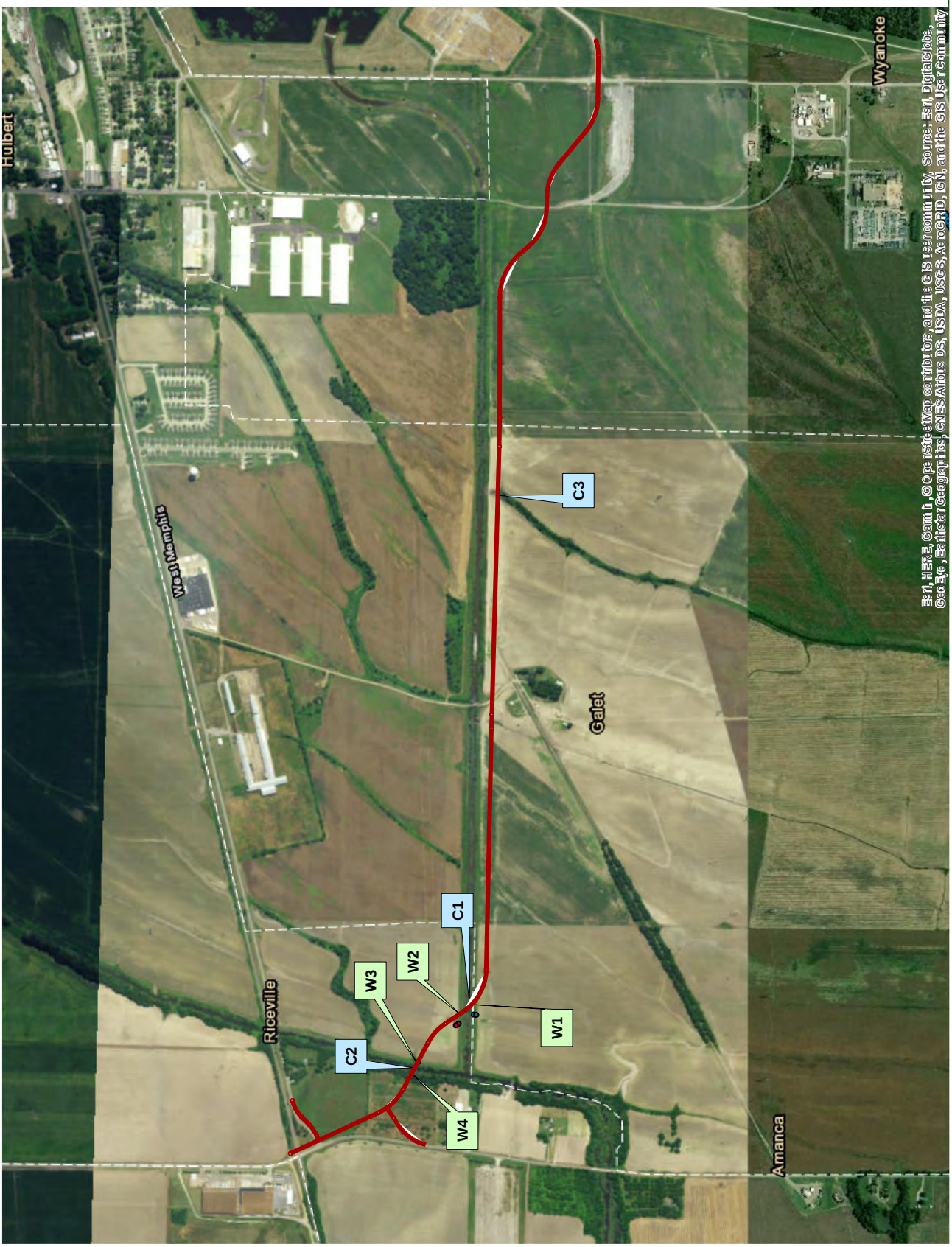
Vegetation

Plant communities in the project area consisted of Johnsongrass (*Sorghum halepense*), yellow foxtail (*Setaria pumila*), smooth sumac (*Rhus glabra*), henbit deadnettle (*Lamium amplexicaule*), scouringrush horsetail (*Equisetum hyemale*), southern dewberry (*Rubus trivialis*), winged elm (*Ulmus alata*), white oak (*Quercus alba*), and southern red oak (*Quercus falcata*). In addition to the natural vegetation, a majority of the project area contains cultivated soybeans (*Glycine max*) and field corn (*Zea mays*).

Soils

Most of the soils underlying the project area have been heavily disturbed for agricultural use. Most of the project area consists of cultivated fields used for farming corn and soybeans. A Natural Resources Conservation Service (NRCS) Custom Soil Resource Report determined eight soil types are underlying the project area. The report shows the majority of the study area (30.8%) is underlain by Tunica clay, 0 to 1 percent slopes, which is poorly drained and has a hydric rating of 15. Alligator silty clay, 0 to 1 percent slopes, occupies 25.2% of the project area. This type of soil is poorly drained, rarely floods, and has a hydric rating of 95. Sharkey silty clay, 0 to 1 percent slopes, is poorly drained and occupies 25.1% of the project area. Tunica clay, gently undulating, occupies 10.1% of the area. This soil is poorly drained and has a hydric rating of 15. The remaining 7.3% of the project area consists of Dundee silt loam gently undulating (somewhat poorly drained), Bowdre silty clay, 0 to 1 percent slope (somewhat poorly drained), Dundee silt loam, 0 to 1 percent slope (somewhat poorly drained), and Alligator silty clay gently undulating (poorly drained). These soils have a hydric rating of 10, 15, 6, and 95, respectively.

Figure 4. Location of potentially jurisdictional areas.



Chapter 4. Impacts

Impacts were assessed at each potentially jurisdictional area or assessment location along the project right-of-way. These sites are discussed below according to worksheet page number. Plan and profile sheets have not been developed. All information was grouped according to scale approximately 1:4,000. Bridge crossings for this project were designed in a manner to make crossing as short as possible to minimize impacts to wetlands and channels located in the project area. Furthermore, Build Alternative B was ruled out based on impacts it would impose on wetlands within the project area. Worksheet page numbers in this report start with Page 3.

Worksheet 3

Two tributaries will be bridged (Channel 1 – 150 linear feet and Channel 2 – 250 linear feet) at this location.

The emergent wetlands (Wetland 1 – 0.09 acres, Wetland 2 – 0.11 acres, Wetland 3- 0.08 acres and Wetland 4- 0.11 acres) found around the perimeter of the tributaries will be permanently impacted by the project.

Under the guidance of Mr. Joe Brougher from the Regulatory Branch of U.S. Army Corps of Engineers, Memphis District, data points were not collected along Ten Mile Bayou (Channel 2). While data points were not collected, anticipated impacts in this location (Channel 2- 250 linear feet, Wetland-3- 0.08 acres, and Wetland-4 0.11 acres) were still assessed.

Worksheet 4

A channel crossing will be constructed for the roadway at channel assessment (CA) location 3. The channel will be routed into a 123 linear foot R.C. pipe culvert (Channel-3- 123 linear feet) at this location.

Table 1. Data Point Summary Table

Data Point	Wetland ID#	Site # OR Worksheet #	Latitude*	Longitude*	Approximate Station Number	Section-Township-Range	Area from ROW to ROW (Acres)	Cowardin Classification	Impact**
DP-1	W-2	3	35.11794	-90.22394	112+50	22-6N-8E	0.11	PEM	Permanent fill of 0.11 acres of wetlands for bridge construction
DP-2		3			112+50	22-6N-8E		Upland	
DP-3	W-1	3			118+50	27-6N-8E	0.09	PEM	Permanent fill of 0.09 acres of wetlands for bridge construction
DP-4		3			118+00	27-6N-8E		Upland	

Data points were not collected for W-3 (0.08 acres) and W-4 (0.11 acres) after a conversation with Mr. Joe Brougher from the Regulatory Branch of U.S. Army Corps of Engineers, Memphis District, where he stated that Ten Mile Bayou was jurisdictional wetlands.

DP- Data point- collection point for sampling data for wetland assessment
W- Wetland- areas described as wetlands
PFO- Palustrine Forested
PEM- Palustrine Emergent
PSS- Palustrine Shrub-Scrub
Station Numbers are approximate

Wetland Summary:	4 Total Present (acres)	Permanent Fill (acres)	Temporary Fill (acres)
Forested:	0.11	0.11	0.00
Shrub-Scrub:	0.0	0	0.00
Emergent:	0.28	0.28	0.00
Total	**0.39**	**0.39**	**0.00**

Table 2. Channel Assessment Table

CA #	Site #/ OR Worksheet #	Latitude*	Longitude*	Section-Township-Range	Sta.	Type	Length in Project Area (feet)	Channel Width (feet)	Name	Impact**
1	3	35.11770	-90.22387	22-6N-8E	115 +50	P	115	150	Drainage Ditch # 20	150ft- New bridge construction
2	3	35.11930	-90.22559	22-6N-8E	108 +50	P	115	280	Ten Mile Bayou	280ft- New bridge construction
3	4	35.11689	-90.20470	26-6N-8E	171 +50	I	123	123	Former Ditch #20	123ft- R.C. Pipe Culvert

CA- Channel Assessment- Channel Assessment point location
Type:
P-Perennial
I-Intermittent
E-Ephemeral
OHWM-Ordinary High Water Mark
Station numbers (Sta.) are approximate

CA Summary	Total Present (ft)	New Bridge Width Shade/ Clear (ft)	Temporary Bridge Width Shade/ clear (ft)	Culvert/ Pipe (ft)	Rip-Rap/ Armor (ft)	Relocate and Fill (ft)	New Channel with rip-rap (ft)
Perennial:	430	430	0	0	0	0	0
Intermittent:	123	0	0	123	0	0	0
Ephemeral:	0	0	0	0	0	0	0
Total (P.I.E.)	**553**	**430**	**0**	**123**	**0**	**0**	**0**

Table 3. Pond Assessment Table

Pond ID #	Latitude*	Longitude*	Approximate Sta.	Section-Township-Range	Size (Acres)	Impact
N/A						

Pond Summary: **0.0 acres Total**

0.0 acres Permanent Loss

Chapter 5. References

Phone: [Joe Brougher. 2/12/2019. Ten Mile Bayou. U.S. Army Corps of Engineers (USACE). 901-544-3472. No data points collected along Ten Mile Bayou].

E-mail: [Joe Brougher. 2/11/2019. South Loop Extension. USACE. Joseph.F.Brougher@usace.army.mil. Review of project location].

Godfrey, RK and Wooten, JW. 1981. *Aquatic Plants of the Southeastern United States: Dioctyledons and Monoctyledons.* University of Georgia Press. Athens, GA.

U.S. Army Corps of Engineers (USACE). Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual.* Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Memphis, TN.

U.S. Army Corps of Engineers (USACE). 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain (Version 2.0).* ed. Wakeley JS, Lichvar RW and Noble CV. EDRC/ EL TR- 10-20. Memphis, TN: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2007. *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (Rapanos Guidance).

U.S. Army Corps of Engineers (USACE). 2009. North American Digital Flora: National Wetland Plant List. rsgis.crrel.usace.army.mil, Accessed February 2019.

U.S. Department of Agriculture (USDA). Natural Resource Conservation Service (NRCS). 2006. *Field Indicators of the Hydric Soils in the United States.* Version 6.0. ed. Hurt GS and Vasilas LM. USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

USDA, NRCS. 2006. *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin*. U.S. Department of Agriculture Handbook 296.

USDA, NRCS. Web Soil Survey- Custom Soil Report, websoilsurvey.nrcs.usda.gov, Accessed: August 8, 2018

United States Fish and Wildlife Service (USFWS). 1979. *Classification of Wetlands and Deepwater Habitats of the United States* by Cowardin LM, Carter V, Golet FC, LaRoe ET. FWS/ OBS-79/31.

USFWS. 1988. *National List of Plant Species that Occur in Wetlands: Southeast (Region 2)* by Reed PB. Biological Report 88(26.2).

United States Fish and Wildlife Service. National Wetland Inventory (NWI) maps.

United States Geological Survey. National Elevation Dataset Digital Elevation Model. Obtained from the Mississippi Geospatial Clearinghouse, www.gis.ms.gov.

Weather Underground weather website. Accessed February 14, 2019 for rainfall information

Appendix A — Methods and Tools

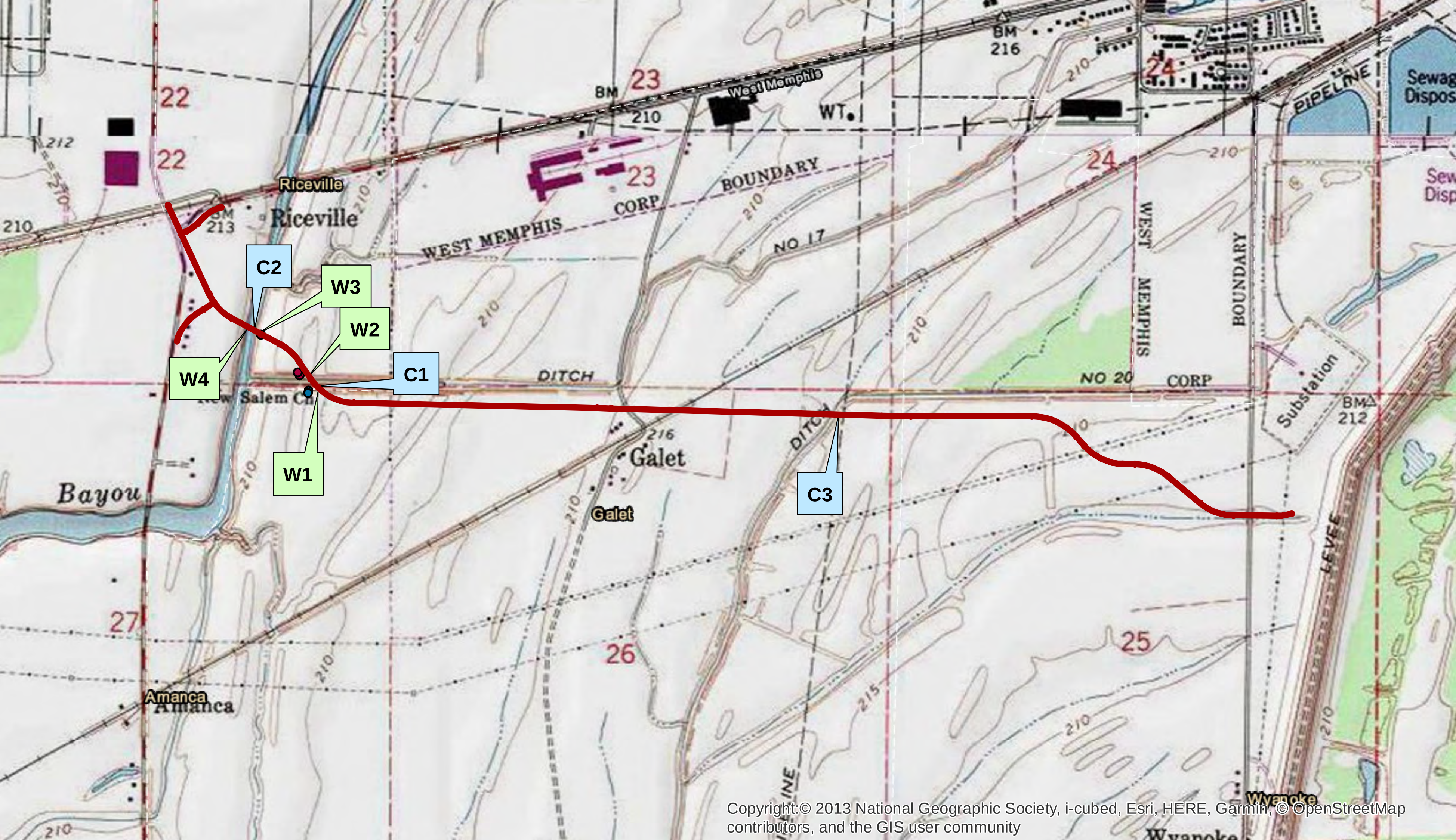
Table A-1. Methods and tools used to prepare the report.

Parameter	Method or Tool	Website	Reference
Wetland Delineation	1987 Manual	http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf	Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, US. Army Engineer Waterways Experiment Station, Vicksburg, Miss.
	Regional Supplement	http://el.erdc.usace.army.mil/elpubs/pdf/trel10-20.pdf	U.S. Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)*, ed. J.S. Wakely, R.W. Lichvar, and C.V. Noble. ERDC/ EL TR-10-20. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
Wetland Classification	USFWS / Cowardin Classification System	http://www.fws.gov/nwi/Pubs_Reports/Class_Manual/class_titlepg.htm	Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. Government Printing Office, Washington, D.C.
Other Waters Delineation	OHWM	http://www.usace.army.mil/inet/functions/cw/cecwo/reg/33cfr328.htm	Congressional Federal Register 33 Part 328 Definition of Waters of the United States.
Hydrology	Technical Standard	http://el.erdc.usace.army.mil/wrap/pdf/tnwrap05-2.pdf	U.S. Army Corps of Engineers. 2005. *Technical Standard for Water-Table Monitoring of Potential Wetland Sites, WRAP Technical Notes Collection* (ERDC TN-WRAP-05-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS.
Plant Indicator Status	Southeast (Region 2) (Reed, 1988)	http://plants.usda.gov/wetinfo.html	Reed, P.B. Jr. 1988. *National list of plant species that occur in wetlands: Southeast* (Region 2) Washington. Biological Report NERC-88/26.2 for National Wetlands Inventory, Washington, D.C.
	National Wetland Plant List	https://rsgis.crrel.usace.army.mil/apex/f?p=703:1:3582582867881596	North American Digital Flora: National Wetland Plant List
	USDA Plant Database	http://plants.usda.gov/	Website (see Appendix A)
Soils Data	Soil Survey	Web Soil Survey: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx Soil Data Mart: http://soildatamart.nrcs.usda.gov/	Website
	Hydric Soil Indicators	http://soils.usda.gov/use/hydric/	USDA Natural Resources Conservation Service. 2006b. *Field indicators of hydric soils in the United States, Version 6.0*. ed. G. W. Hurt and L. M. Vasilas. Fort Worth, TX: USDA NRCS in cooperation with the National Technical Committee for Hydric Soils.
Climate Data	Wets Table	http://www.wcc.nrcs.usda.gov/climate/wetlands.html	Website

Appendix B — Detailed Site Information

Site maps, Plan and Profile Sheets, Wetland Datasheet, Other Water Field Datasheet, Site Photographs


West Memphis
Riceville
C2
W3
W2
W4
C1
W1
C3
Galet
Amanca
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	1	
				(2)	SOUTH LOOP EXTENSION (WEST MEMPHIS)(S)			

CITY OF WEST MEMPHIS, ARKANSAS
CONSTRUCTION PLANS FOR CITY STREET

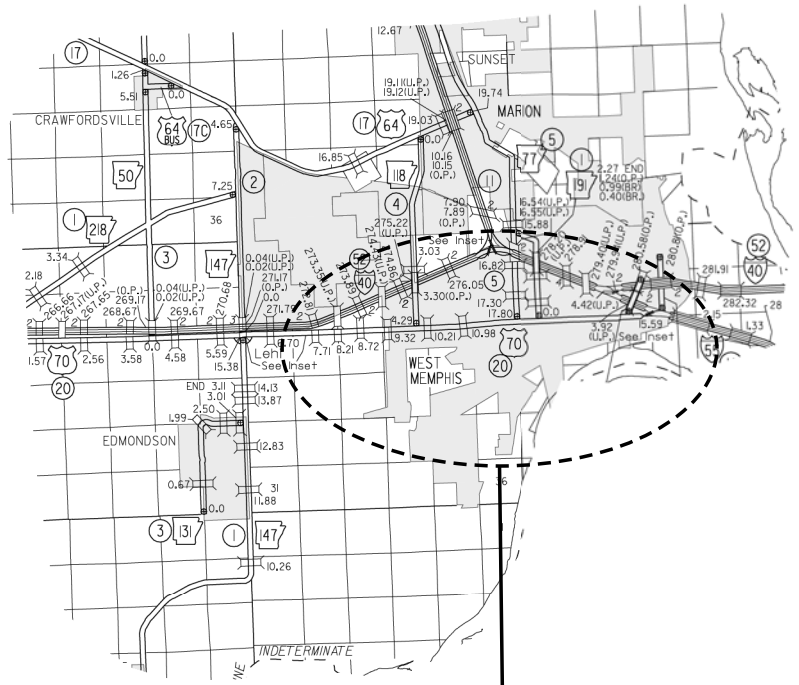
SOUTH LOOP EXTENSION (WEST MEMPHIS)(S)

CRITTENDEN COUNTY

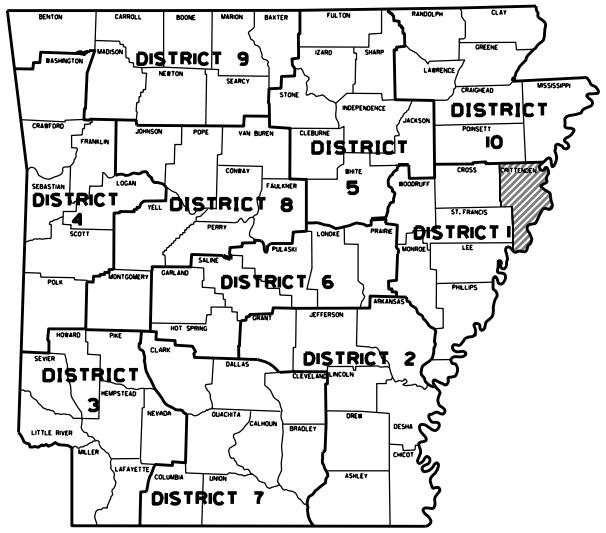
JOB 110676

FED. AID PROJ. STPU-9448(42)

PRELIMINARY
SUBJECT TO REVISION

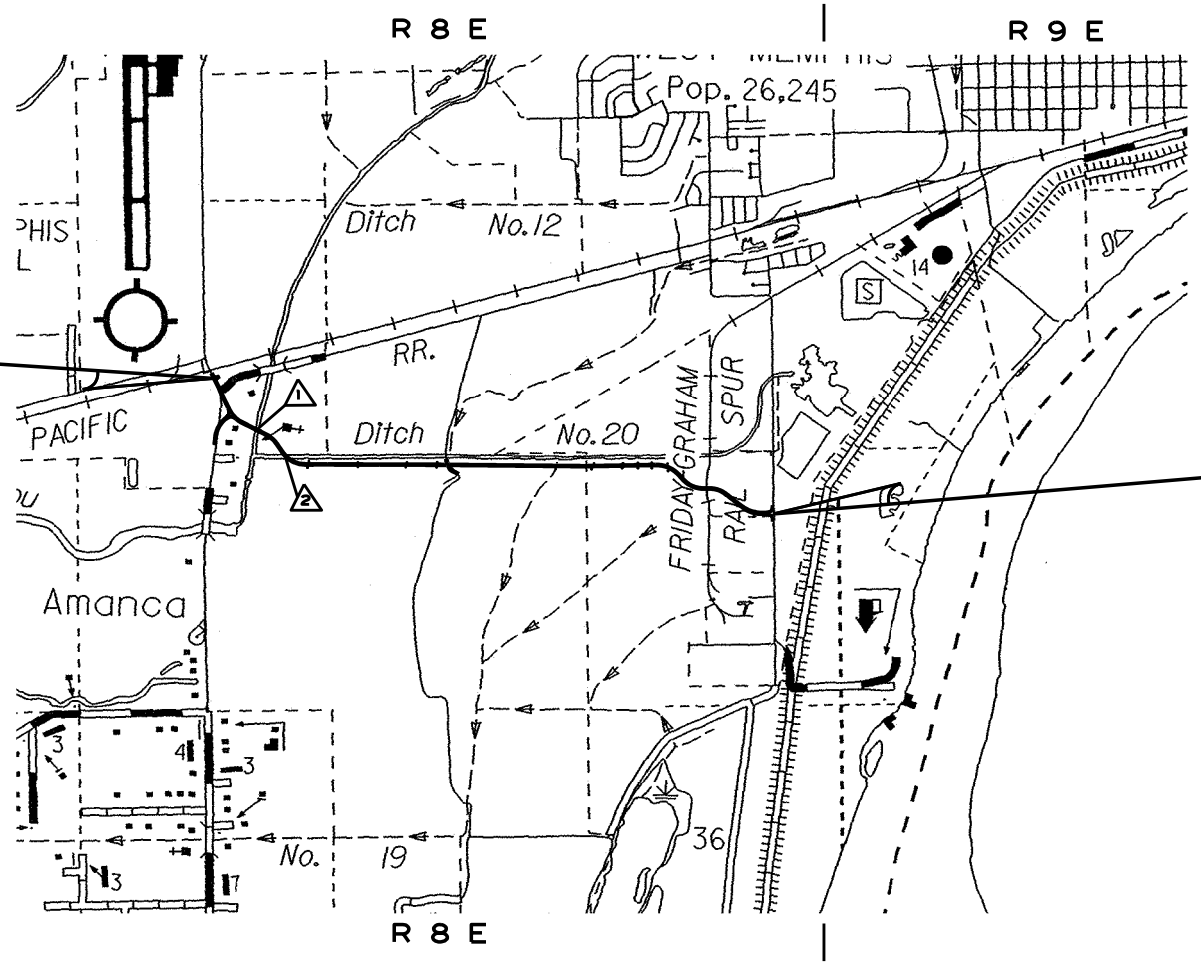


VICINITY MAP



ARK. HWY. DIST. NO. 10

NOT TO SCALE



STA. 92+00.00
BEGIN JOB 110676

STA. 221+34.38
END JOB 110676

STRUCTURES OVER 20'-0" SPAN

(1)

(2)

• DESIGN TRAFFIC DATA •

DESIGN YEAR	2041
2021 ADT	1409
2041 ADT	9373
2041 DHV	1031
DIRECTIONAL DISTRIBUTION	55%/45%
TRUCKS	20%
DESIGN SPEED	40 MPH

	BEGIN PROJECT	MID-POINT OF PROJECT	END PROJECT
LATITUDE	N 35°07'22"	N 35°07'01"	N 36°06'50"
LONGITUDE	W 90°13'43"	W 90°12'37"	W 90°11'22"

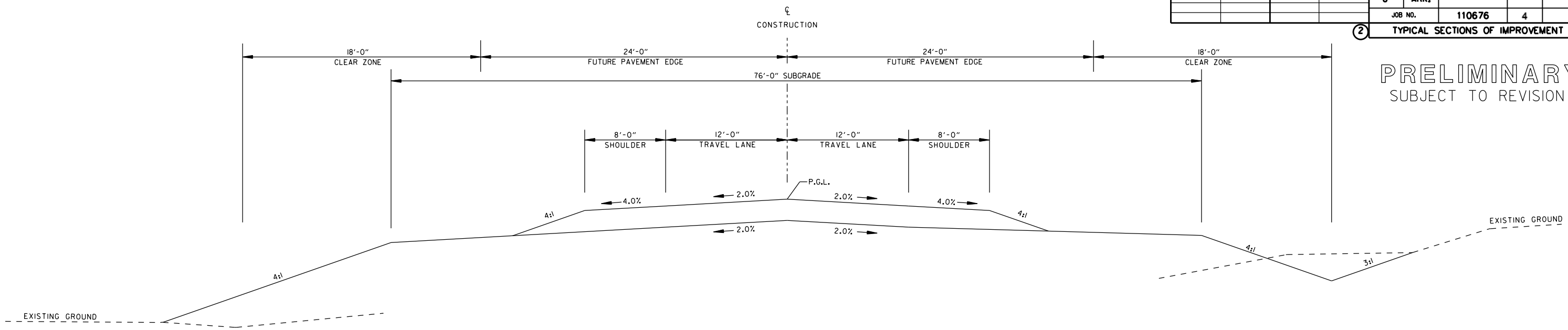
GROSS LENGTH OF PROJECT	12,934.38	FEET	OR	2.450	MILES
NET " " ROADWAY	--	"	"	--	"
NET " " BRIDGES	--	"	"	--	"
NET " " PROJECT	12,934.38	"	"	2.450	"

P.E. JOB 110676
NON. PART.

DATE & TIME: 2/21/2019 11:07:53 AM MODEL: Title Sheet
FILE: J:\2544\Sheets\44T-Title.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	4	
				(2)	TYPICAL SECTIONS OF IMPROVEMENT			

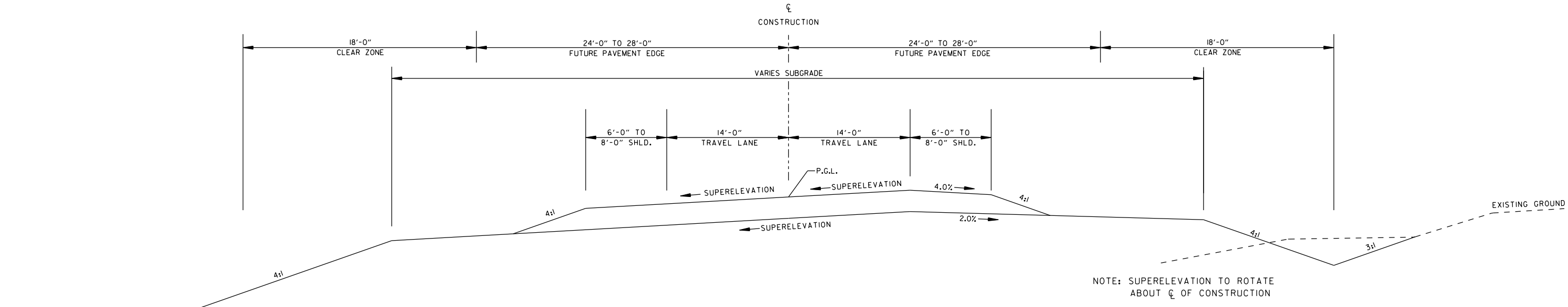
PRELIMINARY
SUBJECT TO REVISION



SOUTH LOOP
2 LANE TYPICAL SECTION
BOP TO STA 99+08.19
STA 105+64.84 TO STA 108+57.63
STA 122+01.95 TO STA 192+20.14

NOTES:

1. REFER TO CROSS SECTIONS FOR DEVIATION FROM THE NORMAL SLOPES. NO CHANGES SHALL BE MADE FROM THE PLANNED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.
2. THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH (25MM) OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.
3. ASPHALT FOR LEVELING OF EXISTING PAVEMENT SHALL BE PLACED ONLY IF AND WHERE DIRECTED BY THE ENGINEER. CALCULATIONS FOR THE AMOUNT OF LEVELING AND/OR LEVELING OPERATIONS SHALL BE PERFORMED BEFORE CONSTRUCTING NOTCH AND WIDENING.



NOTE: SUPERELEVATION TO ROTATE ABOUT ℄ OF CONSTRUCTION

SOUTH LOOP
2 LANE TRANSITION TRACKING
SUPERELEVATED SECTION
STA 99+08.19 TO STA 100+08.19
STA 104+64.84 TO STA 105+64.84
STA 108+57.63 TO STA 109+57.63
STA 121+01.95 TO STA 122+01.95
STA 192+20.14 TO STA 193+20.14

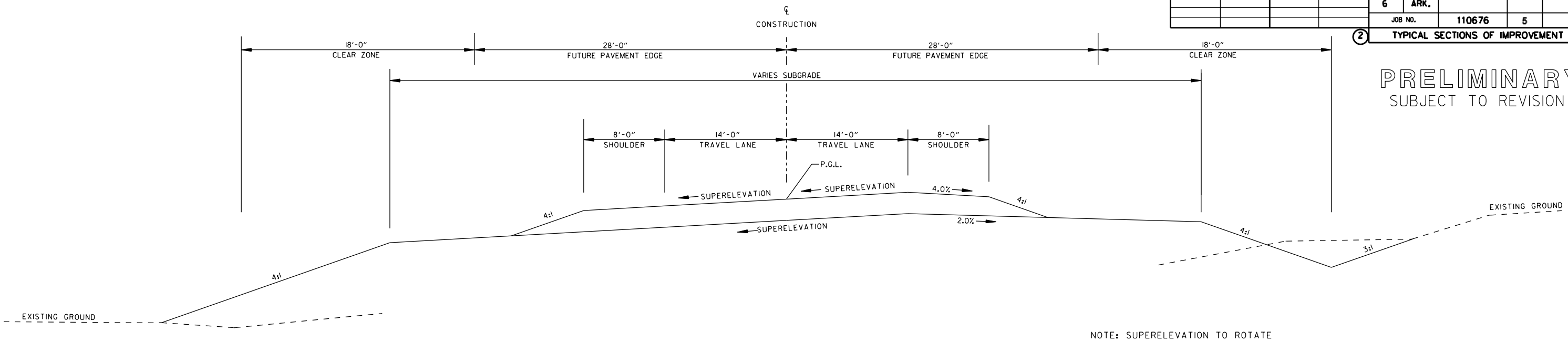
TYPICAL SECTIONS OF IMPROVEMENT

DATE & TIME: 2/21/2019 8:33:32 AM MODEL: PROPOSED DESIGN
FILE: J:\2544T\Sheets\44T-TypicalSections.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	5	

(2) TYPICAL SECTIONS OF IMPROVEMENT

PRELIMINARY
SUBJECT TO REVISION

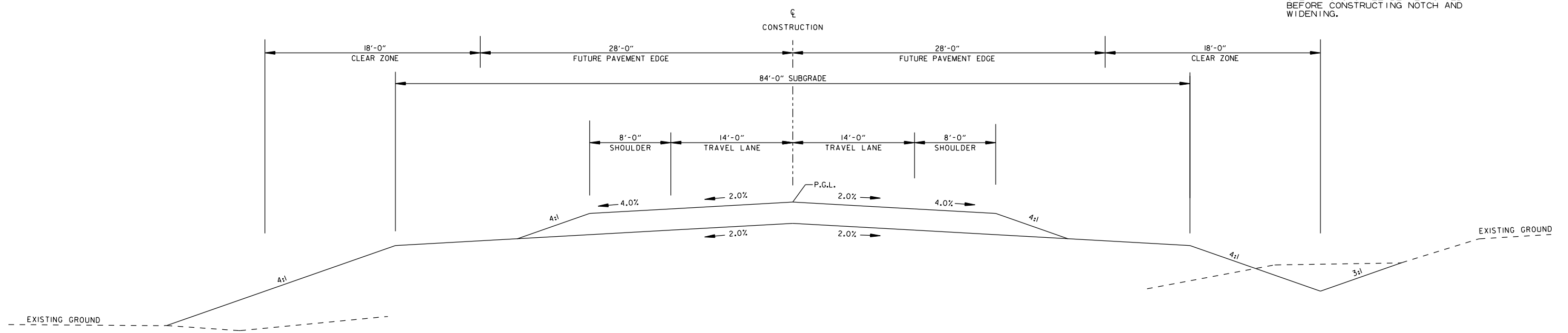


SOUTH LOOP
2 LANE WIDENED FOR OFF TRACKING
SUPERELEVATED SECTION
STA 100+08.19 TO STA 104+64.84
STA 109+57.63 TO STA 121+01.95
STA 193+20.14 TO STA 211+61.89
STA 213+30.71 TO STA 213+55.00

NOTE: SUPERELEVATION TO ROTATE ABOUT ℄ OF CONSTRUCTION

NOTES:

1. REFER TO CROSS SECTIONS FOR DEVIATION FROM THE NORMAL SLOPES. NO CHANGES SHALL BE MADE FROM THE PLANNED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.
2. THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH (25MM) OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.
3. ASPHALT FOR LEVELING OF EXISTING PAVEMENT SHALL BE PLACED ONLY IF AND WHERE DIRECTED BY THE ENGINEER. CALCULATIONS FOR THE AMOUNT OF LEVELING AND/OR LEVELING OPERATIONS SHALL BE PERFORMED BEFORE CONSTRUCTING NOTCH AND WIDENING.



SOUTH LOOP
2 LANE WIDENED FOR OFF TRACKING
TANGENT SECTION
STA 211+61.89 TO STA 213+30.71

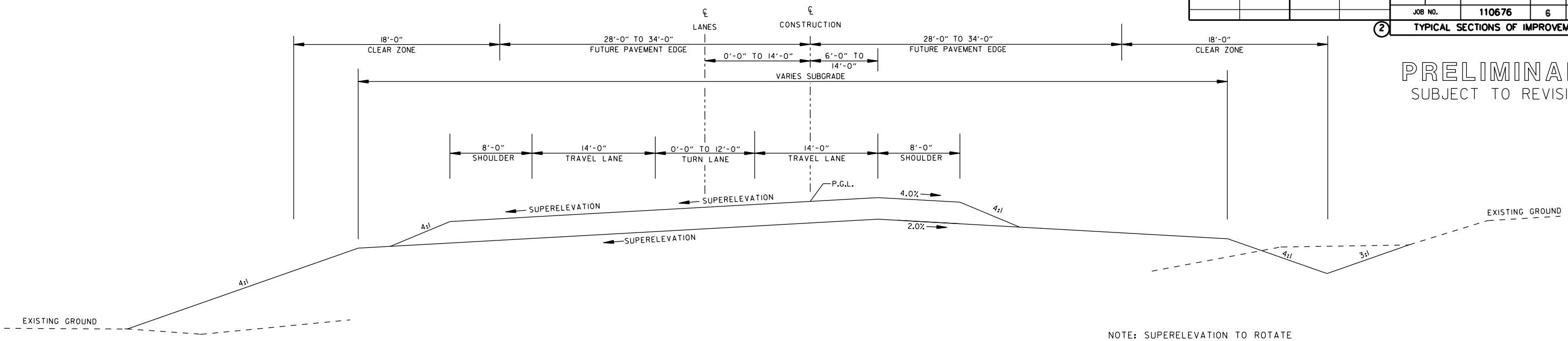
TYPICAL SECTIONS OF IMPROVEMENT

DATE & TIME: 2/2/2009 8:33:33 AM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44-TypicalSections.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	6	

(2) TYPICAL SECTIONS OF IMPROVEMENT

PRELIMINARY
SUBJECT TO REVISION

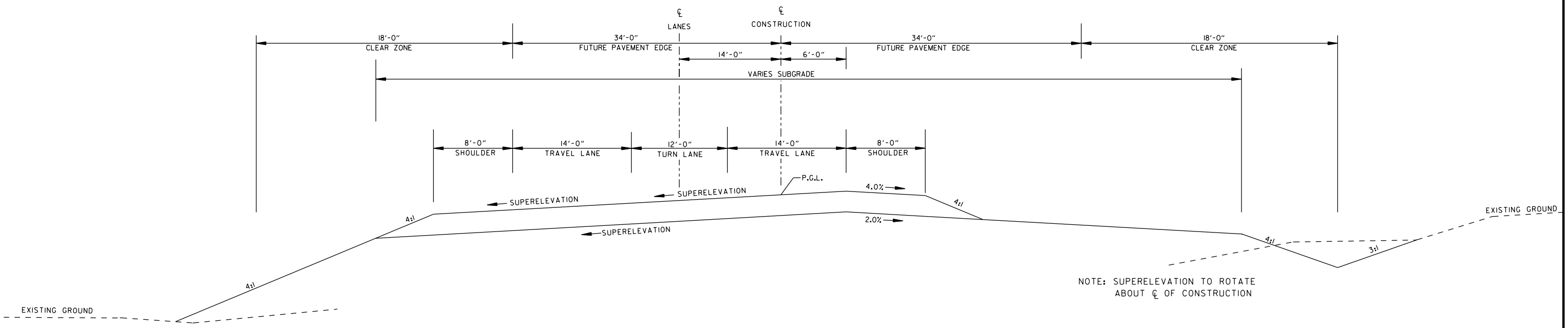


SOUTH LOOP
2 LANE TO 3 LANE TRANSITION
AND LANE SHIFT
SUPERELEVATED SECTION
STA 213+55.00 TO STA 216+55.00

NOTE: SUPERELEVATION TO ROTATE
ABOUT ℄ OF CONSTRUCTION

NOTES:

1. REFER TO CROSS SECTIONS FOR DEVIATION FROM THE NORMAL SLOPES. NO CHANGES SHALL BE MADE FROM THE PLANNED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.
2. THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH (25MM) OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.
3. ASPHALT FOR LEVELING OF EXISTING PAVEMENT SHALL BE PLACED ONLY IF AND WHERE DIRECTED BY THE ENGINEER. CALCULATIONS FOR THE AMOUNT OF LEVELING AND/OR LEVELING OPERATIONS SHALL BE PERFORMED BEFORE CONSTRUCTING NOTCH AND WIDENING.



NOTE: SUPERELEVATION TO ROTATE
ABOUT ℄ OF CONSTRUCTION

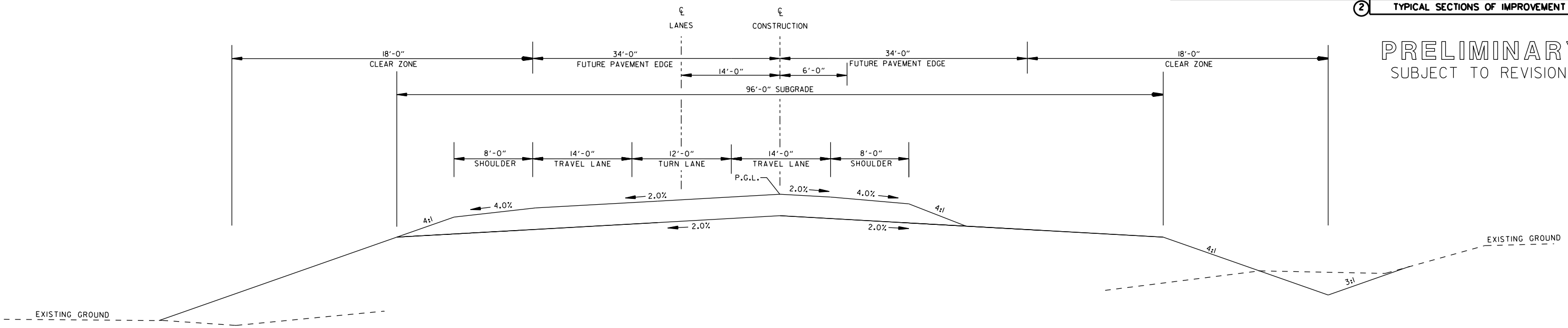
SOUTH LOOP
3 LANE SUPERELEVATED SECTION
STA 216+55.00 TO STA 220+04.82

TYPICAL SECTIONS OF IMPROVEMENT

DATE & TIME: 2/21/2019 8:33:33 AM MODEL: PROPOSED DESIGN
FILE: J42544N\Sheets\44r-TypicalSections.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	7	
				(2)	TYPICAL SECTIONS OF IMPROVEMENT			

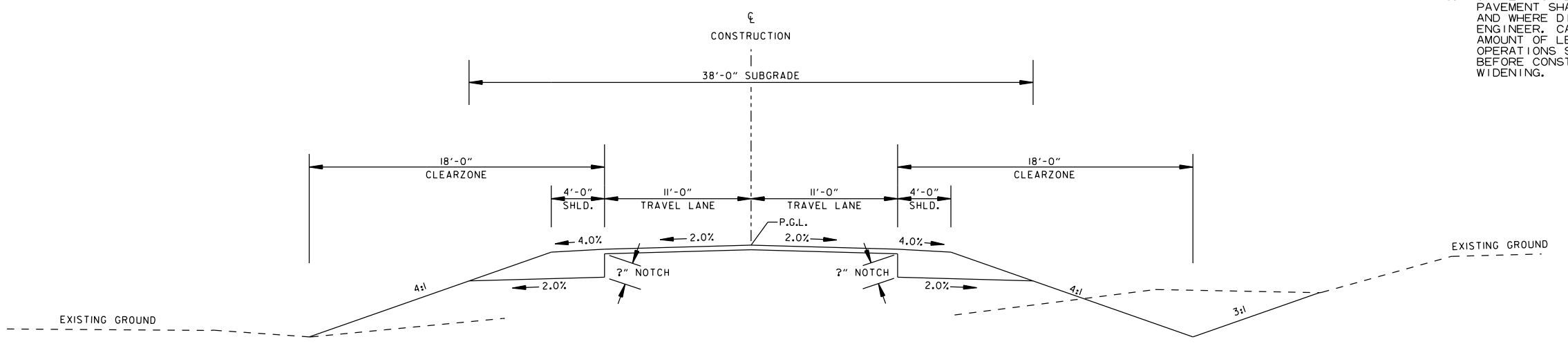
PRELIMINARY
SUBJECT TO REVISION



SOUTH LOOP
3-LANE TYPICAL SECTION
STA 220+04.82 TO EOP

NOTES:

1. REFER TO CROSS SECTIONS FOR DEVIATION FROM THE NORMAL SLOPES. NO CHANGES SHALL BE MADE FROM THE PLANNED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.
2. THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH (25MM) OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.
3. ASPHALT FOR LEVELING OF EXISTING PAVEMENT SHALL BE PLACED ONLY IF AND WHERE DIRECTED BY THE ENGINEER. CALCULATIONS FOR THE AMOUNT OF LEVELING AND/OR LEVELING OPERATIONS SHALL BE PERFORMED BEFORE CONSTRUCTING NOTCH AND WIDENING.

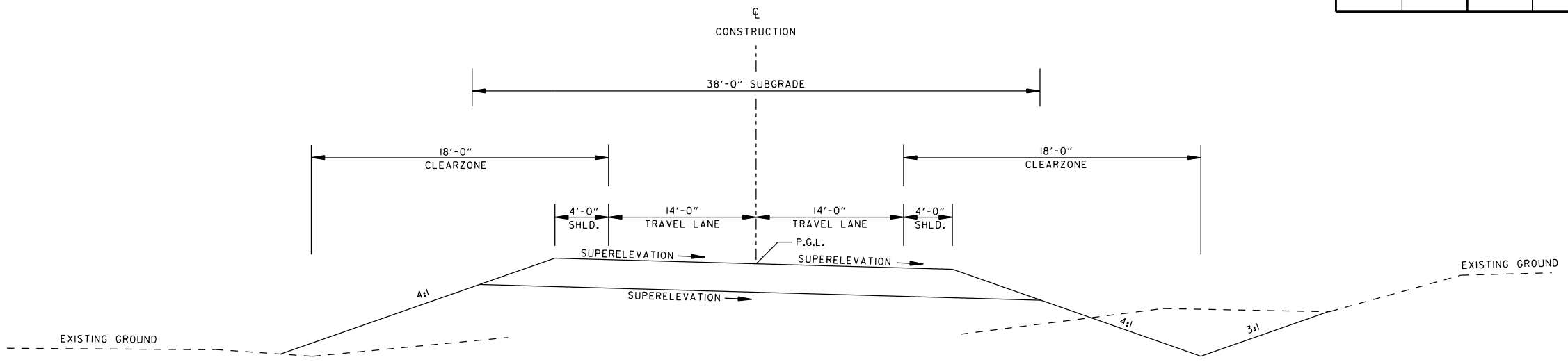


RAINER RD.
AND
WAVERLY RD.
TYPICAL SECTION
STA. 13+50.00 TO STA. 14+45.69 WAVERLY RD.
STA. 10+12.00 TO STA. 11+25.00 RAINER RD.

DATE & TIME: 2/2/2009 8:33:34 AM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44TypicalSections.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	8	
				(2)	TYPICAL SECTIONS OF IMPROVEMENT			

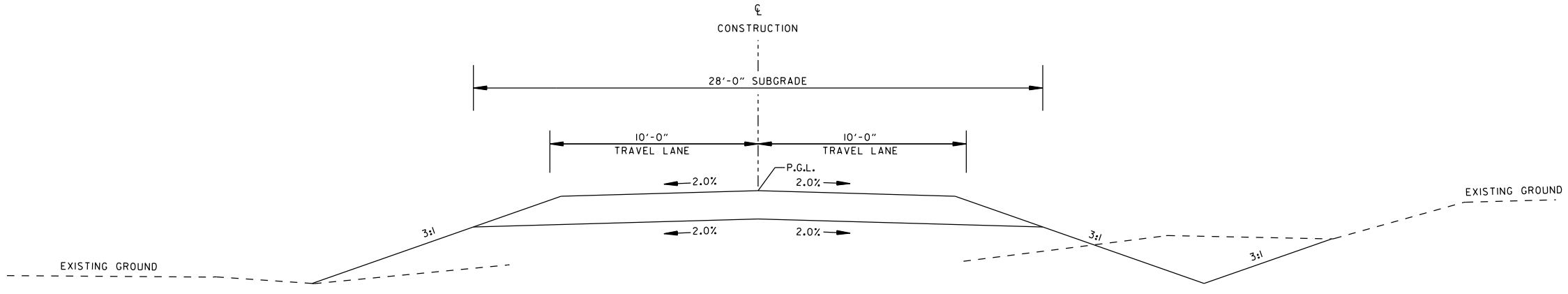
PRELIMINARY
SUBJECT TO REVISION



WAVERLY RD.
SUPERELEVATED
TYPICAL SECTION
STA. 14+45.69 TO STA. 21+14.80

NOTES:

1. REFER TO CROSS SECTIONS FOR DEVIATION FROM THE NORMAL SLOPES. NO CHANGES SHALL BE MADE FROM THE PLANNED SLOPES WITHOUT THE APPROVAL OF THE ENGINEER.
2. THE THICKNESS OF AGGREGATE BASE COURSE SHALL BE WITHIN PLUS OR MINUS ONE INCH (25MM) OF THE PLAN THICKNESS SHOWN. THE CONTRACTOR WILL CORRECT ANY DEFICIENT THICKNESS THAT DOES NOT MEET TOLERANCE INDICATED. PAYMENT WILL NOT BE MADE FOR MATERIAL PLACED IN EXCESS OF THE TOLERANCE INDICATED.
3. ASPHALT FOR LEVELING OF EXISTING PAVEMENT SHALL BE PLACED ONLY IF AND WHERE DIRECTED BY THE ENGINEER. CALCULATIONS FOR THE AMOUNT OF LEVELING AND/OR LEVELING OPERATIONS SHALL BE PERFORMED BEFORE CONSTRUCTING NOTCH AND WIDENING.



BOLLINGER RD.
TYPICAL SECTION
STA. 12+03.87 TO STA. 16+37.54

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	46	

(2) PLAN AND PROFILE SHEETS

STA. 90+88.67 ON SOUTH LOOP
= CENTERLINE OF SOUTHERN PACIFIC RAILROAD
Δ = 78° 17' 01.47"

SOUTHERN PACIFIC RAILROAD

90 EXIST. R/W

FROM 1976'S

EXIST. R/W

P.T. 12+31.22

RAINER RD.
P.I. = 11+43.95
Δ = 20° 33' 54.5" LT.
D = 11° 39' 15.3"
T = 89.19'
L = 176.46'
R = 491.63

P.I. 11+43.95

PROP. ROW

P.C. 10+54.76

RAINER RD.

60' R

95 STA. 93+36.90 ON SOUTH LOOP
= STA. 10+00.00 ON RAINER RD.
Δ = 90° 00' 00.00"

SOUTH LOOP

PROP. ROW

STA. 92+00.00
START JOB 110676

(1) FERGUSON E S & BRYANT FAMILY PROPERTIES LP

(2) PATRICIA ANN WAGGENER

(2) PATRICIA ANN WAGGENER

100 STA. 101+51.99 ON SOUTH LOOP EXT.
= STA. 21+28.76 ON WAVERLY RD.
Δ = 90° 00' 00.00"

+08.19 PAVEMENT TRANSITION SEE SPECIAL DETAILS +08.19

P.C. 100+50.69

PROP. ROW

8' 12' 12' 8' 14' 14' 8'

EXISTING WAVERLY RD.

PROP. ROW

WAVERLY RD.

20

P.I. 102+43.31

P.T. 19+94.54

P.T. 104+22.34

+64.84 PAVEMENT TRANSITION SEE SPECIAL DETAILS +64.84

PROP. ROW

8' 14' 14' 8'

SOUTH LOOP

PROP. ROW

(2) PATRICIA ANN WAGGENER

SOUTH LOOP
P.I. = 102+43.31
Δ = 37° 09' 53.0" LT.
D = 10° 00' 00.0"
T = 192.63'
L = 371.65'
e = 4.0%
R = 572.96
V = 40 MPH

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

STA. 99+08.19 BEGIN SUPERELEVATION (N.C.)
STA. 100+98.19 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 103+74.84 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 105+64.84 END SUPERELEVATION (N.C.)

K = 159.8
VC = 200'
e = 0.31'

K = 266.7
VC = 200'
e = -0.19'

P.V.I. 92+00.00 ELEV. 218.23
P.V.I. 93+00.00 ELEV. 217.60
P.V.I. 94+00.00 ELEV. 217.01
P.V.C. 99+00.00 ELEV. 214.50
P.V.I. 100+00.00 ELEV. 214.00
P.V.T. 101+00.00 ELEV. 214.75
P.V.C. 103+00.00 ELEV. 216.25
P.V.I. 104+00.00 ELEV. 217.00
P.V.T. 105+00.00 ELEV. 217.00

-0.63% -0.59% -0.50% 0.75%

280 270 260 250 240 230 220 210 200 190

90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00 101+00 102+00 103+00 104+00 105+00

PRELIMINARY
SUBJECT TO REVISION

DATE & TIME: 2/21/2019 12:40:5 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	47	

(2) PLAN AND PROFILE SHEETS

SOUTH LOOP
P. I. = 111+44.58
Δ = 28°17'59.6" RT.
D = 10°00'00.0"
T = 144.45'
L = 283.00'
e = 4.0%
R = 572.96
V = 40 MPH

SOUTH LOOP
P. I. = 118+07.70
Δ = 55°00'13.3" LT.
D = 10°00'00.0"
T = 298.29'
L = 550.04'
e = 4.0%
R = 572.96
V = 40 MPH

SOUTH LOOP EXTENSION

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

STA. 99+08.19 BEGIN SUPERELEVATION (N.C.)
STA. 100+98.19 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 103+74.84 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 105+64.84 END SUPERELEVATION (N.C.)

STA. 108+57.63 BEGIN SUPERELEVATION (N.C.)
STA. 110+47.63 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 112+35.63 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 115+56.91 REVERSE SUPERELEVATION (0.040 FT./FT.)

STA. 112+35.63 REVERSE SUPERELEVATION (0.040 FT./FT.)
STA. 115+56391 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 120+11.95 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 122+01.95 END SUPERELEVATION (N.C.)

NOTE:
THE TEN MILE BAYOU IS CLASSIFIED AS A _ C.F.S. STREAM.
THE TOP OF THE CHANNEL ELEVATION IS --- FT. MSL.
REFER TO SECTION 110.05(C) OF THE 2014 STANDARD SPECIFICATIONS.

NOTE:
THE DITCH 17/20 IS CLASSIFIED AS A _ C.F.S. STREAM.
THE TOP OF THE CHANNEL ELEVATION IS --- FT. MSL.
REFER TO SECTION 110.05(C) OF THE 2014 STANDARD SPECIFICATIONS.

K = 83.3
VC = 200'
e = -0.60'

P.V.C. 118+00.00
ELEV. 217.00

P.V.I. 119+00.00
ELEV. 217.00

P.V.T. 120+00.00
ELEV. 214.60

0.00%

Q100 DESIGN H.W. ELEVATION 208.00

Q100 DESIGN H.W. ELEVATION 208.00

PRELIMINARY
SUBJECT TO REVISION

105+00 106+00 107+00 108+00 109+00 110+00 111+00 112+00 113+00 114+00 115+00 116+00 117+00 118+00 119+00 120+00

170 180 190 200 210 220 230 240 250 260

DATE & TIME: 2/21/2019 12:40:5 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44f-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	48	

(2) PLAN AND PROFILE SHEETS

CHANNEL BOTTOM
DITCH 17/20
(6) LEONARD CIELL MILLER
CHANNEL BOTTOM
(1) FERGUSON E S & BRYANT FAMILY PROPERTIES, L.P.
CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM
(7) BOLLINGER BROS INC.
CHANNEL BOTTOM

120 | 125 | 130 | 135

+01.95 PAVEMENT TRANSITION SEE SPECIAL DETAILS +01.95

PROP. ROW
PROP. ROW / EXIST. P.D.E.
PROP. ROW / EXIST. P.D.E.
PROP. ROW
PROP. ROW

8' 14' 14' 8' | 8' 12' 12' 8' | 8' 12' 12' 8'

P.T. 120+59.45

STA. 121+12 CONSTRUCT
DBL. 36" x 112' R.C. PIPE CULVERT
D.A. = 31.18 AC. Q50 = 132.82 CFS

(1) FERGUSON E S & BRYANT FAMILY PROPERTIES, L.P.

STA. 131+57 CONSTRUCT
24" x 87' R.C. PIPE CULVERT
D.A. = 6.40 AC. Q50 = 28.86 CFS

(7) BOLLINGER BROS INC.

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

STA. 112+35.63 REVERSE SUPERELEVATION (0.040 FT./FT.)
STA. 115+56391 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 120+11.95 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 122+01.95 END SUPERELEVATION (N.C.)

K = 69.0
VC = 200'
e = 0.73'

K = 200.0
VC = 200'
e = -0.25'

K = 200.0
VC = 200'
e = 0.25'

P.V.T. 120+00.00 ELEV. 214.60
P.V.C. 120+50.00 ELEV. 213.40
P.V.I. 121+50.00 ELEV. 211.00
P.V.T. 122+50.00 ELEV. 211.50
P.V.C. 125+50.00 ELEV. 213.00
P.V.I. 126+50.00 ELEV. 213.50
P.V.T. 127+50.00 ELEV. 213.00
P.V.C. 130+50.00 ELEV. 211.50
P.V.I. 131+50.00 ELEV. 211.00
P.V.T. 132+50.00 ELEV. 211.50

2.40% 0.50% -0.50% 0.50%

270 | 260 | 250 | 240 | 230 | 220 | 210 | 200 | 190 | 180

STA. 121+12
F.L. INLET RT. = 206.29
F.L. OUTLET LT. = 206.01

STA. 131+57
F.L. INLET RT. = 207.00
F.L. OUTLET LT. = 206.80

PRELIMINARY
SUBJECT TO REVISION

120+00 | 121+00 | 122+00 | 123+00 | 124+00 | 125+00 | 126+00 | 127+00 | 128+00 | 129+00 | 130+00 | 131+00 | 132+00 | 133+00 | 134+00 | 135+00

DATE & TIME: 2/21/2019 12:40:5 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\447-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	49	

(2) PLAN AND PROFILE SHEETS

CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM

(10) CITY OF WEST MEMPHIS

CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM

135 | 140 | 145 | 150

(7) BOLLINGER BROS INC.

N

SOUTH LOOP
P.I. = 147+55.39
Δ = 00°22'51.7" RT.
D = 00°15'00.0"
T = 76.20'
L = 152.41'
e = NC
R = 22918.31
V = 40 MPH

P.I. 147+55.39

PROP. ROW / EXIST. P.D.E.
PROP. ROW / EXIST. P.D.E.
PROP. ROW / EXIST. P.D.E.

8'
12'
12'
8'

PROP. ROW
PROP. ROW
PROP. ROW

STA. 141+71 CONSTRUCT
DBL. 30" x 99' R.C. PIPE CULVERT
D.A. = 14.51 AC. Q50 = 70.78 CFS

(7) BOLLINGER BROS INC.

P.C. 146+79.19
P.T. 148+31.60

STA. 148+07 CONSTRUCT
DBL. 30" x 101' R.C. PIPE CULVERT
D.A. = 5.57 AC. Q50 = 49.71 CFS

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

PRELIMINARY
SUBJECT TO REVISION

K = 200.0
VC = 200'
e = -0.25'

K = 186.7
VC = 200'
e = 0.27'

K = 161.5
VC = 200'
e = -0.31'

K = 75.0
VC = 100'
e = 0.17'

P.V.C. 135+50.00 ELEV. 213.00
P.V.I. 136+50.00 ELEV. 213.50
P.V.T. 137+50.00 ELEV. 213.00
P.V.C. 140+50.00 ELEV. 211.50
P.V.I. 141+50.00 ELEV. 211.00
P.V.T. 142+50.00 ELEV. 211.57
P.V.C. 144+00.00 ELEV. 212.43
P.V.I. 145+00.00 ELEV. 213.00
P.V.T. 146+00.00 ELEV. 212.33
P.V.C. 147+50.00 ELEV. 211.33
P.V.I. 148+00.00 ELEV. 211.00
P.V.T. 148+50.00 ELEV. 211.33

0.50% | -0.50% | 0.57% | -0.67% | 0.67%

STA. 141+71
F.L. INLET RT. = 206.20
F.L. OUTLET LT. = 206.00

STA. 148+07
F.L. INLET RT. = 205.80
F.L. OUTLET LT. = 205.70

270 260 250 240 230 220 210 200 190 180

135+00 136+00 137+00 138+00 139+00 140+00 141+00 142+00 143+00 144+00 145+00 146+00 147+00 148+00 149+00 150+00

DATE & TIME: 2/21/2019 12:40:6 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	50	

(2) PLAN AND PROFILE SHEETS

CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM

(10) CITY OF WEST MEMPHIS

CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM

STA. 150+36.34 ON SOUTH LOOP
= STA. 13+35.66 ON BOLLINGER RD
Δ = 110° 12' 37.61"

(7) BOLLINGER BROS INC.

BOLLINGER RD.
P. I. = 12+20.76
Δ = 15° 06' 36.9" LT.
D = 45° 00' 00.0"
T = 16.89'
L = 33.58'
R = 127.32
V = 20 MPH

P. C. 12+03.87
P. I. 12+20.76
P. T. 12+37.45

STA. 150+15 LT CONSTRUCT
DBL. 1 18" x 50' SIDE DRAIN
D. A. = 0.79 AC. Q10 = 6.02 CFS

PROP. ROW / EXIST. P.D.E.

155 160 165

N

PROP. ROW / EXIST. P.D.E.

8' 12' 12' 8'

SOUTH LOOP

GRAVEL TRAIL

P. C. 13+94.40

PROP. ROW PROP. ROW PROP. ROW

STA. 150+56 RT CONSTRUCT
DBL. 1 18" x 52' SIDE DRAIN
D. A. = 0.86 AC. Q10 = 9.80 CFS

P. I. 14+48.13

BOLLINGER RD.
P. I. = 14+48.13
Δ = 45° 45' 14.2" LT.
D = 44° 59' 59.9"
T = 53.72'
L = 101.68'
R = 127.32
V = 20 MPH

STA. 152+53 RT. IN PLACE
12" x 28' C.M. PIPE
TO REMAIN

BOLLINGER RD.

P. T. 14+96.08

P. C. 16+07.94

(7) BOLLINGER BROS INC.

BOLLINGER RD.
P. I. = 17+22.36
Δ = 120° 51' 29.6" RT.
D = 88° 15' 00.0"
T = 114.42'
L = 136.95'
R = 64.92
V = 20 MPH

P. I. 17+22.36

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

K = 111.4
VC = 100'
e = -0.11'

P.V.C. 155+00.00
ELEV. 215.67

P.V.I. 155+50.00
ELEV. 216.00

P.V.T. 156+00.00
ELEV. 215.88

0.67%

-0.23%

270 260 250 240 230 220 210 200 190 180

150+00 151+00 152+00 153+00 154+00 155+00 156+00 157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00 165+00

PRELIMINARY
SUBJECT TO REVISION

DATE & TIME: 2/21/2019 12:40:6 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	51	

(2) PLAN AND PROFILE SHEETS

(8) ACBL TRANSPORTATION SERVICES LLC

CHANNEL BOTTOM

DITCH 17/20

CHANNEL BOTTOM

(7) BOLLINGER BROS INC.

STA. 173+00 LT. IN PLACE
72" x 49' C.M. PIPE
TO REMAIN

GAS

P.C. 177+47.18

(8) ACBL TRANSPORTATION SERVICES LLC

PROP. ROW / EXIST. P.D.E.

8'
12'
12'
8'

EXIST. DITCH

PROP. ROW

P.I. 179+02.66

STA. 172+83 CONSTRUCT
DBL. 48" x 123' R.C. PIPE CULVERT
D.A. = 64.35 AC. Q50 = 200.99 CFS

SOUTH LOOP
P.I. = 179+02.66
Δ = 01°33'17.1" LT.
D = 00°30'00.0"
T = 155.48'
L = 310.95'
e = NC
R = 11459.16
V = 40 MPH

(8) ACBL TRANSPORTATION SERVICES LLC

EXIST. DITCH

(7) BOLLINGER BROS INC.

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

PRELIMINARY
SUBJECT TO REVISION

K = 90.2
VC = 100'
e = 0.14'

K = 114.0
VC = 100'
e = -0.11'

P.V.C. 172+30.00
ELEV. 212.12

P.V.I. 172+80.00
ELEV. 212.00

P.V.T. 173+30.00
ELEV. 212.44

P.V.C. 178+00.00
ELEV. 216.56

P.V.I. 178+50.00
ELEV. 217.00

P.V.T. 179+00.00
ELEV. 217.00

-0.23%

0.88%

0.00%

STA. 172+83
F.L. INLET RT. = 203.36
F.L. OUTLET LT. = 203.29

270 260 250 240 230 220 210 200 190 180

165+00 166+00 167+00 168+00 169+00 170+00 171+00 172+00 173+00 174+00 175+00 176+00 177+00 178+00 179+00 180+00

DATE & TIME: 2/21/2019 12:40:6 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	52	

(2) PLAN AND PROFILE SHEETS

CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM
DITCH 17/20
CHANNEL BOTTOM

STA. 180+90 LT. IN PLACE
DBL. 30" x 68' C.M. PIPE
TO REMAIN

(8) ACBL TRANSPORTATION SERVICES LLC

DIAMOND PIPELINE

(9) ALLEN COX, III, FAMILY L.P.

STA. 186+91 LT. IN PLACE
24" x 64' C.M. PIPE
TO REMAIN

STA. 189+97 LT. IN PLACE
DBL. 24" x 90' C.M. PIPE
TO REMOVE 28'

+20.14 PAVEMENT TRANSITION SEE SPECIAL DETAILS

+20.14

STA. 192+88 LT. IN PLACE
DBL. 18" x 73' C.M. PIPE
TO REMOVE 13'

P.T. 180+58.13

PROP. ROW / EXIST. P.D.E.

PROP. ROW / EXIST. P.D.E.

PROP. ROW / EXIST. P.D.E.

EXIST. P.D.E.

PROP. ROW

EXIST. DITCH

EXIST. DITCH

EXIST. DITCH

8'
12'
12'
8'

8'
14'
14'
8'

PROP. ROW

PROP. ROW

P.C. 193+62.64

PROP. ROW

STA. 180+64 CONSTRUCT
DBL. 18" x 124' R.C. PIPE CULVERT
D.A. = 1.26 AC. Q50 = 11.28 CFS

STA. 186+76 CONSTRUCT
DBL. 30" x 94' R.C. PIPE CULVERT
D.A. = 18.78 AC. Q50 = 87.76 CFS

STA. 189+94 CONSTRUCT
DBL. 30" x 104' R.C. PIPE CULVERT
D.A. = 15.01 AC. Q50 = 66.14 CFS

STA. 192+82 CONSTRUCT
DBL. 18" x 105' R.C. PIPE CULVERT
D.A. = 5.38 AC. Q50 = 27.44 CFS

(8) ACBL TRANSPORTATION SERVICES LLC

(9) ALLEN COX, III, FAMILY L.P.

DIAMOND PIPELINE

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

STA. 192+20.14 BEGIN SUPERELEVATION (N.C.)
STA. 194+10.14 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 198+58.91 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 200+76.20 REVERSE SUPERELEVATION (0.040 FT./FT.)

PRELIMINARY
SUBJECT TO REVISION

K = 133.3
VC = 100'
e = -0.09'

K = 87.0
VC = 100'
e = 0.14'

K = 120.0
VC = 100'
e = -0.10'

P.V.C. 181+50.00
ELEV. 217.00

P.V.I. 182+00.00
ELEV. 217.00

P.V.T. 182+50.00
ELEV. 216.63

P.V.C. 189+50.00
ELEV. 211.38

P.V.I. 190+00.00
ELEV. 211.00

P.V.T. 190+50.00
ELEV. 211.20

P.V.C. 194+50.00
ELEV. 212.80

P.V.I. 195+00.00
ELEV. 213.00

0.00%

-0.75%

0.40%

STA. 180+64
F.L. INLET RT. = 208.18
F.L. OUTLET LT. = 208.00

STA. 186+76
F.L. INLET RT. = 205.21
F.L. OUTLET LT. = 205.01

STA. 189+94
F.L. INLET RT. = 203.42
F.L. OUTLET LT. = 203.21

STA. 192+82
F.L. OUTLET LT. = 203.92
F.L. INLET RT. = 203.99

270 260 250 240 230 220 210 200 190 180

180+00 181+00 182+00 183+00 184+00 185+00 186+00 187+00 188+00 189+00 190+00 191+00 192+00 193+00 194+00 195+00

DATE & TIME: 2/21/2019 12:40:17 PM MODEL: PROPOSED DESIGN
FILE: J:\25447\Sheets\447-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	53	

(2) PLAN AND PROFILE SHEETS

STA. 195+72 IN PLACE
DBL. 30" x 63' C.M. PIPE
TO REMAIN

P. I. 196+52.36

SOUTH LOOP
P. I. = 196+52.36
Δ = 48°56'23.9" RT.
D = 09°00'00.0"
T = 289.72'
L = 543.78'
e = 4.0%
R = 636.62
V = 40 MPH

STA. 196+26 CONSTRUCT
DBL. 30" x 144' R.C. PIPE CULVERT
D.A. = 7.08 AC. Q50 = 68.10 CFS

P.C. 200+28.79

P.T. 199+06.41

P. I. 202+82.43

SOUTH LOOP
P. I. = 202+82.43
Δ = 47°46'17.0" LT.
D = 10°00'00.0"
T = 253.73'
L = 477.71'
e = 4.0%
R = 572.96
V = 40 MPH

STA. 205+66.32 ON SOUTH LOOP
= CENTERLINE OF FRIDAY-GRAHAM RAIL SPUR
Δ = 89°42'48.42"

P.T. 205+06.41

P.C. 206+36.19

P. I. 208+35.26

SOUTH LOOP
P. I. = 208+35.26
Δ = 38°19'11.4" RT.
D = 10°00'00.0"
T = 199.08'
L = 383.20'
e = 4.0%
R = 572.96
V = 40 MPH

P.T. 210+19.39

ALLEN COX, III, FAMILY L.P. (9)

CITY OF WEST MEMPHIS (10)

FRIDAY-GRAHAM RAILROAD SPUR

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

STA. 192+20.14 BEGIN SUPERELEVATION (N.C.)
STA. 194+10.14 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 198+58.91 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 200+76.20 REVERSE SUPERELEVATION (0.040 FT./FT.)

STA. 198+58.92 REVERSE SUPERELEVATION (0.040 FT./FT.)
STA. 200+76.20 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 204+58.91 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 205+66.32 MATCH FRIDAY-GRAHAM RAIL SPUR
STA. 206+83.69 REVERSE SUPERELEVATION (0.040 FT./FT.)

STA. 204+58.91 REVERSE SUPERELEVATION (0.040 FT./FT.)
STA. 205+66.32 MATCH FRIDAY-GRAHAM RAIL SPUR
STA. 206+83.69 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 209+71.89 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 211+61.89 END SUPERELEVATION (N.C.)

PRELIMINARY
SUBJECT TO REVISION

K = 120.0
VC = 100'
e = -0.10'

K = 240.0
VC = 100'
e = -0.05'

K = 117.6
VC = 100'
e = 0.11'

K = 63.5
VC = 100'
e = 0.20'

K = 63.5
VC = 100'
e = -0.20'

K = 1065.5
VC = 150'
e = -0.03'

O.H.E. +36.57'
ELEV. = 242.27'
REQUIRED CLEARANCE = 30'

O.H.E. +34.88
ELEV. = 240.62'
REQUIRED CLEARANCE = 30'

P.V.I. 195+00.00 ELEV. 213.00
P.V.T. 195+50.00 ELEV. 212.78
STA. 196+26
F.F.L. OUTLET LT. = 202.62
F.F.L. INLET RT. = 203.18
P.V.C. 197+50.00 ELEV. 211.92
P.V.I. 198+00.00 ELEV. 211.70
P.V.T. 198+50.00 ELEV. 211.27
P.V.C. 199+50.00 ELEV. 210.43
P.V.I. 200+00.00 ELEV. 210.00
P.V.T. 200+50.00 ELEV. 210.00
P.V.C. 202+50.00 ELEV. 210.00
P.V.I. 203+00.00 ELEV. 210.00
P.V.T. 203+50.00 ELEV. 210.79
P.V.C. 204+50.00 ELEV. 212.36
P.V.I. 205+00.00 ELEV. 213.15
P.V.T. 205+50.00 ELEV. 213.15
P.V.C. 206+25.00 ELEV. 213.15
P.V.I. 207+00.00 ELEV. 213.15
P.V.T. 207+75.00 ELEV. 213.04

-0.43% -0.85% 0.00% 1.58% 0.00% -0.14%

270 260 250 240 230 220 210 200 190 180

195+00 196+00 197+00 198+00 199+00 200+00 201+00 202+00 203+00 204+00 205+00 206+00 207+00 208+00 209+00 210+00

DATE & TIME: 2/21/2019 12:40:17 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	54	
				(2)	PLAN AND PROFILE SHEETS			

STA. 221+16.71 ON SOUTH LOOP
= STA. 13+19.80 ON PORT RD.
Δ = 89° 59' 04.48"

STA. 221+24 LT. IN PLACE
24" x 81' R.C. PIPE CULVERT
TO REMAIN

STA. 221+24 RT. IN PLACE
36" x 82' R.C. PIPE CULVERT
TO REMAIN

STA. 221+04.58
END JOB 110676

P.T. 210+19.39

P.C. 214+73.21

P.T. 218+62.32

SOUTH LOOP
P.I. = 216+75.60
Δ = 38° 54' 39.6" LT.
D = 10° 00' 00.0"
T = 202.39'
L = 389.11'
e = 4.0%
R = 572.96
V = 40 MPH

P.I. 216+75.60

STA. 217+32 CONSTRUCT
30" x 107' R.C. PIPE CULVERT
D.A. = 2.75 AC. Q50 = 19.57 CFS

ALLEN COX, III, FAMILY L.P. (9)

WEST MEMPHIS TRANSLOAD LLC (12)

PAVEMENT TRANSITION *55.00

PROP. ROW, TRAIL, EXIST. DITCH, EXIST. ROW, OHE, STOP, SOUTH LOOP, PORT RD., EXIST. RAILROAD

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

SOUTH LOOP EXTENSION

STA. 204+58.91 REVERSE SUPERELEVATION (0.040 FT./FT.)
STA. 205+66.32 MATCH FRIDAY-GRAHAM SPUR
STA. 206+83.69 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 209+71.89 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 211+61.89 END SUPERELEVATION (N.C.)

STA. 213+30.71 BEGIN SUPERELEVATION (N.C.)
STA. 215+20.71 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 218+14.82 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 220+04.82 END SUPERELEVATION (N.C.)

O.H.E. +07.29
ELEV.= 275.45'
REQUIRED CLEARANCE = 40'

K = 164.9
VC = 100'
e = 0.08'

P.V.C. 216+80.00 ELEV. 211.77
P.V.I. 217+30.00 ELEV. 211.70
P.V.T. 217+80.00 ELEV. 211.93
P.V.I. 221+04.58 ELEV. 213.44
P.V.I. 221+16.35 ELEV. 213.70

-0.14%
0.47%
2.18%

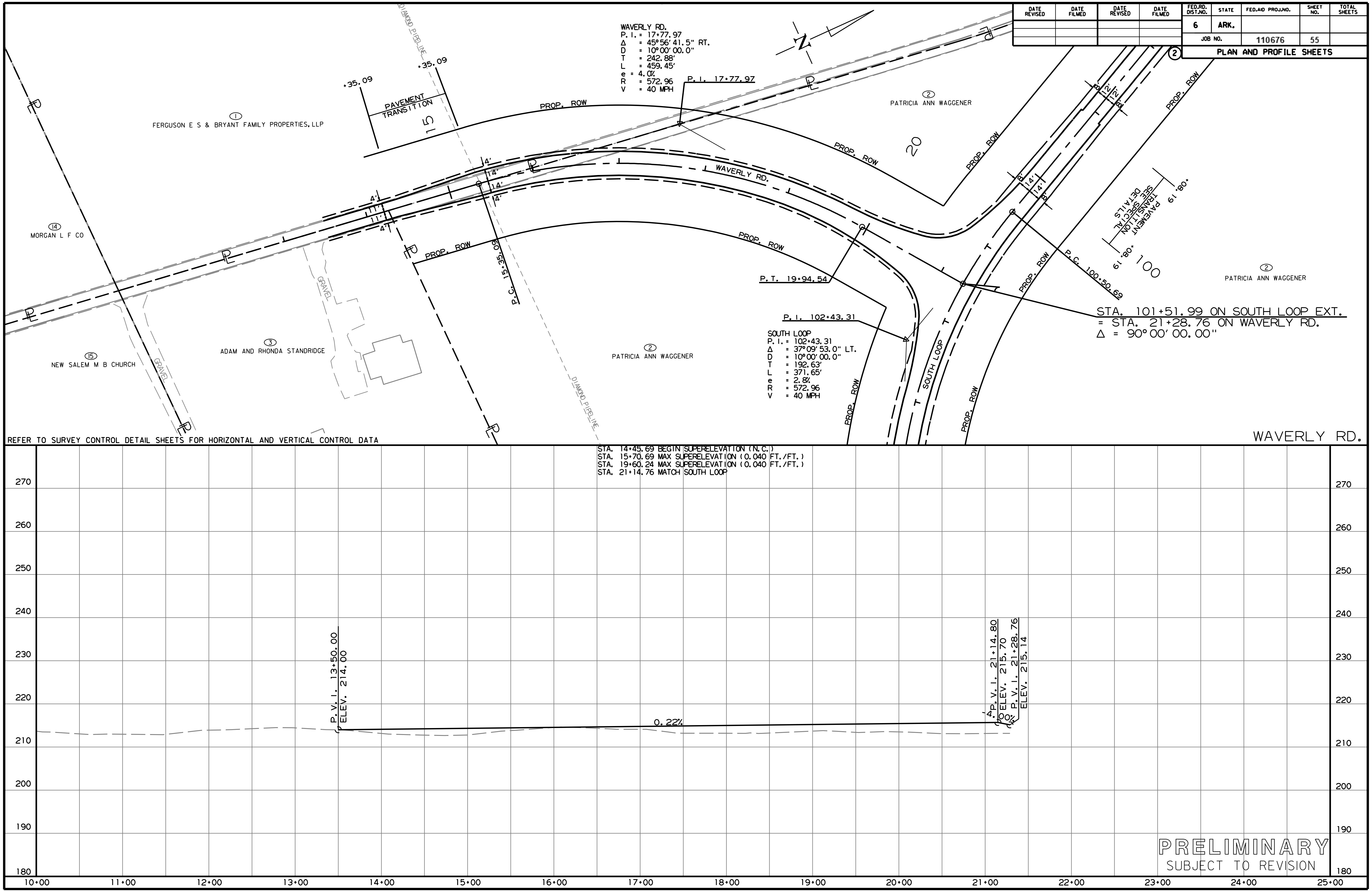
STA. 217+32
F.L. INLET RT. = 207.09
F.L. OUTLET LT. = 206.96

PRELIMINARY
SUBJECT TO REVISION

DATE & TIME: 2/21/2019 12:40:18 PM MODEL: PROPOSED DESIGN
FILE: J:\2544T\Sheets\44T-PNP_MainLanes.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		110676	55	

(2) PLAN AND PROFILE SHEETS



WAVERLY RD.
P. I. = 17+77.97
Δ = 45°56' 41.5" RT.
D = 10°00' 00.0"
T = 242.88'
L = 459.45'
e = 4.0%
R = 572.96
V = 40 MPH
P. I. 17+77.97
+35.09
PAVEMENT TRANSITION
15
FERGUSON E S & BRYANT FAMILY PROPERTIES, LLP
PROP. ROW
PATRICIA ANN WAGGENER
20
WAVERLY RD.
DIAMOND PIPELINE
MORGAN L F CO
NEW SALEM M B CHURCH
GRAVEL
ADAM AND RHONDA STANDRIDGE
P.C. 15+35.09
P.T. 19+94.54
P. I. 102+43.31
SOUTH LOOP
P. I. = 102+43.31
Δ = 37°09' 53.0" LT.
D = 10°00' 00.0"
T = 192.63'
L = 371.65'
e = 2.8%
R = 572.96
V = 40 MPH
SOUTH LOOP
+80.19
PAVEMENT TRANSITION SEE SPECIAL DETAILS
100
P.C. 100+50.69
STA. 101+51.99 ON SOUTH LOOP EXT.
= STA. 21+28.76 ON WAVERLY RD.
Δ = 90°00' 00.00"
REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA
WAVERLY RD.
STA. 14+45.69 BEGIN SUPERELEVATION (N.C.)
STA. 15+70.69 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 19+60.24 MAX SUPERELEVATION (0.040 FT./FT.)
STA. 21+14.76 MATCH SOUTH LOOP
P.V.I. 13+50.00
ELEV. 214.00
0.22%
P.V.I. 21+14.80
ELEV. 215.70
P.V.I. 21+28.76
ELEV. 215.14
-4.00%
270
260
250
240
230
220
210
200
190
180
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
PRELIMINARY
SUBJECT TO REVISION

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED

FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
6	ARK.			
JOB NO.		110676	56	

(2) PLAN AND PROFILE SHEETS

(1) FERGUSON P.S. & BRYANT FAMILY PROPERTIES, L.P.

(10) CITY OF WEST MEMPHIS

(7) BOLLINGER BROS INC.

(16) FIRST COMMUNITY BANK OF EASTERN ARKANSAS

EXIST. P.D.E.

PROP. ROW / EXIST P.D.E.

PROP. ROW

CHANNEL BOTTOM

DITCH IZ/20

BOLLINGER RD.

GRAVEL

TRAIL

SOUTH LOOP

BOLLINGER RD.
P. I. = 17+22.36
Δ = 120°51'29.6" RT.
D = 88°15'00.0"
T = 114.42'
L = 136.95'
R = 64.92
V = 20 MPH

P. I. 17+22.36

STA. 152+33 RT. IN PLACE
12" × 28' C.M. PIPE
TO REMAIN

P. C. 16+07.94
P. T. 17+44.89

STA. 150+56
RT CONSTRUCT
18" × 52'
SIDE DRAIN

P. I. 14+96.08

P. I. 14+48.13

STA. 150+15
LT CONSTRUCT
18" × 50'
SIDE DRAIN

P. C. 12+03.87
P. I. 12+20.76
P. T. 12+37.45

10'
10'

BOLLINGER RD.
P. I. = 12+20.76
Δ = 15°06'36.9" LT.
D = 45°00'00.0"
T = 16.89'
L = 33.58'
R = 127.32
V = 20 MPH

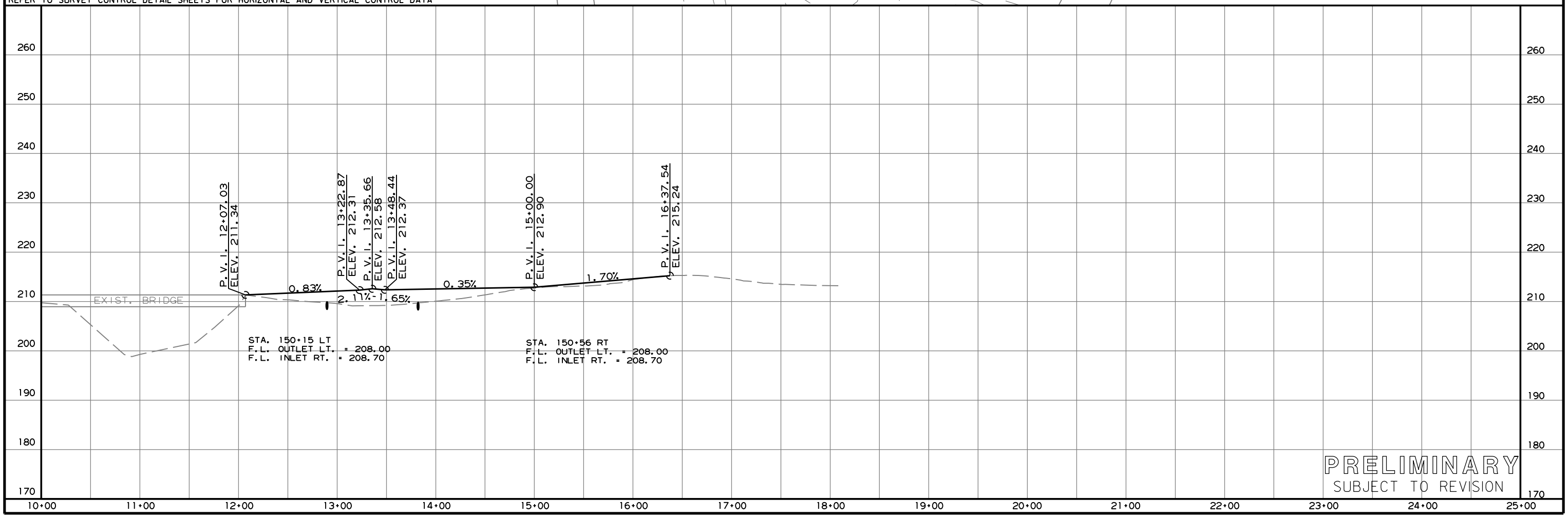
BOLLINGER RD.
P. I. = 14+48.13
Δ = 45°45'14.2" LT.
D = 44°59'59.9"
T = 53.72'
L = 101.68'
e = 4.0%
R = 127.32
V = 20 MPH

P. C. 13+94.40

STA. 150+36.34 ON SOUTH LOOP EXT.
= STA. 13+35.66 ON BOLLINGER RD.
Δ = 110°12'37.61"

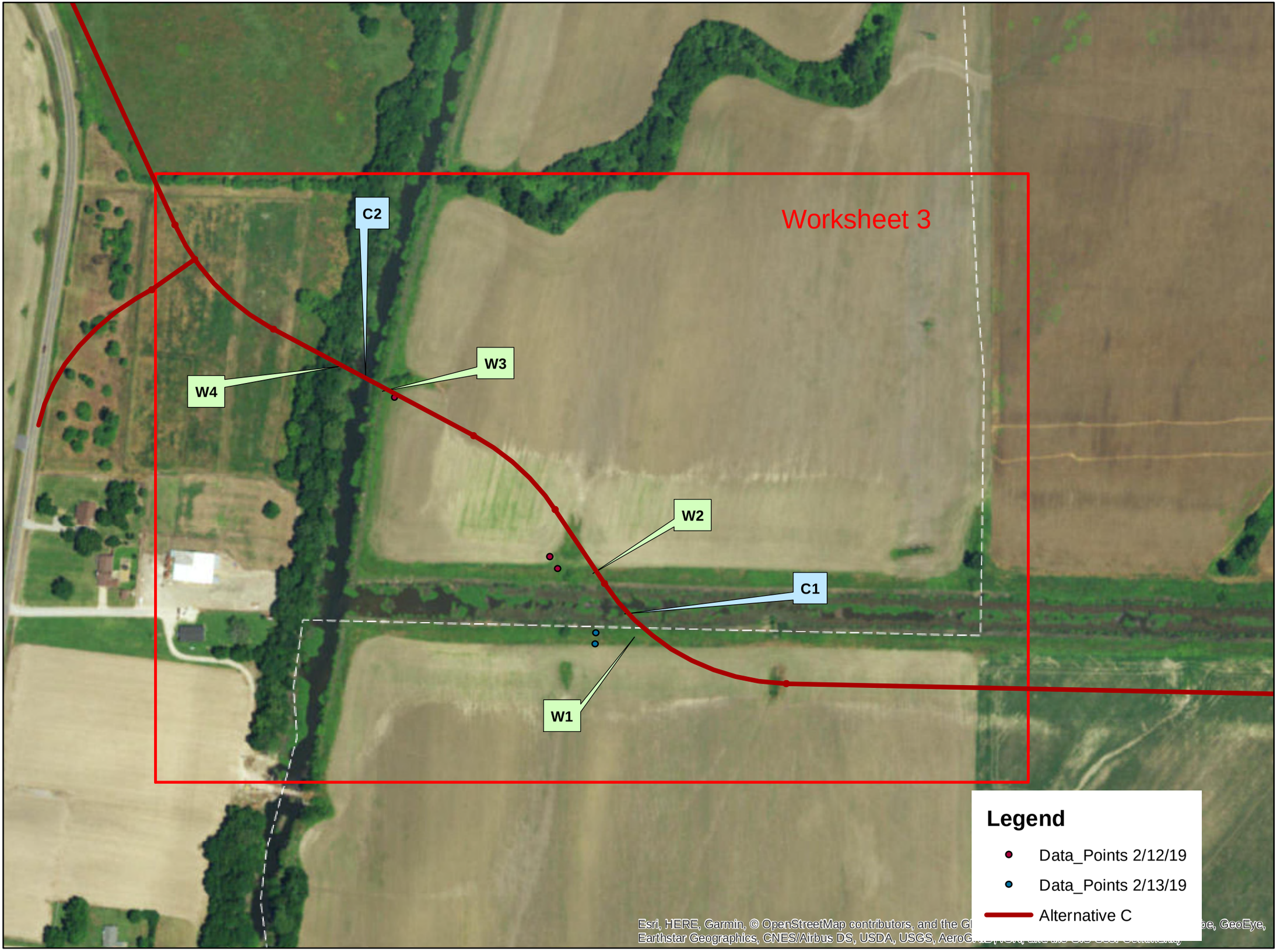
REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL AND VERTICAL CONTROL DATA

BOLLINGER RD.



PRELIMINARY
SUBJECT TO REVISION

DATE & TIME: 2/21/2019 12:40:9 PM MODEL: PROPOSED DESIGN
FILE: J:\2544\Sheets\44r-PNP_Bollinger.dgn


Worksheet 3
C2
W3
W4
W2
C1
W1
Legend
Data_Points 2/12/19
Data_Points 2/13/19
Alternative C
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GI
Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroG
be, GeoEye,

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: South Loop Extension City/County: West Memphis/Crittenden Sampling Date: 2/12/2019

Applicant/Owner: The City of West Memphis State: AR Sampling Point: DP-1

Investigator(s): Pickering Firm, Inc. Section, Township, Range: Section 22, T 6 N, R 8 E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 40

Subregion (LRR or MLRA): MLRA-131A, LLR-O Lat: 35.11794 Long: -90.22394 Datum: WGS84

Soil Map Unit Name: Alligator silty clay, 0 to 1 percent slopes NWI classification: R4SBCx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ✓ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ✓	Depth (inches): ____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-1

Tree Stratum (Plot sizes: 1/10 acre)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (1/10 acre)			
1. Rhus glabra	10	yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
	10 = Total Cover		
Herb Stratum (1/10 acre)			
1. Sorghum halepense	70	yes	FACU
2. Equisetum hyemale	20	yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		
Woody Vine Stratum (1/10 acre)			
1. Rubus trivialis	5	yes	FACU
2.			
3.			
4.			
5.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	75	x 4 =	300
UPL species	10	x 5 =	50
Column Totals:	105 (A)		390 (B)

Prevalence Index = B/A = 3.71

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	3/2 10 yr	100					Silt Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ✓ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

DP-1- WETLAND HABITAT

VIEW OF WETLAND SOILS LOCATED AT DATA POINT 1.

DP-1- WETLAND HABITAT

VIEW LOOKING EAST ACROSS WETLAND HABITAT.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: South Loop Extension City/County: West Memphis/Crittenden Sampling Date: 2/12/2019

Applicant/Owner: The City of West Memphis State: AR Sampling Point: DP-2

Investigator(s): Pickering Firm, Inc. Section, Township, Range: Section 22, T 6 N, R 8 E

Landform (hillslope, terrace, etc.): agricultural field Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR or MLRA): MLRA-131A, LLR-O Lat: 35.11803 Long: -90.22400 Datum: WGS84

Soil Map Unit Name: Tunica clay, 0 to 1 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ✓	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-2

Tree Stratum (Plot sizes: 1/10 acre)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (1/10 acre)			
1. Lamium amplexicaule	60	yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (1/10 acre)			
1. Rubus trivialis	5	yes	FACU
2.			
3.			
4.			
5.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	60	x 5 =	300
Column Totals:	65 (A)		320 (B)

Prevalence Index = B/A = 4.92

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	3/2 10 yr	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

DP-2-UPLAND HABITAT

VIEW OF UPLAND SOILS LOCATED AT DATA POINT 2.

DP-2- UPLAND HABITAT

VIEW LOOKING WEST ACROSS UPLAND HABITAT.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: South Loop Extension City/County: West Memphis/Crittenden Sampling Date: 2/13/2019

Applicant/Owner: The City of West Memphis State: AR Sampling Point: DP-3

Investigator(s): Pickering Firm, Inc. Section, Township, Range: Section 27, T 6 N, R 8 E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 40

Subregion (LRR or MLRA): MLRA-131A, LLR-O Lat: 35.11749 Long: -90.22361 Datum: WGS84

Soil Map Unit Name: Alligator silty clay, 0 to 1 percent slopes NWI classification: R4SBCx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-3

Tree Stratum (Plot sizes: 1/10 acre)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (1/10 acre)			
1. Sorghum halepense	60	yes	FACU
2. Equisetum hyemale	20	yes	FACW
3. Setaria pumila	20	yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	4/2 2.5 yr	100					Silt Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

DP-3-WETLAND HABITAT

VIEW OF WETLAND SOILS LOCATED AT DATA POINT 3.

DP-3-WETLAND HABITAT

VIEW LOOKING WEST ALONG WETLAND HABITAT.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: South Loop Extension City/County: West Memphis/Crittenden Sampling Date: 2/12/2019

Applicant/Owner: The City of West Memphis State: AR Sampling Point: DP-4

Investigator(s): Pickering Firm, Inc. Section, Township, Range: Section 27, T 6 N, R 8 E

Landform (hillslope, terrace, etc.): agricultural field Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR or MLRA): MLRA-131A, LLR-O Lat: 35.11742 Long: -90.22362 Datum: WGS84

Soil Map Unit Name: Alligator silty clay, 0 to 1 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____ No ✓	Depth (inches): _____
Water Table Present?	Yes _____ No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____ No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-4

Tree Stratum (Plot sizes: 1/10 acre)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (1/10 acre)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (1/10 acre)			
1. Lamium amplexicaule	60	yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60 = Total Cover		
Woody Vine Stratum (1/10 acre)			
1. Rubus trivialis			
2.			
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 0	x 1 = 0
FACW species 0	x 2 = 0
FAC species 0	x 3 = 0
FACU species 0	x 4 = 0
UPL species 60	x 5 = 300
Column Totals: 60 (A)	300 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	4/2 2.5yr	100					Silt Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

DP-4-UPLAND HABITAT

VIEW OF HYDRIC SOILS LOCATED AT DATA POINT 4.

DP-4-UPLAND HABITAT

VIEW LOOKING WEST ALONG UPLAND HABITAT.

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

Project: South Loop Extenstion	**City/County/State:** West Memphis/Crittenden Co./ Arkansas	
Investigator(s): Pickering Firm, Inc.	**Lat:** 35.11770 **Long:** -90.22387	**Sample Location ID:** CA-1
Applicant/Owner: City of West Memphis	**Date:** 2/12/2019	
Reason for Survey: Bridge Crossing for south loop extension project.		
River Basin/HUC Number: Lower St. Francis/ 08020203 **Size of Watershed:** 1,957,832.7 Acres **Size of Drainage Area:** 3023.68 miles squared	**Tributary Name (if known):** Drainage Ditch #20 **Nearest TNW:** St. Francis River	

TRIBUTARY CHARACTERIZATION	**Tributary subsystem:** ☐ Ephemeral ☐ Intermittent ☑ Perennial **Tributary flows directly into a TNW?** **Explain:** No, it flows into ten mile bayou which is non navigable waterway at this location **Distance to nearest TNW:** River Miles: ~57.65 Aerial Miles: ~35.11 **Describe flow route to TNW:** Drainage Ditch #20 flows W into 10 mile bayou, 10 mile bayou flows SW to 15 mile bayou, 15 mile bayou continues SW to the St. Francis R. **Tributary is** (natural / artificial / manipulated): Artificial **Explain:** Man-made drainage ditch to control Mississippi River flood waters.
WEATHER CONDITIONS	**Current:** ☐ rain (steady rain) ☐ showers (intermittent) ☑ cloud cover 75 (%) ☐ clear/ sunny air temperature: 52 (°F) **Has there been heavy rain in the last 7 days?** Yes **Average Rainfall:** 1.11 (in.) **Comment:** 15 mph winds flowing W to E. Furthermore, rainfall occurred the day prior and morning of the site visit.
WATERSHED FEATURES	**Predominant surrounding landuse:** ☐ Forest ☐ Commercial ☐ Other (Explain): ☐ Field/Pasture ☐ Industrial ☑ Agricultural ☐ Residential

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

TRIBUTARY FEATURES	**Estimated reach length:** 12,153 (ft.) **Estimated channel width:** 130 (ft.) **Estimated channel depth:** 8 (ft.) **Channelized:** Yes **Dam present:** No **Estimated slope of banks:** vertical ☐ 2:1 ☐ 3:1 ☑ 4:1 ☐ greater ☐ **Substrate:** sand ☐ cobble ☐ silt ☑ gravel ☐
TRIBUTARY CONDITION	**Tributary has** (defined bed and banks / OHWM): **Explain:** well defined bed and banks located along the drainage ditch. **Bank stability** (highly eroded, sloughing banks, etc): **Explain:** Banks are stable and contain large quantities of vegetation. **Riffle / Run / Pool complex:** No **Explain:**
FLOW CONDITIONS	**Tributary geometry** (relatively straight, meandering, other): **Explain:** Relatively straight in the project area, the far eastern portion outside of the project area near the retention pond used for pumping water back into the Mississippi River is meandering. **Current flow is** (discrete, confined, overland sheet flow, etc): **Explain:** No flow was observed at the time of the site visit. However, if flow was present it would be confined within the stream banks. **Average flow events per year:** 0
VEGETATION	**Approximate width of riparian buffer:** 20 (ft.) **Dominant species present** (top bank / buffer): *Sorghum halepense, Setaria pumila, Rhus glabra, Lamium amplexicaule, and Equisetum hyemale* **Aquatic vegetation present:** No **Comment:** No aquatic vegetation was observed near the location of the proposed crossing at the time of the site visit.

CA-1

VIEW UPSTREAM ALONG CA-1 ASSESSMENT LOCATION.

CA-1

TYPICAL VIEW OF DOWNSTREAM FROM CA-1 ASSESSMENT LOCATION.

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

Project: South Loop Extenstion	**City/County/State:** West Memphis/Crittenden Co./ Arkansas	
Investigator(s): Pickering Firm, Inc.	**Lat:** 35.11689 **Long:** -90.20470	**Sample Location ID:** CA-2
Applicant/Owner: City of West Memphis	**Date:** 2/12/2019	
Reason for Survey: Bridge Crossing for south loop extension project.		
River Basin/HUC Number: Lower St. Francis/ 08020203 **Size of Watershed:** 1,957,832.7 Acres **Size of Drainage Area:** 3023.68 miles squared	**Tributary Name (if known):** Ten Mile Bayou **Nearest TNW:** St. Francis River	

TRIBUTARY CHARACTERIZATION	**Tributary subsystem:** ☐ Ephemeral ☐ Intermittent ☑ Perennial **Tributary flows directly into a TNW?** **Explain:** No, it flows into ten mile bayou which is non navigable waterway at this location **Distance to nearest TNW:** River Miles: ~55.65 Aerial Miles: ~34.11 **Describe flow route to TNW:** Ten Mile Bayou flows SW to 15 mile bayou, 15 mile bayou continues SW to the St. Francis River **Tributary is** (natural / artificial / manipulated): Manipulated **Explain:** Manipulated to control Mississippi River flood waters.
WEATHER CONDITIONS	**Current:** ☐ rain (steady rain) ☐ showers (intermittent) ☑ cloud cover 75 (%) ☐ clear/ sunny air temperature: 52 (°F) **Has there been heavy rain in the last 7 days?** Yes **Average Rainfall:** 1.11 (in.) **Comment:** 15 mph winds flowing W to E. Furthermore, rainfall occurred the day prior and morning of the site visit.
WATERSHED FEATURES	**Predominant surrounding landuse:** ☐ Forest ☐ Commercial ☐ Other (Explain): ☐ Field/Pasture ☐ Industrial ☑ Agricultural ☐ Residential

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

TRIBUTARY FEATURES	**Estimated reach length:** 20,153 (ft.) **Estimated channel width:** 250 (ft.) **Estimated channel depth:** 8 (ft.) **Channelized:** Yes **Dam present:** No **Estimated slope of banks:** vertical ☐ 2:1 ☐ 3:1 ☐ 4:1 ☐ greater ☑ **Substrate:** sand ☐ cobble ☐ silt ☑ gravel ☐
TRIBUTARY CONDITION	**Tributary has** (defined bed and banks / OHWM): **Explain:** Water was above the banks due to man made dam to the south of the project area. **Bank stability** (highly eroded, sloughing banks, etc): **Explain:** Banks are assumed to be stable. However water was over the banks at the time of the site visit. **Riffle / Run / Pool complex:** No **Explain:**
FLOW CONDITIONS	**Tributary geometry** (relatively straight, meandering, other): **Explain:** Relatively straight in the project area **Current flow is** (discrete, confined, overland sheet flow, etc): **Explain:** flow to the south was observed at the time of the site visit. In addition, a man made dam was observed to restrict flow to the south. This is located south of the project area. **Average flow events per year:** 3 to 4
VEGETATION	**Approximate width of riparian buffer:** 15 (ft.) **Dominant species present** (top bank / buffer): *Ulmus alata, Quercus alba, Quercus falcata, and Lamium amplexicaule* **Aquatic vegetation present:** No **Comment:** No aquatic vegetation was observed near the location of the proposed crossing at the time of the site visit.

CA-2

VIEW DOWNSTREAM ALONG CA-2 ASSESSMENT LOCATION.

CA-2

VIEW UPSTREAM ALONG CA-2 ASSESSMENT LOCATION.


Worksheet 4
C3
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

Project: South Loop Extenstion	**City/County/State:** West Memphis/Crittenden Co./ Arkansas	
Investigator(s): Pickering Firm, Inc.	**Lat:** 35.11689 **Long:** -90.20470	**Sample Location ID:** CA-3
Applicant/Owner: City of West Memphis	**Date:** 2/12/2019	
Reason for Survey: Culvert placement for south loop extension project.		
River Basin/HUC Number: Lower St. Francis/ 08020203 **Size of Watershed:** 1,957,832.7 Acres **Size of Drainage Area:** 3023.68 miles squared	**Tributary Name (if known):** Former Drainage Ditch #20 **Nearest TNW:** St. Francis River	

TRIBUTARY CHARACTERIZATION	**Tributary subsystem:** ☐ Ephemeral ☑ Intermittent ☐ Perennial **Tributary flows directly into a TNW?** **Explain:** No, it flows into ten mile bayou which is non navigable waterway at this location **Distance to nearest TNW:** River Miles: ~62.65 Aerial Miles: ~36.11 **Describe flow route to TNW:** Drainage Ditch #19 flows SW into 10 mile bayou, 10 mile bayou flows SW to 15 mile bayou, 15 mile bayou continues SW to the St. [illegible] **Tributary is** (natural / artificial / manipulated): Artificial **Explain:** Man-made drainage ditch to control Mississippi River flood waters.
WEATHER CONDITIONS	**Current:** ☐ rain (steady rain) ☐ showers (intermittent) ☑ cloud cover 75 (%) ☐ clear/ sunny air temperature: 52 (°F) **Has there been heavy rain in the last 7 days?** Yes **Average Rainfall:** 1.11 (in.) **Comment:** 15 mph winds flowing W to E. Furthermore, rainfall occurred the day prior and morning of the site visit.
WATERSHED FEATURES	**Predominant surrounding landuse:** ☐ Forest ☐ Commercial ☐ Other (Explain): ☐ Field/Pasture ☐ Industrial ☑ Agricultural ☐ Residential

FIELD DATA SHEET

OTHER WATERS OF THE U.S.

TRIBUTARY FEATURES	**Estimated reach length:** 13,000 (ft.) **Estimated channel width:** 15 (ft.) **Estimated channel depth:** 8 (ft.) **Channelized:** Yes **Dam present:** No **Estimated slope of banks:** vertical ☐ 2:1 ☑ 3:1 ☐ 4:1 ☐ greater ☐ **Substrate:** sand ☐ cobble ☐ silt ☑ gravel ☐
TRIBUTARY CONDITION	**Tributary has** (defined bed and banks / OHWM): **Explain:** well defined bed and banks located along the drainage ditch. **Bank stability** (highly eroded, sloughing banks, etc): **Explain:** Banks are stable and contain large quantities of vegetation. **Riffle / Run / Pool complex:** No **Explain:**
FLOW CONDITIONS	**Tributary geometry** (relatively straight, meandering, other): **Explain:** Relatively straight in the project area. **Current flow is** (discrete, confined, overland sheet flow, etc): **Explain:** No flow was observed at the time of the site visit. However, if flow was present it would be confined within the stream banks. **Average flow events per year:** 0
VEGETATION	**Approximate width of riparian buffer:** 15 (ft.) **Dominant species present** (top bank / buffer): *Sorghum halepense, Setaria pumila, and Equisetum hyemale* **Aquatic vegetation present:** No **Comment:** No aquatic vegetation was observed near the location of the proposed crossing at the time of the site visit.

CA-3

VIEW DOWNSTREAM ALONG CA-3 ASSESSMENT LOCATION.

CA-3

VIEW OF CULVERT ALOWWING FLOW INTO DRAINGE DITCH #19 AT CA-3 ASSESSMENT LOCATION.

Appendix C — Background Information

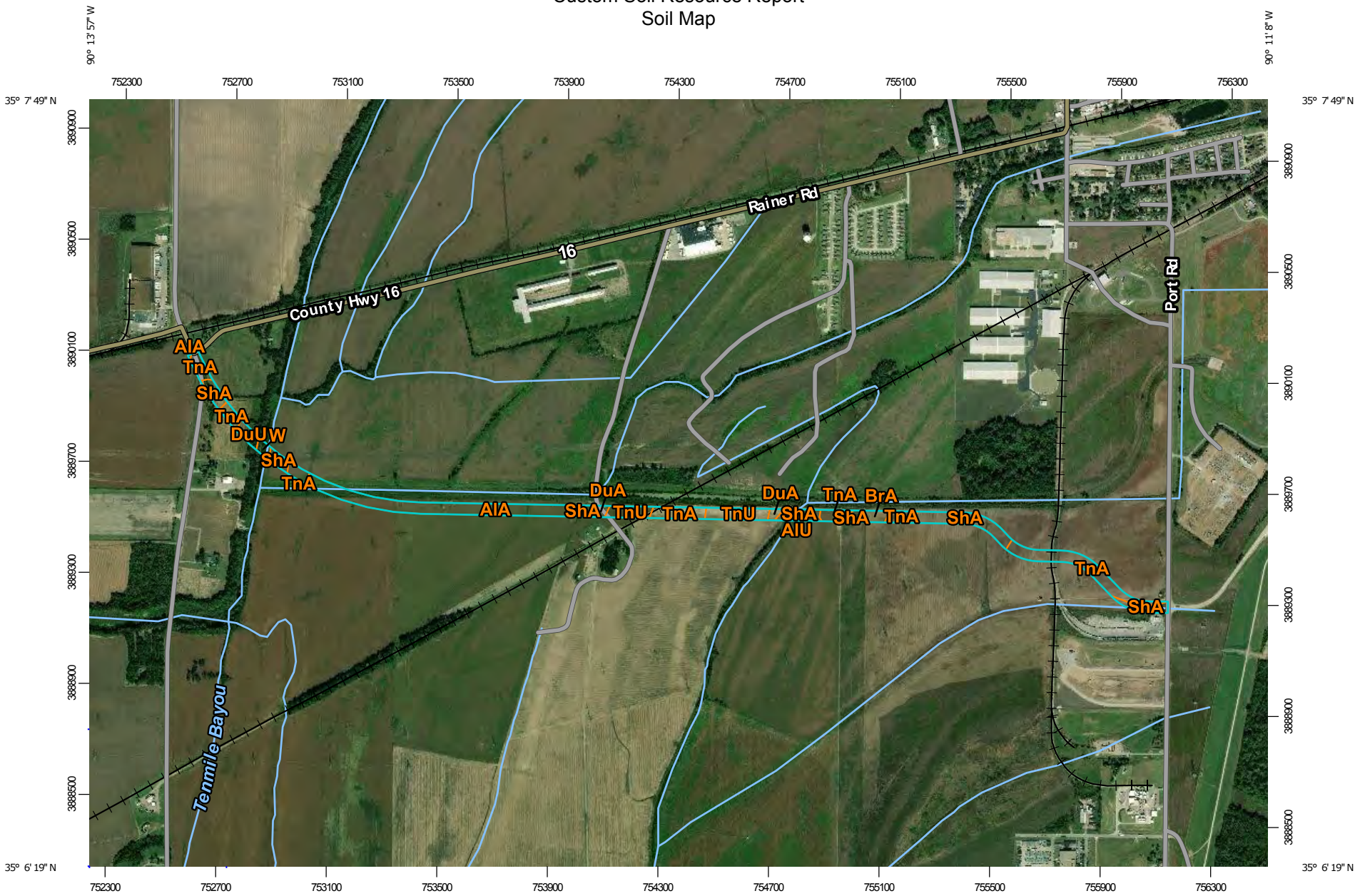
USDA NRCS Web Soil Survey

USFWS Nation Wetland Inventory Map

USGS National Elevation Dataset

USDA National Land Cover Dataset

Custom Soil Resource Report
Soil Map



Map Scale: 1:19,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Crittenden County, Arkansas
Survey Area Data: Version 16, Oct 5, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 13, 2015—Dec 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AlA	Alligator silty clay, 0 to 1 percent slopes	9.9	25.2%
AlU	Alligator silty clay, gently undulating	0.1	0.3%
BrA	Bowdre silty clay, 0 to 1 percent slopes	0.9	2.3%
DuA	Dundee silt loam, 0 to 1 percent slopes	0.9	2.2%
DuU	Dundee silt loam, gently undulating	1.0	2.5%
ShA	Sharkey silty clay, 0 to 1 percent slopes, protected	9.9	25.1%
TnA	Tunica clay, 0 to 1 percent slopes	12.1	30.8%
TnU	Tunica clay, gently undulating	4.0	10.1%
W	Water	0.6	1.5%
Totals for Area of Interest		**39.3**	**100.0%**

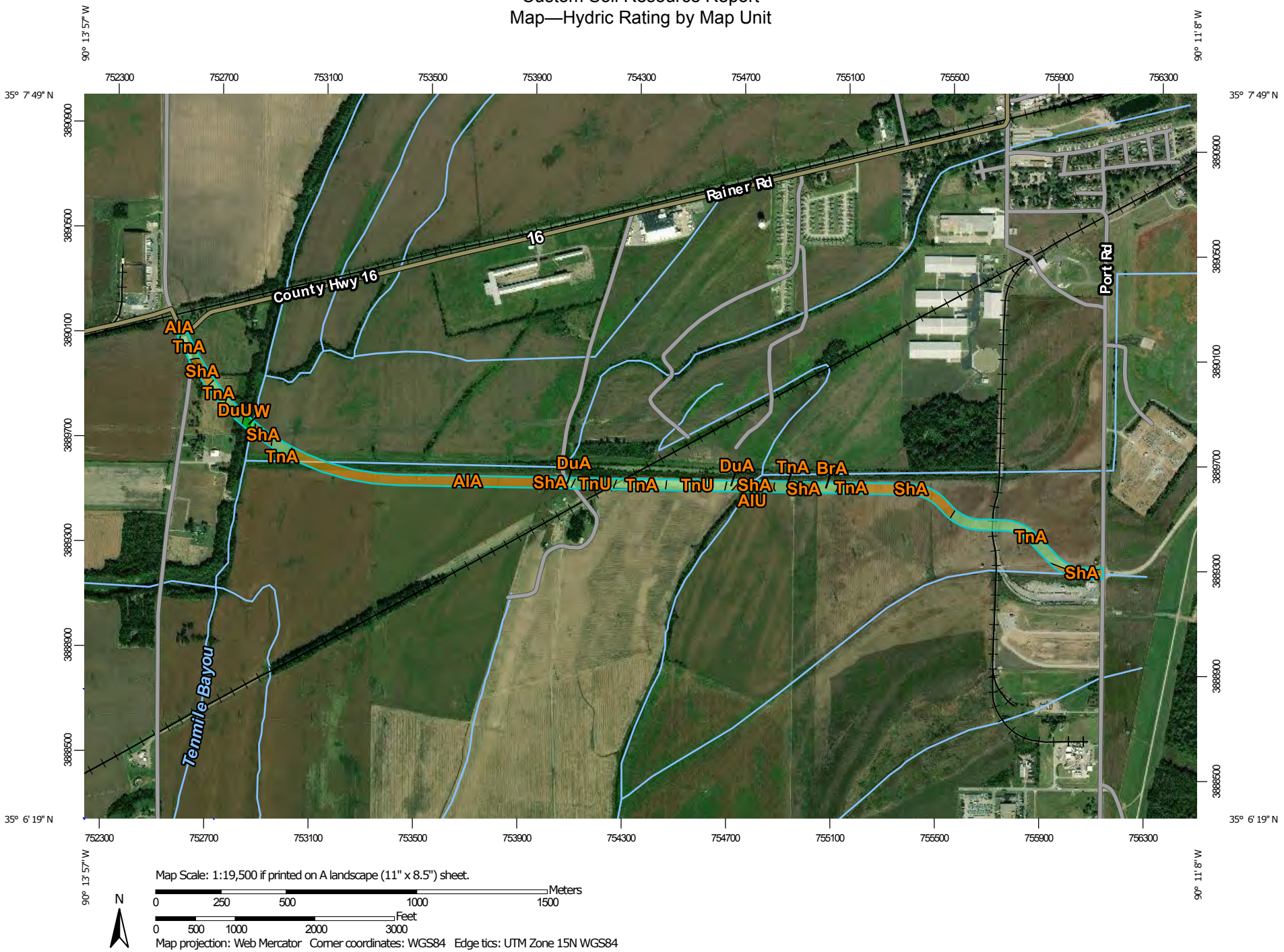
Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas

Map—Hydric Rating by Map Unit



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Crittenden County, Arkansas
Survey Area Data: Version 16, Oct 5, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 13, 2015—Dec 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AlA	Alligator silty clay, 0 to 1 percent slopes	95	9.9	25.2%
AlU	Alligator silty clay, gently undulating	95	0.1	0.3%
BrA	Bowdre silty clay, 0 to 1 percent slopes	15	0.9	2.3%
DuA	Dundee silt loam, 0 to 1 percent slopes	6	0.9	2.2%
DuU	Dundee silt loam, gently undulating	10	1.0	2.5%
ShA	Sharkey silty clay, 0 to 1 percent slopes, protected	94	9.9	25.1%
TnA	Tunica clay, 0 to 1 percent slopes	15	12.1	30.8%
TnU	Tunica clay, gently undulating	15	4.0	10.1%
W	Water	0	0.6	1.5%
Totals for Area of Interest			**39.3**	**100.0%**

Rating Options—Hydric Rating by Map Unit

Aggregation Method: Percent Present

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Percent Present" returns the cumulative percent composition of all components of a map unit for which a certain condition is true. For example, attribute "Hydric Rating by Map Unit" returns the cumulative percent composition of all components of a map unit where the corresponding hydric rating

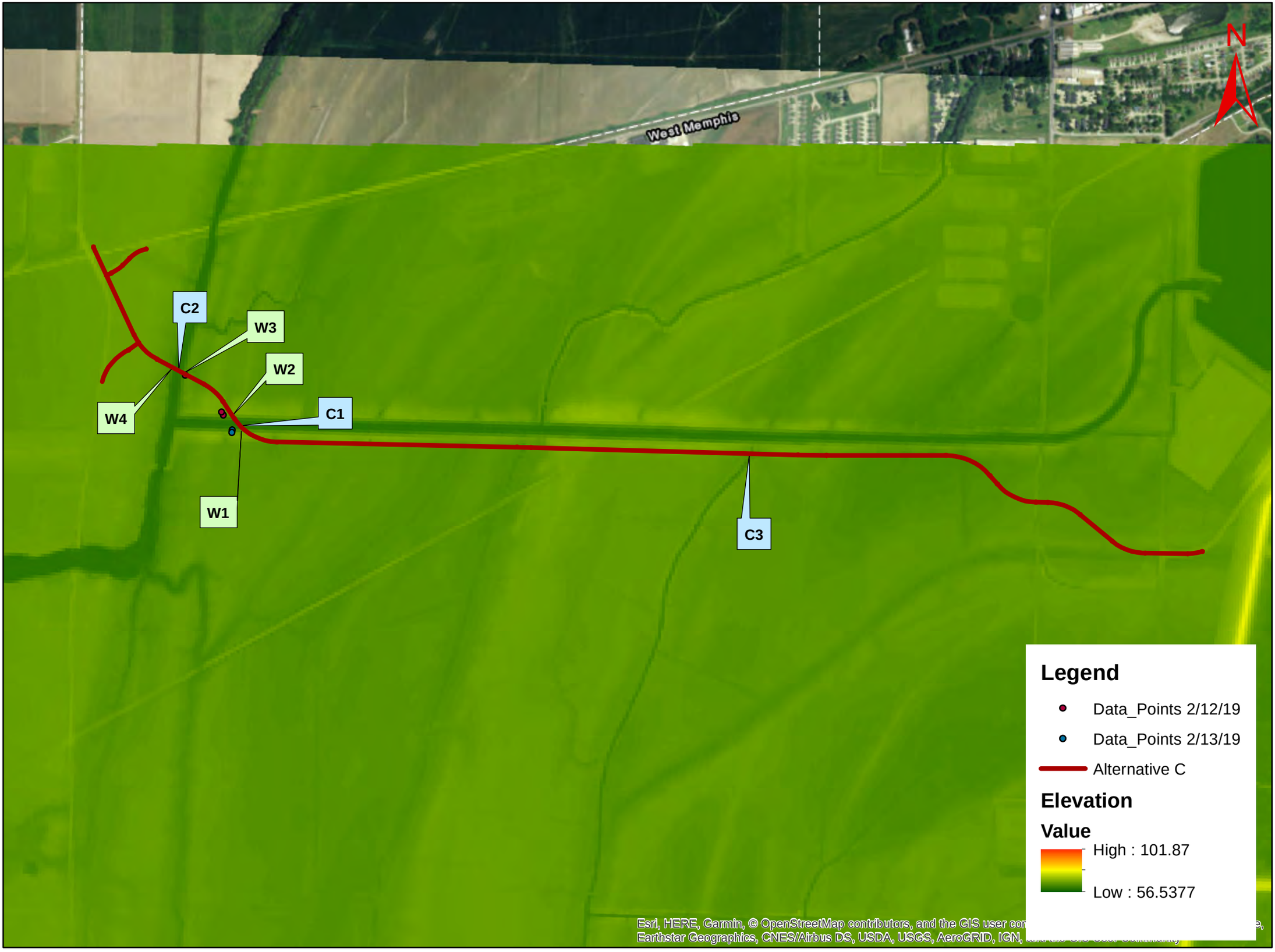
U.S. Fish and Wildlife Service
National Wetlands Inventory

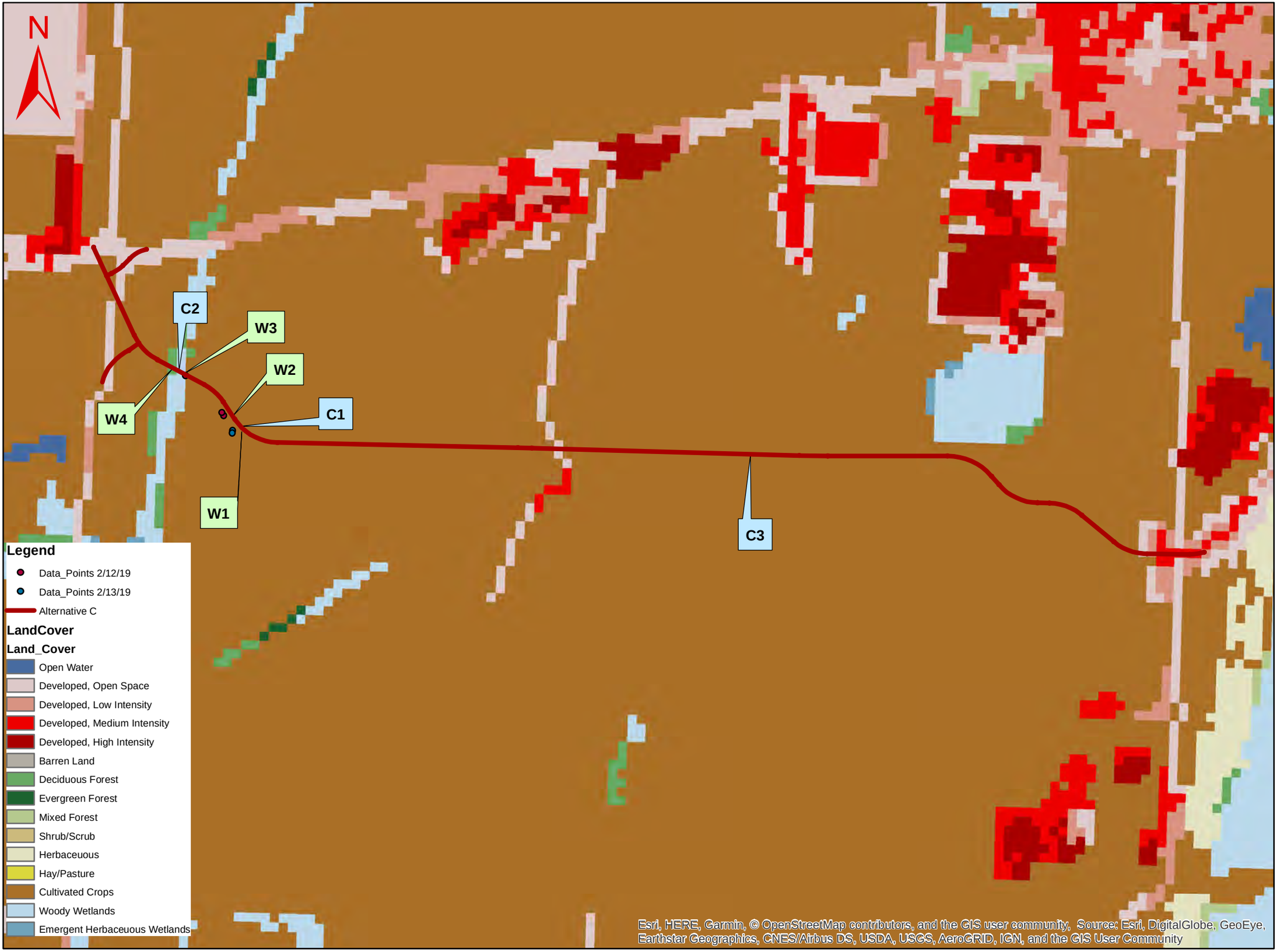
South Loop Extension (West Memphis)

June 18, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine


West Memphis
N
C2
W3
W2
W4
C1
W1
C3
Legend
Data_Points 2/12/19
Data_Points 2/13/19
Alternative C
Elevation
Value
High : 101.87
Low : 56.5377
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user com
Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,


N
C2
W3
W2
W4
C1
W1
C3
Legend
Data_Points 2/12/19
Data_Points 2/13/19
Alternative C
LandCover
Land_Cover
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceuous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceuous Wetlands
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix D — Rainfall Data

Wets Tables

Local Recorded Weather

AgACIS

Month	Total Precipitation Normal (inches)
January	3.90
February	4.48
March	4.91
April	5.23
May	5.49
June	3.88
July	3.61
August	2.90
September	3.09
October	4.44
November	5.43
December	6.04
Annual	53.40

Climatological Data for WEST MEMPHIS, AR - February 2019

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-02-01	51	25	38.0	0	0	0.00	0.0	0
2019-02-02	52	38	45.0	5	0	0.03	M	M
2019-02-03	66	42	54.0	14	4	0.00	0.0	0
2019-02-04	69	54	61.5	22	12	0.04	0.0	0
2019-02-05	69	58	63.5	24	14	0.08	0.0	0
2019-02-06	67	60	63.5	24	14	0.00	0.0	0
2019-02-07	70	58	64.0	24	14	0.78	0.0	0
2019-02-08	68	22	45.0	5	0	0.74	M	M
2019-02-09	M	M	M	M	M	M	M	M
2019-02-10	68	24	46.0	6	0	0.21	0.0	0
2019-02-11	49	38	43.5	4	0	0.07	0.0	0
2019-02-12	61	48	54.5	15	5	2.35	0.0	0
2019-02-13	55	33	44.0	4	0	0.00	M	M
2019-02-14	55	42	48.5	9	0	0.00	M	M
2019-02-15	58	44	51.0	11	1	0.00	M	M
2019-02-16	58	28	43.0	3	0	0.00	M	M
2019-02-17	59	29	44.0	4	0	0.53	0.0	0
2019-02-18	44	30	37.0	0	0	0.00	0.0	0
2019-02-19	M	M	M	M	M	M	M	M
2019-02-20	M	M	M	M	M	M	M	M
2019-02-21	M	M	M	M	M	M	M	M
2019-02-22	M	M	M	M	M	M	M	M
2019-02-23	M	M	M	M	M	M	M	M
2019-02-24	M	M	M	M	M	M	M	M
2019-02-25	M	M	M	M	M	M	M	M
2019-02-26	M	M	M	M	M	M	M	M
2019-02-27	M	M	M	M	M	M	M	M
2019-02-28	M	M	M	M	M	M	M	M
Average|Sum	59.9	39.6	49.8	174	64	4.83	0.0	0.0

Monthly Total Precipitation for WEST MEMPHIS, AR

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2000	1.74	3.65	3.26	4.57	7.78	4.19	0.41	M	1.23	1.09	7.85	3.54	M
2001	3.44	6.29	3.85	2.48	4.78	4.64	5.92	0.29	2.64	7.98	11.04	11.79	65.14
2002	4.12	2.65	14.03	1.11	6.20	2.56	5.40	4.91	8.76	6.74	2.64	10.05	69.17
2003	1.34	8.19	2.76	2.58	11.49	4.36	4.07	0.89	3.85	3.26	6.13	3.04	51.96
2004	3.46	5.61	3.76	8.60	4.50	5.01	3.55	3.16	0.80	9.62	11.46	5.56	65.09
2005	6.15	3.86	4.10	5.34	1.97	1.27	5.95	4.75	5.26	0.13	3.28	1.43	43.49
2006	7.71	2.99	3.95	3.13	4.82	2.69	1.30	4.80	2.97	2.15	4.12	8.21	48.84
2007	5.92	M	0.63	3.88	2.78	0.44	0.42	0.09	3.65	7.86	2.62	6.49	M
2008	3.02	M	8.35	9.94	6.49	1.52	1.24	3.72	3.62	4.51	2.84	8.63	M
2009	4.99	2.59	6.92	4.02	9.83	3.45	10.28	3.13	10.06	10.62	1.34	5.44	72.67
2010	5.23	3.66	4.37	3.73	13.34	2.04	5.81	3.87	0.22	1.44	7.98	1.26	52.95
2011	3.12	M	M	12.44	11.77	M	4.67	4.76	1.72	1.47	8.08	8.48	M
2012	2.94	3.34	M	M	3.83	1.56	4.83	1.68	6.47	4.17	3.01	4.35	M
2013	10.16	4.96	3.39	6.32	10.30	4.80	4.67	2.02	4.59	2.01	3.48	6.12	62.82
2014	2.42	M	7.84	6.50	7.25	11.87	1.65	1.84	2.56	4.58	2.84	2.94	M
2015	1.78	3.47	6.65	6.09	7.79	2.29	5.19	4.59	3.32	2.04	12.02	5.53	60.76
2016	3.18	3.75	14.92	6.68	6.90	2.28	7.66	4.94	1.50	1.77	3.33	5.83	62.74
2017	3.57	2.52	4.59	5.32	6.36	4.54	3.81	3.16	4.79	2.83	2.05	7.96	51.50
2018	3.39	12.37	5.65	7.33	1.08	2.15	3.27	2.46	6.67	4.13	5.23	7.81	61.54
2019	M	M	M	M	M	M	M	M	M	M	M	M	M
Mean	4.09	4.66	5.82	5.56	6.80	3.43	4.22	3.06	3.93	4.13	5.33	6.02	59.13

Appendix H – Protected Species

Lauren McWhorter

From: Lewis, Lindsey <lindsey_lewis@fws.gov>
Sent: Friday, August 03, 2018 11:52 AM
To: Lauren McWhorter
Subject: Re: [EXTERNAL] South Loop Extension Project

Ms. McWhorter,

The Service does not have any information indicating that there are any federally listed species in the affected areas of this action due to the habitat type, disturbed environment, and distance to any known species locations.

The comments herein are for the sole purpose of providing technical assistance to the action agency or for individual pre-project planning assistance. These comments and opinions should not be misconstrued as an "effect determination" or considered as concurrence with any proceeding determination(s) by the action agency in accordance with Section 7 of the Endangered Species Act (ESA). These comments do not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, a finding concurrence letter, etc.) from the Service, both lethal and non-lethal "takes" of protected species are in violation of the ESA.

Please let me know if you have any questions or require further assistance.

Thanks,

Lindsey Lewis
Biologist

US Fish & Wildlife Service
Arkansas Field Office
110 South Amity Rd., Suite 300
Conway, Arkansas 72032

(501) 513-4489 - voice
(501) 513-4480 - fax
Lindsey_Lewis@fws.gov
http://www.fws.gov/arkansas-es/

Marcus D Hope

From: Lewis, Lindsey <lindsey_lewis@fws.gov>
Sent: Monday, October 01, 2018 8:35 AM
To: Marcus D Hope
Subject: Fwd: [EXTERNAL] South Loop Extension Project

Lindsey Lewis
Biologist

US Fish & Wildlife Service
Arkansas Field Office
110 South Amity Rd., Suite 300
Conway, Arkansas 72032

(501) 513-4489 - voice
(501) 513-4480 - fax
Lindsey_Lewis@fws.gov
http://www.fws.gov/arkansas-es/

---------- Forwarded message ----------
From: **Lewis, Lindsey** <lindsey_lewis@fws.gov>
Date: Thu, Aug 30, 2018 at 1:36 PM
Subject: Re: [EXTERNAL] South Loop Extension Project
To: Marcus D Hope <mhope@pickeringfirm.com>

Mr. Hope,

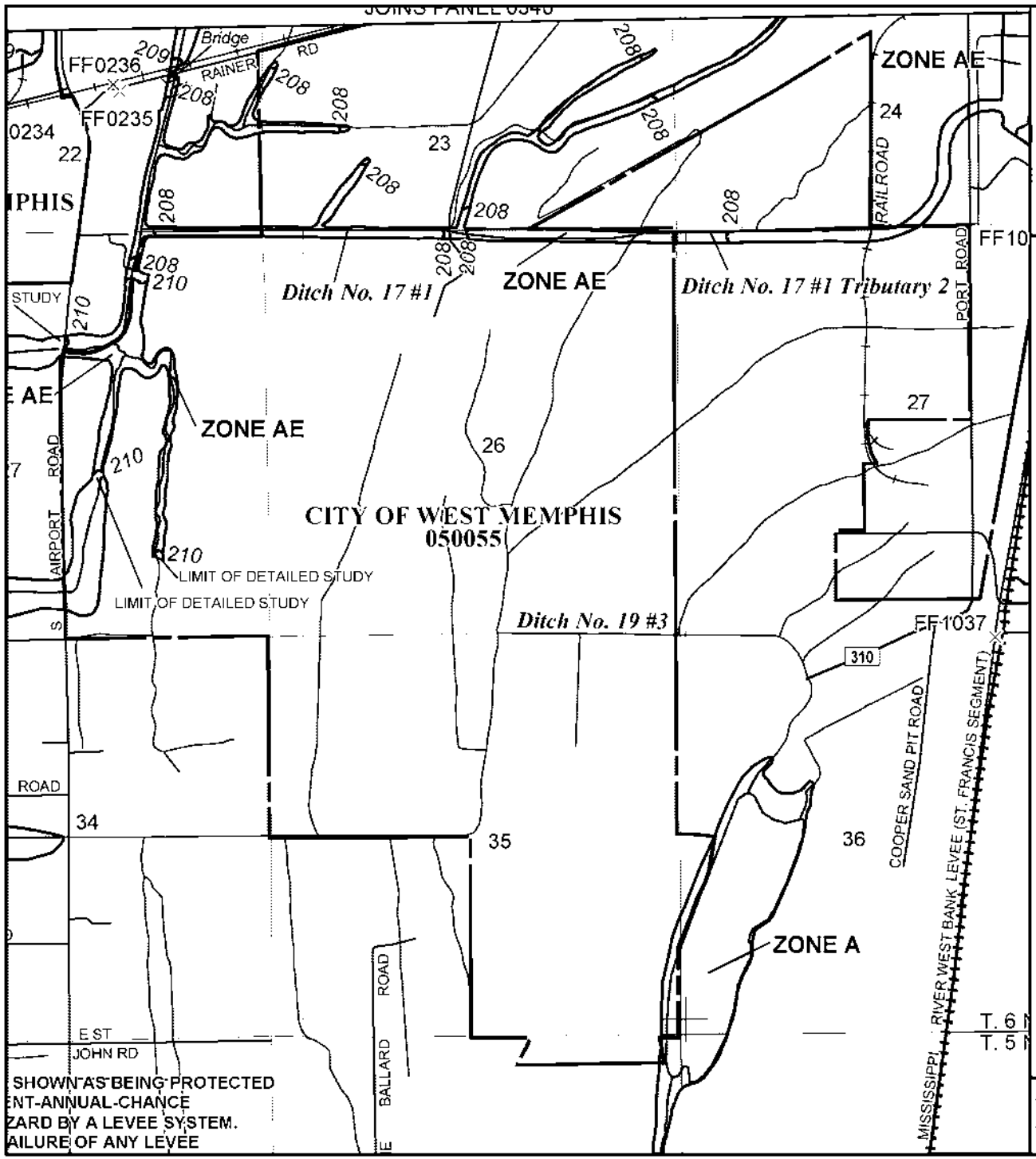
The Service has reviewed the project information you provided along with your determination, the location of the project, and our records and we agree with your assessment. The Service has no concerns or further comments for this project at this time. No further action is necessary regarding Section 7 of the Endangered Species Act.

Thank you,

Lindsey Lewis
Biologist

US Fish & Wildlife Service
Arkansas Field Office
110 South Amity Rd., Suite 300
Conway, Arkansas 72032

Appendix I – FEMA Floodplain Map



MAP SCALE 1" = 2000'

0 2000 4000 FEET

NFIP

PANEL 0450E

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CRITTENDEN COUNTY, ARKANSAS

AND INCORPORATED AREAS

PANEL 450 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CRITTENDEN COUNTY	050429	0450	E
WEST MEMPHIS, CITY OF	050055	0450	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community

MAP NUMBER
05035C0450E

EFFECTIVE DATE
MAY 3, 2011

Federal Emergency Management Agency

Appendix J – Noise Study

NOISE STUDY REPORT

PROPOSED SOUTH LOOP EXTENSION

WEST MEMPHIS, ARKANSAS

PREPARED FOR:

THE CITY OF WEST MEMPHIS
ARKANSAS

PREPARED BY:

PICKERING FIRM, INC
2001 AIRPORT ROAD
SUITE 201
FLOWOOD, MISSISSIPPI 39232

FEBRUARY 2019
Revised MAY 2019
PICKERING PROJECT NO.: 25447.00

This page intentionally blank.

INTRODUCTION

The City of West Memphis engaged Pickering Firm, Inc. (Pickering) to conduct an Environmental Assessment (EA) of the proposed South Loop Extension Project in West Memphis, Crittenden County, Arkansas. The Project would involve constructing a new roadway to connect the intersection of South Loop Road and Port Road to South Airport Road near the southern city limits of West Memphis (**Exhibit 1**).

The Federal Highway Administration (FHWA) established a standard for assessing highway traffic-generated noise in compliance with 23 USC Section 109(h) and (i). The standard, published as Part 772 of Title 23 of the Code of Federal Regulations (23 CFR Part 772), provides procedures for assessing noise impacts. A noise impact assessment was completed for the proposed South Loop Extension Project in accordance with the FHWA standard and the Arkansas Department of Transportation (ARDOT) *Policy on Highway Traffic Noise Abatement*.

This Noise Study Report provides the assessment results for inclusion in the EA and serves to:

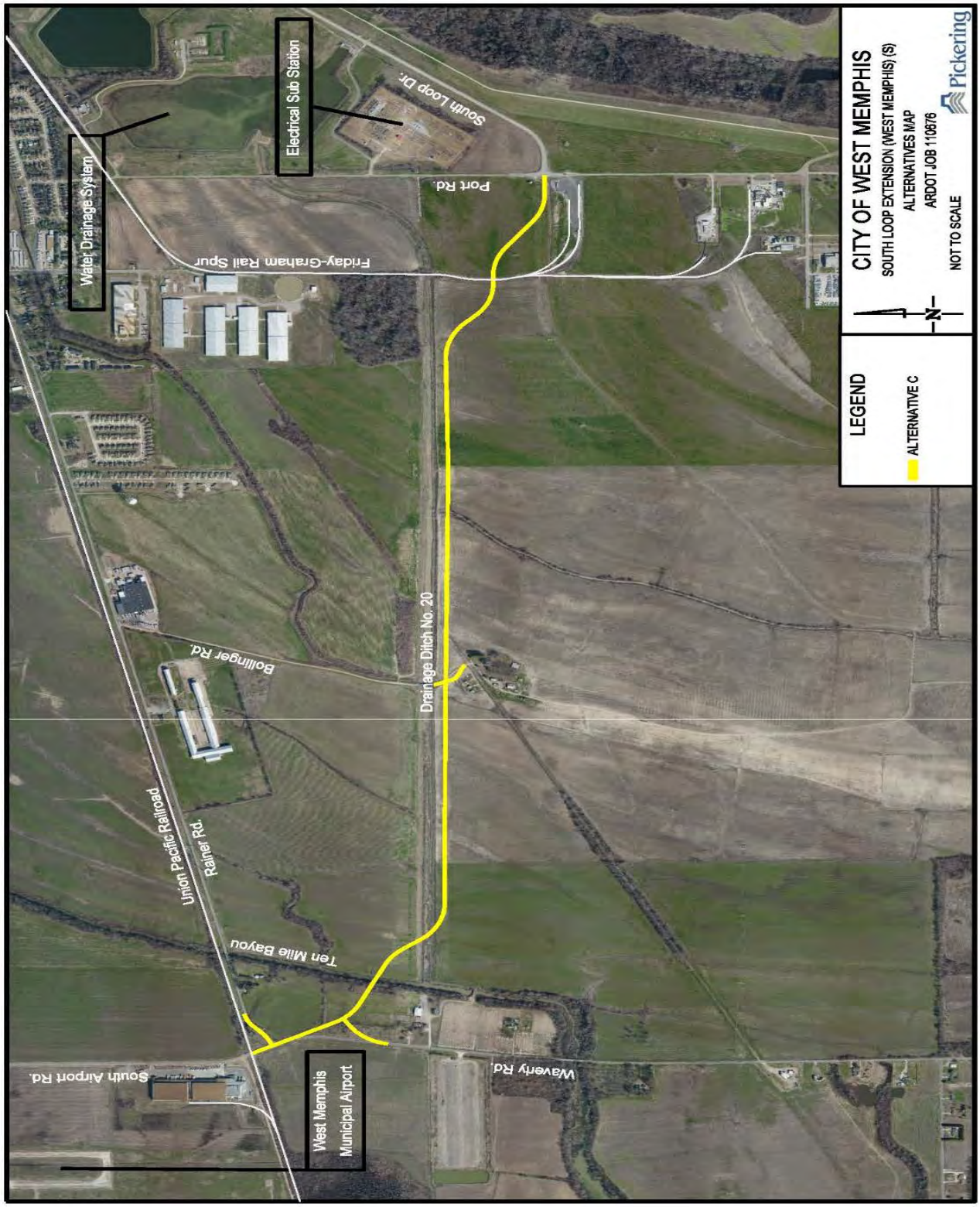
- Provide baseline noise levels to use for determining impacts.
- Predict the effects the project would have on the noise environment.
- Identify noise impact locations and evaluate the potential for noise abatement measures.

PROJECT DESCRIPTION

Five alternatives were originally studied for this Project. With the ultimate elimination of Alternatives B, D, E, the two final alternatives considered for the proposed Project were Alternative A (No Build Alternative) and Alternative C (Build Alternative). Alternative C is shown on Exhibit 1.

EXHIBIT 1

General Location Map



The Project's purpose is to provide an alternate route for commercial/industrial traffic, including heavy trucks, so that the primarily residential and local business areas in the heart of West Memphis can be avoided. It would also provide access to currently inaccessible property that is zoned for industrial uses, thereby promoting economic growth in the region. The connector would be approximately 2.5 miles in length and be comprised of two paved 12-foot wide travel lanes with 8-foot wide shoulders.

METHODOLOGY

A "receptor" is defined as a representative location of a noise sensitive area for various land uses. Alternative C's alignment was reviewed using topographic maps and aerial photographs to identify possible noise receptors within the Project corridor. These receptors were then field verified and classified according to their functional use (residence, commercial, light industrial, etc.). The receptors were also classified by "Activity Category" as established by the FHWA Noise Abatement Criteria (NAC) chart shown in **Exhibit 2**. The Activity Categories and NAC are used to determine when noise impacts occur. The NAC values are hourly equivalent A-weighted sound levels in decibels and expressed as $L_{eq(h)}$ (the Fundamentals of Sound and Noise discussion on pages 5 through 8 of this report provides a detailed decibel descriptor information). The NAC are for impact determination only; they are not design goals or standards for noise abatement measures.

Recent (2018) Aerial Photographs accessed on Google Earth were used in the alternative analysis and for estimating distances from the proposed alignment to nearby receptors, along with more exact distances obtained from Pickering's engineering team. The FHWA Traffic Noise Model Version 2.5 (TNM) was used to predict traffic noise levels.

EXHIBIT 2

FHWA Noise Abatement Criteria

Activity Category	*Description of Activity Category*	*Evaluation Location*	*Criteria $L_{eq}(h)$*
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where preservation of those qualities is essential if the area is to continue to serve its intended purpose.	Exterior	57 dBA
B(1)	Residential	Exterior	67 dBA
C(1)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.	Exterior	67 dBA
D	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.	Interior	52 dBA
E(1)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.	Exterior	72 dBA
F	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.	--	--
G	Undeveloped lands that are not permitted.	--	--

(1) Includes undeveloped lands permitted for this activity category.

NOISE IMPACT CRITERIA

Noise impacts occur when predicted traffic noise levels approach or exceed the NAC threshold for a specific Activity Category or when noise levels are predicted to substantially increase. An "Approach" is defined as 1 dBA less than the established NAC. A "substantial increase" is defined as traffic noise level increase of 10 dBA or more. These guidelines provide the basis for the conclusions made in this report.

SUMMARY OF RESULTS

Two single family residences on the Bollinger Farm property along the southern portion of the Project were identified as the only noise sensitive receptors in the project area. The locations of these occupied structures are listed with names and distances from the proposed roadway in **Exhibit 3** below. A third structure in this area (former single family residence) is currently being used as a storage building for the adjacent farm. A single family residence and a church is located at the western terminus of this Project. Noise study boundaries typically extend 500 feet on either side of an existing or proposed roadway, unless TNM results indicate that impacts are possible beyond that point. It was therefore concluded that the single family residence and church at the western Project terminus were not within the Noise Study Boundary and would not experience noise impacts. All of the structures described above are shown on **Figure 1** attached at the end of this document. The "receiver" designations on Figure 1 indicate the modeling point in TNM at which sound levels were predicted, and is used interchangeably with the receptor references in this report. As detailed in the remainder of this report, TNM results predicted no noise impacts associated with Alternative C.

EXHIBIT 3
Structures within Noise Study Boundary

Receptor Number	*Structure Type and Address*	*Distance from Roadway**
1	Wood Frame Residence, located off Bollinger Rd	194
2	Brick Residence, located off Bollinger Rd	370

* *Approximate distance from centerline of roadway in feet.*

FUNDAMENTALS OF SOUND AND NOISE

Sound is defined as the vibration of air molecules, which travels in waves to the human ear. These sound waves are produced by objects moving back and forth rapidly. The frequency of the moving objects determines pitch of the sound. Human ears can only

hear sound waves with a frequency or pitch between approximately 20 cycles per second and 15,000 cycles per second.

Noise, defined as unwanted or excessive sound, is an undesirable by-product of our modern way of life. It can interfere with sleep, work, or recreation, and in extremes, may cause physical and psychological damage. While noise emanates from many different sources, transportation noise is persistent and difficult to avoid in society today. Highway traffic noise is a major contributor to overall transportation noise.

The unit of measure used to describe the sound pressure or intensity of sound is the decibel (dB), while the pitch of a particular sound is determined by its frequency. The threshold of hearing for humans begins at 0 dB, which represents the faintest sound that can be heard by humans with very good hearing. With each 10 dB increase in sound level, humans perceive that increase as a doubling of loudness. For example, a sound level of 50 dB (quiet urban daytime) is twice as loud as a sound level of 40 dB (quiet urban nighttime), while a sound level of 60 dB (commercial area) is twice as loud as the 50 dB quiet urban daytime and four times louder than the quiet urban night.

An adjustment or weighting of the high-pitched and low-pitched sounds is often made to approximate how an average person hears sounds. For highway traffic noise studies, this compensation is called A-weighting, with A-weighted decibel measurements indicated by dBA. **Exhibit 4** provides an illustration of some common indoor and outdoor noise levels shown in dBA.

The decibel scale for measuring the intensity of sound is based on the logarithm of the sound level pressure relative to a reference sound level pressure. Because of the logarithmic nature of the decibel scale for sound levels, changes in sound levels are complex to define. For example, if a sound of 60 dBA is added to another sound of 60 dBA, the resulting sound is 63 dBA instead of 120 dBA.

EXHIBIT 4

Common Outdoor and Indoor Noise Levels

SOURCE: accusonus.com

Sounds associated with the use of roadways and highways are usually considered a nuisance or noise. Because the noise level associated with a particular road is never constant, a statistical descriptor is used to describe the varying noise levels. The equivalent continuous sound level (L_{eq}) is the statistical descriptor used for this noise study. The L_{eq} sound level is the steady A-weighted sound level that will produce the

same A-weighted sound energy over a stated period of time as a specified time-varying sound.

NOISE LEVEL ESTIMATES

In making these estimates, the traffic volume, operating speed, and terrain were considered. The TNM results of the predicted exterior noise levels for Alternative C are presented in **Table 1** attached at the end of this report.

TRAFFIC

Paragraph b, Section 772.17 of 23 CFR 772 says that, "in predicting noise levels and assessing noise impacts, traffic characteristics which will yield the worst hourly traffic noise impact on a regular basis for the design year shall be used". Since the level of highway traffic noise is normally related directly to the traffic volume, the traffic characteristics which will yield the worst hourly traffic noise impact on a regular basis for the current and the design year will be the Design Hourly Volume (DHV).

Traffic data for the Project was obtained from the Traffic Study dated December 17, 2018, prepared by Pickering. Existing turning movement volumes for the South Airport Road and Port Road intersections were field measured by West Memphis MPO on Tuesday, May 8, 2018 and Wednesday, July 25, 2018 for this study. From the existing count data collected, AM peak hour/DHV was determined to occur between 7:00 and 8:00 AM, with PM peak hour/DHV determined to occur between 4:00 and 5:00 PM. With opening year of South Loop Extension estimated to be in 2021, existing turning movement counts were calculated using a 2.0% growth rate on the base of average historical growth rates within the city of West Memphis. Due to the nature of the surrounding Project area, growth of the industrial district is assumed to increase by 20% every 5 years until the area is fully developed in the year 2045. Therefore, the Design Year (2041) would see 80% development of the industrial district. This information was applied to conservatively project the future turning movement count in 2041. A copy of

the Pickering Traffic Study is included in Appendix A of the EA. For the purpose of this noise study, the predicted Average Daily Traffic (ADT) for the proposed roadway in both the completion and design year was used to forecast the noise levels at the two receivers located in the Project area.

EXISTING NOISE ENVIRONMENT

Traffic along Waverly Road at the western terminus and Port Road at the eastern terminus comprise the traffic noise sources within the Project area. A sound level meter was used to measure the existing ambient noise level at Receptors/Receivers 1 and 2. The ambient noise level was determined to be 49.1 dB LAeq (the A-weighted equivalent continuous sound level used to express sound level meter values), well below the approach level of 66 dBA.

BUILD YEAR AND DESIGN YEAR ALTERNATIVE A

The existing receptors are not currently experiencing noise impacts. Minor increases in both the build year 2021 and design year 2041 noise levels would be possible if traffic volumes increased on neighboring roads. However, these increases would be due to general growth in the area and not attributable to the Project.

BUILD YEAR AND DESIGN YEAR ALTERNATIVE C

Currently, one single family residence is located approximately 194 feet from and one single family residence is located approximately 370 feet from Alternative C. Based on the TNM results, neither of these residences would receive traffic noise levels approaching or exceeding NAC levels in build year 2021 or design year 2041.

TRAFFIC NOISE ABATEMENT

In accordance with FHWA and ARDOT noise policy, noise abatement measures were not evaluated because traffic noise impacts were not predicted. Additionally, noise abatement measures (e.g., noise barriers) would not be feasible due to barrier placement considerations, including the need to maintain driveway access. Among other considerations, noise abatement measures would also not be reasonable for factors related to cost effectiveness.

CONSTRUCTION NOISE ABATEMENT

A slight noise increase would initially be caused by construction activities and then gradually increase by volumetric increases in traffic flow along the build alternative. Although no noise abatement barriers or other noise abatement measures are recommended for this Project, noise should be minimized during the construction of the road. The following construction noise controls and abatement measures should be incorporated into the Project plans and specifications to minimize adverse construction noise in the Project area.

- Each internal combustion engine should be equipped with the muffler recommended by the equipment manufacturer.
- The contractor should comply with all other state and local regulations related to noise control and applicable to projects of this type.

INFORMATION FOR LOCAL OFFCIALS

Noise-compatible development through effective land use planning and control is traditionally an area of local responsibility. Source control or control of noise emissions from the vehicles themselves is a joint responsibility of private industry and of federal, state, and local governments.

Local officials and developers are encouraged to consider highway traffic noise in the planning, zoning, and development of property near existing and proposed highways. Local officials and developers are encouraged to visit the FHWA Highway Traffic Noise website (www.fhwa.dot.gov/environment/noise/) to learn more about Noise Compatible Planning.

TABLES

PROPOSED SOUTH LOOP EXTENSION
WEST MEMPHIS, ARKANSAS

TABLE 1
EXTERIOR NOISE LEVELS

RECEIVER LOCATION NUMBER	CATERGORY AND 23 CFR 772	DISTANCE FROM CENTERLINE*	2021 BUILD ALTERNATIVE		2041 BUILD ALTERNATIVE	
	NOISE ABATEMENT LEVEL Leq Dba		ESTIMATED Leq Dba	NOISE IMPACT (YES/NO)	ESTIMATED Leq dBA	NOISE IMPACT (YES/NO)
1	Residence/ 67	194	56.1	No	64.3	No
2	Residence/ 67	370	50.6	No	58.9	No

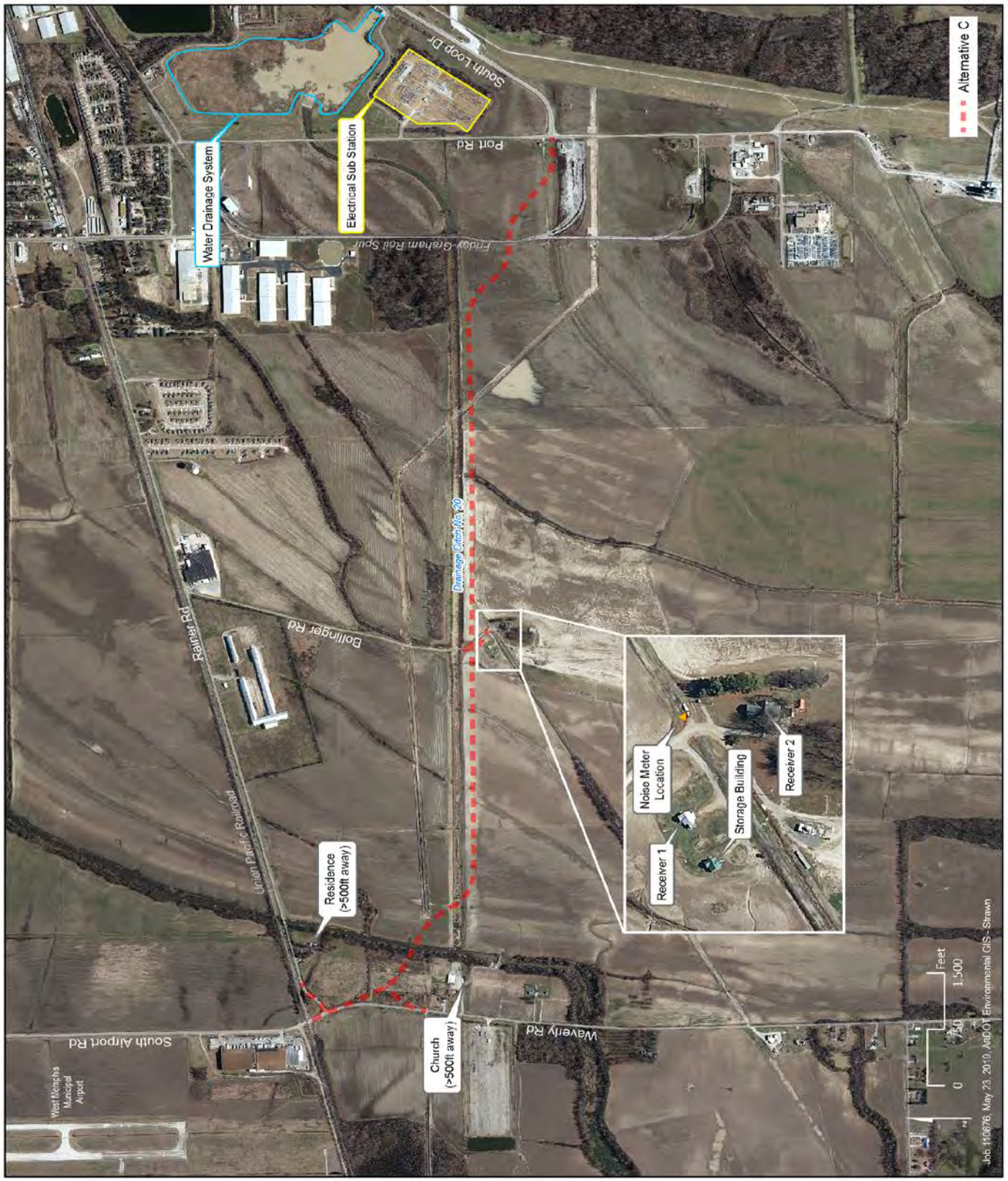
TABLE 2
TRAFFIC DATA AND Leq CONTOURS

ROADWAY	TIME AND PROJECT ALTERNATIVE	DHV	PERCENT AUTO	PERCENT MEDIUM TRUCKS	PERCENT HEAVY TRUCKS	ACOUSTICALLY HARD SITES		ACOUSTICALLY SOFT SITES	
						66 dBA Leq CONTOUR*	71 dBA Leq CONTOUR*	66 dBA Leq CONTOUR*	71 dBA Leq CONTOUR*
SOUTH LOOP	2021 Build	155	50%	10%	40%	<20	<20	<20	<20
	2041 Build	1,031	50%	10%	40%	<30	<30	<30	<30

* Distance From Centerline of Roadway In Feet.

Contours Based on Traffic Speed of 45 MPH.

FIGURE



Proposed South Loop Extension