

## **Appendix A**

***Reconstruction of I-20 from Washington Street to  
US 61 North, Vicksburg, Warren County, Mississippi  
April 2002***

**MDOT Study Report**

Zack Stewart  
Northern District Commissioner

Dick Hall  
Central District Commissioner

Wayne H. Brown  
Southern District Commissioner



Larry L. "Butch" Brown  
Executive Director

James H. Kopf  
Deputy Executive Director  
Chief Engineer

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Mississippi Department of Transportation / P.O. Box 1850 / Jackson, Mississippi 39215-1850 / Telephone (601) 359-7001 / FAX (601) 359-7110

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May 20, 2002

Neel-Schaffer, Inc.  
P.O. Box 22625  
Jackson, MS 39225-2625

Att'n: Mark Bailey

RE: 54-0020-01-106-10 P.E.  
Study for the Reconstruction of I-20 in Vicksburg  
Warren County

Dear Mark:

This letter serves as notice the final study report dated April, 2002, on above project is complete. Thank you for assisting the MDOT with this study.

Sincerely,

A handwritten signature in black ink that reads "John B. Pickering". The signature is written in a cursive, flowing style.

John B. Pickering, P.E.  
Roadway Design Division Engineer

pc: District Three  
Planning Division  
FHWA  
File



Stewart  
Northern District Commissioner

Dick Hall  
Central District Commissioner

Wayne H. Brown  
Southern District Commissioner



Larry L. "Butch" Brown  
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Walter G. Lyons  
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Mississippi Department of Transportation / P.O. Box 630 / Yazoo City, MS 39194 / Ph. (662) 746-2513 / FAX (662) 746-9344

May 15, 2002

**MEMORANDUM**

To: Mr. John Pickering  
Roadway Design Division Engineer

From: Carl B. Middleton *CBM*  
Assistant District Engineer - Construction

Re: 54-0020-01-106-10 P. E.  
Study for the Reconstruction of I-20 in Vicksburg  
Warren County

**Received**  
MAY 16 2002  
**Roadway Design**

District Three has reviewed the Neel-Schaffer's response to our comments on the most recent submittal of the above-referenced study.

We concur that the consultant has appropriately addressed our comments.

CBM:ar

pc: Mr. Walter Lyons  
Planning Division  
FHWA  
file



**Kidd, Jim**

**From:** Middleton, Carl  
**Sent:** Wednesday, March 20, 2002 8:30 AM  
**To:** Pickering, John  
**Cc:** Lyons, Walter  
**Subject:** 54-0020-01-106-10 P.E.: FMS 100367/001000

The District has reviewed the submittals from Neel-Schaffer on the above referenced project and has the following comments.

In the Report on Reconstruction of I-20, Traffic Volume and LOS Report:

- Section 5.4, Alternate 1 (page 8) - It should be noted that some of the recommended improvements at Hall's Ferry Road and Indiana Avenue have been made by other construction projects.
- Section 5.5, Alternate 2 (page 10) - This section describes modifications of Alternate 1 but does not describe the major changes from Alternate 1 at the US 61 South Interchange.
- Phase 5 construction (page 28) - in the reconstruction of the US 61 South Interchange US 61 northbound/I-20 westbound and I-20 westbound/US 61 southbound traffic is detoured using Hall's Ferry Road Interchange and Pemberton Boulevard. This should definitely be reconsidered.
- Estimated costs - no costs are included for chemical treatment of subgrade and subbase, drainage layer and edge drains.
- Where in the development of alternates were the loop ramps between north and south frontage roads at Indiana Avenue added. With these connections at Indiana Avenue are any needed between Indiana and Clay Street. Figure 17 in attachment A, Report Figures show design year traffic for westbound to eastbound connection to be "0". Can eastbound go to CD/Clay Street intersection and back to westbound frontage road.

On sheet 48 in Functional Plans, what kind of traffic control will be used for the ramp labelled "Ramp 61 N- WB" at its intersection with US 61 North.

One comment concerning the project number: I did not find the 54-0020-01-106-10 number in FMS. There is a active Preliminary engineering number IM-0020-01(038)/100367/001000.

*Carl B. Middleton*

*Assistant District Engineer-Construction*

*District 3*

*P.O. Box 630*

*Yazoo City, MS 39194*

# Reconstruction of I-20

From Washington Street To US 61 North  
Vicksburg  
Warren County  
Mississippi

Project No. 54-0020-01-106-10 P. E.

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Prepared for



MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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Prepared by



April, 2002

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Warren County  
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Prepared by



**NEEL-SCHAFFER, INC.**  
**ENGINEERS \* PLANNERS**

Jackson, Mississippi

April, 2002

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## 1.0 INTRODUCTION

### 1.1 Project Description

Neel-Schaffer was retained to evaluate the existing and future traffic volumes on Interstate 20 (I-20) and the adjacent frontage roads, in Vicksburg, Mississippi. The focus of the report was to evaluate an updated geometric design addressing the future requirements of I-20 within the urban limits of Vicksburg. The six-mile study area begins east of the Mississippi River Bridge and extends eastward to one mile east of the US 61 North interchange.

### 1.2 Project Background Data

The Mississippi Department of Transportation (MDOT) focused on this section of I-20 through Vicksburg due to the significant growth in the Vicksburg area in recent years and the increase in traffic volumes on I-20. Additionally, the existing geometry of I-20 contains numerous vertical curves that are below current interstate design standards.

In preparation of this project, MDOT compiled existing traffic volumes at specific locations throughout the study area. Neel-Schaffer conducted traffic modeling for future year analysis (2030). Previous reports and technical memorandums were compiled and presented to MDOT in 1992 and 1999 by Neel-Schaffer to present concept drawings and evaluation of alternate concepts.

### 1.3 Study Area

The project study area was identified to include I-20 and the adjacent frontage roads from east of the Mississippi River Bridge to 1 mile east of the US 61 North interchange. The total project length is approximately 6 miles and includes the following interchanges:

- Washington Street
- US 61 South
- Halls Ferry Road
- Indiana Avenue
- US 80/Clay Street
- US 61 North/MS 27

The location of the project is shown graphically in Figure 1.

### 1.4 Data Collection

Traffic counts conducted by MDOT included turning movement counts during peak hours at all ramp interchanges and frontage road connections and 24-hour machine counts on the mainline interstate, ramps, and cross streets. The majority of the counts are 1999 traffic counts; however, historical counts from 1996, 1997, and 1998 were used to supplement the traffic count data.

The data collection effort also included obtaining recent aerial photography of the study corridor, existing as-built plans for use in the development of conceptual designs and area development information.

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## 2.0 EXISTING CONDITIONS

### 2.1 Land Use

The study corridor consists of I-20 and the parallel frontage road system through the City of Vicksburg, Mississippi. The interstate corridor is a major east/west facility that serves regional and local traffic west into Louisiana over the Mississippi River Bridge and east into Central Mississippi, Alabama, and Georgia. Traffic volumes increase in the vicinity of the major cross streets throughout the corridor as a result of the generation of traffic in the area. Some major attractions include casinos, the Port of Vicksburg, and the Vicksburg National Military Park.

The frontage road system allows two-way travel and parallels I-20 with local and direct access to adjacent commercial property. The majority of the study corridor land use is commercial property that fronts the north and south frontage roads.

### 2.2 Area Circulation

Traffic volumes on I-20 increase from Washington Street on the west to US 61 North on the east and range from 22,000 vehicles per day (vpd) to 41,400 vpd. Washington Street provides access to the area casinos, the old Mississippi River Bridge and the Port of Vicksburg. US 61 South extends south to Port Gibson. Halls Ferry Road, Indiana Avenue and Clay Street provide local access to downtown, residential and commercial areas.

US 61 North extends north to Redwood. A current MDOT project will provide a direct connection between US 61 North and the Port of Vicksburg to re-direct truck traffic from downtown areas and provide a convenient bypass of the urban area for trucks accessing the Port.

### 2.3 Geometry

The existing interstate and frontage road system have numerous vertical and horizontal curves throughout the study area that are below current design standards. Posted traffic speeds are at 50 mph throughout the majority of the route. I-20 is a four lane interstate with two-vehicle lanes in each direction. Left entrances and exits exist within the study corridor at US 61 North and South.

Washington Street is a north/south arterial street that extends over I-20 and has a combination of partial cloverleaf and direct on/off ramps to provide access to I-20.

US 61 South is a divided highway that extends north into I-20 and intersects approximately one half mile east of Washington Street with free-flow grade separated movements. The northbound to westbound movement is a left entry into I-20 and the westbound to southbound movement is a left exit from I-20.

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Halls Ferry Road and Indiana Avenue are major arterial streets that extend over I-20 to the north and south. The intersection of Halls Ferry Road with the south frontage road provides access to the Pemberton Square Mall commercial area. The Halls Ferry Road and Indiana Avenue interchanges are spread diamond type interchanges at I-20.

The intersection of Clay Street and US 61 North with I-20 is a combination of directional grade separated ramps and partial cloverleaf loops. These two interchanges are approximately 0.75 miles apart at the eastern limits of the study corridor.

Two lane, two-way frontage roads on both the north and south sides of I-20 serve abutting commercial properties and residential streets beginning at Halls Ferry Road and ending at old MS 27. The frontage road intersections are signalized at the intersections with Halls Ferry Road and Indiana Avenue.

#### **2.4 Traffic Volumes**

Peak hour turning movement volumes and daily traffic volumes were obtained from MDOT staff for specific locations throughout the study corridor. The existing daily traffic volumes are shown graphically in Figures 2 through 5. The existing PM peak hour traffic volumes are shown in Figures 6 through 9.

The existing volumes reveal that I-20 traffic ranges from 22,000 vpd at the Mississippi River Bridge to 41,400 vpd east of Indiana Avenue. Cross street daily volumes are 25,000 vpd on US 61 South, 15,000 vpd on Halls Ferry Road north of I-20 and 19,000 vpd south, approximately 10,000 vpd on Indiana Avenue north and south of I-20, 19,000 vpd on Clay Street north of I-20, 20,000 vpd on US 61 North, and 12,000 vpd on Highway 27 South.

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## 3.0 PROJECTED TRAFFIC

### 3.1 Historical Traffic

The historical growth trends were analyzed for the interstate and adjacent local street system. The permanent count station on I-20 at the Mississippi River Bridge was used to estimate interstate growth rates. This location yielded an annual growth rate of 4.6 % over the past ten years. Historical growth trends on the streets adjacent to the study corridor ranged from no growth to 5% over the past ten years.

The City of Vicksburg provided information on planned area developments. City officials indicated that traffic volumes on US 61 North will be affected by the construction of a new hospital and other expected residential growth.

### 3.2 Growth Rate

Compound annual growth rates for area traffic volumes were calculated for I-20 and each arterial street within the study area. The arterial street growth rate was calculated to be 1.25% per year on each arterial segment except Washington Street south of I-20 (0.5%) and US 61 North (2.0%). The growth rate calculated for I-20 was 3.5% per year until 2015 and 2.0% from 2015 to 2030. The reduced growth between 2015 and 2030 is a result of the trend that as traffic volumes increase, the annual growth percentage will decrease for substantial volumes of traffic. The roadway section growth rates are shown in Figure 10.

### 3.3 Future Traffic Volumes

The future year traffic volumes were forecast for daily and PM peak hour volumes. The horizon analysis year was determined to be Year 2030. The 2030 traffic volumes were forecast based on the existing traffic volumes and the corresponding annual growth rate.

The PM peak hour volumes for Year 2030 traffic are shown in Figures 11 through 18 for Alternates 1,2 and 3.

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## 4.0 TRAFFIC ANALYSIS WITH EXISTING GEOMETRY

### 4.1 Evaluation Criteria

The capacity and level of service (LOS) of an intersection is evaluated based on the delay, turning movement volumes, traffic composition and roadway geometrics. The interstate traffic volumes were evaluated based on weaving area, merge and diverge movements. The methodology utilized in this analysis is based on the *Highway Capacity Manual* (HCM), Third Edition, 1997 update. The level of service, as outlined in the HCM, is reported as a letter designation of LOS A through LOS F ("A" is least delay and "F" is most delay). Level of service analyses were made at interchange junctions, adjacent street intersections, and merging, diverging and weaving areas along the interstate study corridor.

### 4.2 Computer Software

The analysis software used to evaluate and model existing and future traffic volumes is Corsim, version 1.03 developed by the United States Department of Transportation (US DOT) and the Federal Highway Administration (FHWA). The computer model was used to simulate existing traffic patterns to evaluate current operations and to provide a basis for comparison of future traffic under various scenarios. The Corsim network was developed for the 6 miles of I-20 within the study area and included each of the six interchanges and the frontage roads that parallel I-20 throughout the corridor.

The Corsim software is a computer traffic simulation program that applies internal-based simulation to describe traffic operations. Speed, acceleration, and the status of each vehicle is recalculated each second. As a result, several measures of effectiveness (MOE's) are provided, including delay, density, average speed and travel time. These MOE's provide the basis for comparing operating conditions under various future scenarios.

### 4.3 Capacity and Level of Service

Levels of service were determined by relating the calculated vehicle density or other MOE's on a section of roadway to the level of service density criteria outlined in the HCM.

The levels of service were calculated for existing conditions and the horizon analysis year (2030). The resulting levels of service are summarized in Table 1. The 2030 levels of service are based on the existing roadway geometrics.

The level of service analysis revealed that the majority of the existing traffic volumes are operating at acceptable levels (LOS C or better). The Year 2030 traffic volumes are shown to operate with significant delays at the majority of the analysis areas. The majority of the interstate and interchange ramps are forecast to operate with excessive delays (LOS F) without capacity improvements.

**Table 1  
Level of Service Analysis  
EXISTING CONFIGURATION AND GEOMETRY**

Analysis Type	Location	Critical Movement	Existing LOS	Year 2030 LOS
Signalized Intersections	US 61 South/ Pemberton Square Boulevard	Overall Intersection	C	E
	US 80/Clay Street/Berryman Road	Overall Intersection	B	B
	US 80/Mississippi 27	Overall Intersection	C	D
	Halls Ferry Road/North Frontage Road	Overall Intersection	B	E
	Halls Ferry Road/Pemberton Square Boulevard	Overall Intersection	C	D
	Indiana Avenue/North Frontage Road	Overall Intersection	C	C
	Indiana Avenue/South Frontage Road	Overall Intersection	C	D
	Washington Avenue/North Ramps	Overall Intersection	C	C
	Halls Ferry Road/North Ramps	Overall Intersection	B	D
Unsignalized Intersections	Clay Street/North Frontage Road	Southbound Left	A	A
		Westbound Left	C	F
	US 61 North/North Frontage Road	Southbound Left	A	A
		Westbound Left	F	F
	Washington Avenue/South Ramps	Westbound Left	A	B
		Southbound Left	A	A
	Halls Ferry Road/South Ramps	Eastbound Left	C	F
		Southbound Left	A	F
	Indiana Avenue/North Ramps	Westbound Left	B	F
		Northbound Left	A	A
	Indiana Avenue/South Ramps	Eastbound Left	C	F
		Southbound Left	A	A
Weaving Areas and Ramp Junctions	I-20 EB between Washington Ave and US 61 South	Weaving Area	A	F
	I-20 WB between Washington Ave and US 61 South	Weaving Area	A	D
	I-20 EB between US 61 South and Halls Ferry Rd	Weaving Area	B	F
	I-20 WB between US 61 South and Halls Ferry Rd	Weaving Area	B	E
	I-20 EB between West Clay St and US 61 North	Weaving Area	C	F
	I-20 WB between US 61 North and West Clay St	Merging Area	C	F
Freeway Segments	I-20 EB between Halls Ferry Rd and Indiana Ave	Freeway Segment	C	F
	I-20 WB between Indiana Ave and Halls Ferry Rd	Freeway Segment	C	F
	I-20 EB between Indiana Ave and Clay St	Freeway Segment	C	F
	I-20 WB between Clay St and Indiana Ave	Freeway Segment	C	E

SOURCE: NEEL-SCHAFFER, INC. AUGUST 1999

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## 5.0 ALTERNATE DEVELOPMENT

Evaluation of the Year 2030 traffic volumes on the existing roadway network revealed that significant capacity related deficiencies are anticipated. Freeway segments, weaving areas, and ramp junctions are forecast to operate at levels of service D, E, and F throughout the corridor. Geometric improvements are anticipated to be warranted to mitigate the failing levels of service.

### 5.1 Design Criteria

The overall design parameters for I-20 between Washington Street and east of US 61 North are outlined in the 1988 Design Manual for Interstate Reconstruction and 4-R work. A major portion of the I-20 corridor in Vicksburg was completed early in the interstate construction program; therefore, many of the design criteria in effect during the 1950's do not meet with the design criteria as outlined in the 1988 design manual.

The following design criteria is implemented in Neel-Schaffer's alternate development as directed by MDOT:

1. 60 mph design speed for I-20 mainline throughout the corridor.
2. 50 mph design speed for directional ramps.
3. 50 mph design speed for collector – distributor roads.
4. 45 mph design speed for frontage roads.
5. Vertical clearance for bridges is 16 feet, 6 inches.

The level of service design criteria is to provide a level of service "C" operation or better for the interstate, interstate ramps, merge and diverge points and weaving sections, and Level "D" for individual movements at intersections.

### 5.2 Development of Concepts

In order to improve the existing and projected capacity deficiencies and operational problems, multiple design configurations and geometric alternates were considered. The analysis was conducted to provide for all movements at the interchanges, right-hand exiting and entering directional ramps, loop ramps and frontage road access. The close proximity of the Washington Street, US 61 South and Halls Ferry Road interchanges and the Clay Street/US 80 and US 61 North interchanges merited specific attention for the interaction of these adjacent interchanges.

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### 5.3 Local Traffic Movements

The traffic counts indicate that traffic volumes increase substantially on I-20 between US 61 South and US 61 North. Existing two-way frontage roads serve commercial businesses through a portion of the corridors. The existing frontage road system is discontinuous and does not span the existing railroad tracks. Expansion of the frontage road system adjacent to I-20 was explored as possible relief routes to local traffic using the interstate system.

### 5.4 Alternate 1

Improvements throughout the corridor were identified in a report by Neel-Schaffer submitted in June 1993. The improvements outlined in this report were considered the base condition and labeled as Alternate 1. The improvements included in Alternate 1 are as follows:

#### Washington Street

- Signalize the two ramp termini.
- Lengthen the left turn lanes on Washington Street.

#### US 61 South

- Construct a loop ramp for the northbound to westbound movement.
- Reconstruct I-20 from the Kansas City Southern (KCS) Railway east to Halls Ferry Road to accommodate 60 mph design speed vertical alignment criteria.
- Widen eastbound I-20 to 4 lanes at US 61 South ramp merge point. The outside lane would transition into an exit lane at Halls Ferry Road and 3 lanes would continue eastbound.
- Construct a new right-hand dual lane exit for the westbound to southbound movement.

#### Halls Ferry Road

- Widen I-20 to provide three through lanes through the interchange.
- Replace the diamond interchange on-ramp in the northwest quadrant of the intersection with a loop on-ramp in the northeast quadrant to increase weaving distance.
- The westbound I-20 off-ramp intersection with Halls Ferry Road could be improved with construction of dual westbound left turn lanes and a free flow westbound right turn lane.
- Add a loop ramp in the southeast quadrant and eliminate the diamond interchange exit ramp.
- Widen the Halls Ferry Road bridge over I-20 to accommodate new interchange loop ramps.
- Widen Halls Ferry Road to five lanes and relocate the north frontage road to increase lane capacity and storage lengths.
- Upgrade the existing traffic signal system.

- 
- Construct a continuous right turn lane on Halls Ferry Road between the eastbound I-20 off-ramp and Pemberton Square Boulevard. Construct a right turn lane on the south frontage road for the westbound right turn movement.

#### Frontage Roads between Halls Ferry Road and Indiana Avenue

- Construct three lane, two-way frontage roads between Halls Ferry Road and Indiana Avenue.

#### Indiana Avenue

- Widen I-20 to three lanes in each direction through the interchange.
- Modify the median islands on Indiana Avenue to provide left turn storage at the ramp termini intersections and at the frontage roads.
- Widen the eastbound and westbound I-20 exit ramps at the ramp terminus intersections.
- Widen the south frontage road on both sides of Indiana Avenue for additional intersection capacity.
- Construct a right turn lane between the north frontage road and the westbound I-20 entrance ramp.
- Widen the north frontage road on both sides for additional capacity.
- Upgrade the interchange traffic signal system.

#### US 80 / Clay Street and US 61 North

- Widen I-20 to three lanes with the third lane westbound added as the US 61 North southbound ramp entering movement.
- Construct an eastbound two-lane collector-distributor (CD) road beginning west of the KCS Railway and continuing east of the US 61 North interchange.
- Eastbound I-20 would be constructed on a new alignment parallel to the CD road and extend 0.5 miles east of US 61 North where I-20 and the CD road would intersect.
- Construct a loop ramp in the southwest quadrant for the southbound Clay Street to eastbound I-20 movement. Reconstruct the I-20 eastbound off ramp outside of this new loop ramp.
- Lengthen the westbound I-20 on-ramp acceleration lane over the KCS Railway.
- Construct a ramp for the westbound US 80 to the eastbound CD road.
- Add a loop ramp in the southeast quadrant of the US 61 North interchange for the eastbound CD road to northbound US 61 North movement. Reconstruct the northbound US 61 North to eastbound I-20 on-ramp to accommodate the new loop ramp.
- Construct a loop ramp in the northeast quadrant of the interchange for the northbound US 61 North to westbound I-20 movement.

- 
- Construct a right-hand exit directional ramp from eastbound I-20 to northbound US 61 North. Relocate the northeast frontage road to accommodate this movement.

The lane geometry for Alternate 1 is shown in Figures 19 through 22.

## 5.5 Alternate 2

Development of Alternate 2 consisted of the geometric improvements to the six mile study corridor of I-20 and the parallel frontage roads listed in Alternate 1, with the following modifications:

### US 61 South

- Modify the mainline section of eastbound I-20 to include three through lanes east of the interchange rather than the lane drop and two through lanes in Alternate 1. The ramp configuration is different than Alternate 1 for the westbound I-20 to southbound US 61 movement. The change in design reduces the number of bridges necessary for these crossing movements from three bridges to two, by eliminating the bridge for the westbound to southbound movement crossing northbound US 61 traffic.

### Halls Ferry Road

- Eastbound I-20 has three lanes through the interchange and one exit only lane for the eastbound I-20 to northbound Halls Ferry Road.
- Modify the eastbound I-20 on-ramp from Halls Ferry Road to include access to the south frontage road.
- Allow for the eastbound through movement at the eastbound I-20 off-ramp at Halls Ferry Road for access to eastbound frontage road.
- Construct loop ramp in the northwest quadrant for the westbound I-20 to southbound Halls Ferry Road movement.

### North and South Frontage Roads

- Provided for one-way frontage roads north and south of I-20 between Halls Ferry Road and Clay Street.
- Construct access between north and south frontage roads between interchanges east of Halls Ferry Road and east of Indiana Avenue.
- Construct eastbound and westbound interstate on-ramps from the one-way frontage roads east of Halls Ferry Road and east of Indiana Avenue.

### Indiana Avenue

- Realign the eastbound and westbound I-20 on and off-ramps to intersect with the one-way frontage roads. This will eliminate two signalized intersections and improve the approach capacity.
- Construct an elevated slip ramp from the eastbound to westbound frontage road west of the interchange.

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### Clay Street

- Provide a CD road as an extension of the south frontage road which provides for eastbound I-20 and US 61 North movements.

### US 61 North

- Widen the eastbound to northbound I-20 off-ramp from one lane to two lanes.
- Eliminate the I-20 loop on-ramp in the northeast quadrant and redirect the northbound to westbound traffic to the new on-ramp in the northwest quadrant.
- Eliminate the I-20 off-ramp in the northeast quadrant and redirect the westbound to northbound traffic to the new loop off-ramp in northwest quadrant.
- Relocate the north frontage road intersection further north to allow more weaving area for US 61 northbound traffic from I-20.

The lane geometry for Alternate 2 is shown in Figures 23 through 26.

#### 5.5.1 Alternate 2A

The geometrics associated with Alternates 2 and 2A are similar. The differences between the alternates are as follows:

### Interstate 20

- The number of through lanes on I-20 is increased from three to four lanes at Halls Ferry Road.
- I-20 eastbound at the Halls Ferry Road northbound off-ramp drops the fifth outside lane at the exit and extends four through lanes eastbound.
- The westbound I-20 on-ramp from the north frontage road east of Halls Ferry Road enters through an acceleration lane and transitions out with a taper. Alternate 2 maintained a continuous lane between the on-ramp and the off-ramp to the west of Halls Ferry Road.
- The westbound I-20 to southbound US 61 South movement drops two outside interstate lanes. One exit lane is an auxiliary lane and one exit lane is the fourth mainline interstate lane. This differs from Alternate 2 because of an additional mainline interstate lane.

The geometrics for Alternate 2A are shown in Figures 27 through 30.

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### 5.5.2 Alternate 2B

Alternate 2B is a modified version of Alternate 2A. The geometrics associated with Alternate 2B are similar to those listed in Alternate 2A. The differences between the alternates are as follows:

#### Interstate 20

- Eliminate one of the slip ramps in each direction east of Halls Ferry Road.
- Provide a continuous auxiliary lane eastbound on I-20 between the Indiana Avenue on-ramp and the Clay Street off-ramp.

#### Indiana Avenue

- An elevated westbound to eastbound slip ramp was provided between the north and south frontage roads east of Indiana Avenue.

The geometrics outlined in Alternate 2B are shown in Figures 31 through 34.

## **5.6 Alternate 3**

The geometrics of the study corridor for Alternate 3 are similar to the Alternate 2B, with the following exceptions.

#### Interstate 20

- Widen the Mississippi River Bridge and reconstruct the Washington Street Interchange to allow for three eastbound lanes and three westbound mainline interstate lanes east of Washington Street.
- Extend the westbound merge lane 1500 feet from Washington Street on I-20 onto the Mississippi River Bridge.
- Widen mainline I-20 westbound to provide a fourth through lane from Halls Ferry Road to US 61 South.
- Provide a continuous auxiliary lane westbound on I-20 between Indiana Avenue and Halls Ferry Road.

The geometrics outlined in Alternate 3 are shown in Figures 35 through 38.

## 6.0 TRAFFIC ANALYSIS WITH IMPROVED GEOMETRY

### 6.1 Capacity Analysis

The alternates were evaluated using the analysis criteria outlined in the 1997 update of the *Highway Capacity Manual* (HCM). The evaluation included intersection approach levels of service, weaving area, merge and diverge analysis, and mainline interstate density evaluation. The results of the level of service analysis are listed in Tables 2 through 4 and shown graphically in Figures 39 through 58.

**Table 2**  
**YEAR 2030 INTERSTATE WEAVING AREA EVALUATION**

Roadway	Location	Critical Movement	Alternate				
			1	2	2A	2B	3
I-20 Eastbound	Washington Street	Merge	C	C	C	C	B
I-20 Westbound	Washington Street	Diverge	C	C	C	C	B
		Merge	D	E	E	E	C
I-20 Eastbound	US 61 South	Diverge	C	D	D	D	B
		Merge	B	B	B	B	B
I-20 Westbound	US 61 South	Diverge	C	C	C	C	B
		Merge	C	C	B	B	B
I-20 Eastbound	Halls Ferry Road	Diverge	C	C	C	C	B
		Merge	D	D	C	C	C
I-20 Westbound	Halls Ferry Road	Diverge NB	C	B	B	B	B
		Diverge SB	B	B	B	B	B
I-20 Eastbound	E. of Halls Ferry Road	Merge	n/a	C	B	n/a	n/a
		Merge	n/a	D	C	n/a	n/a
I-20 Westbound	E. of Halls Ferry Road	Merge	n/a	D	C	n/a	n/a
		Merge	n/a	D	C	n/a	n/a
I-20 Eastbound	Indiana Avenue	Merge	C	F	D	C	C
		Diverge	C	C	B	B	C
I-20 Westbound	Indiana Avenue	Merge	D	D	C	C	C
		Diverge	C	E	C	C	C
I-20 Eastbound	C-D Road E. of Indiana	Diverge	D	C	B	B	B
		Merge	n/a	D	C	C	C
I-20 Westbound	Clay Street	Merge NB	A	n/a	n/a	n/a	n/a
		Merge SB	B	n/a	n/a	n/a	n/a
I-20 Eastbound	Clay Street	Diverge NB	A	n/a	n/a	n/a	n/a
		Diverge SB	B	n/a	n/a	n/a	n/a
I-20 Westbound	Clay Street	NB Merge	C	D*	C*	C*	B*
		SB Merge	C				
I-20 Eastbound	US 61 North	Diverge	D	B	B	B	B
		Merge					
I-20 Westbound	US 61 North	Merge NB	A	A	A	A	A
		Merge SB	B	B	B	B	B
I-20 Eastbound	US 61 North	Diverge NB	B	B	B	B	A
		Diverge SB	A	A	A	A	A
I-20 Westbound	US 61 North	Merge	F	C	C	C	B
		Diverge					
I-20 Eastbound	US 61 North	Merge NB	C	B*	B*	B*	B*
		Merge SB	D				
I-20 Westbound	US 61 North	Diverge NB	F	C*	C*	C*	B*
		Diverge SB	C				

n/a - At-Grade intersection does not have merge/diverge movements.

\* - Directional merge or diverge does not exist, LOS includes both directions in combined ramp.

Source: Neel-Schaffer, Inc., June 2000

**Table 3  
YEAR 2030 INTERSTATE SEGMENT EVALUATION**

Roadway	Location	Critical Movement	Alternate				
			1	2	2A	2B	3
I-20 Eastbound	W. of Washington Street	Freeway Segment	C	C	C	C	B
I-20 Westbound	W. of Washington Street	Freeway Segment	C	E	D	D	C
I-20 Eastbound	E. of Washington Street	Freeway Segment	D	C	C	C	B
I-20 Westbound	E. of Washington Street	Freeway Segment	C	D	D	D	C
I-20 Eastbound	E. of US 61 South	Freeway Segment	C	B	B	B	B
I-20 Westbound	E. of US 61 South	Freeway Segment	C	D	D	D	C
I-20 Eastbound	E. of Halls Ferry Road	Freeway Segment	D	D	C	C	C
I-20 Westbound	E. of Halls Ferry Road	Freeway Segment	D	D	D	D	C
I-20 Eastbound	E. of Indiana Avenue	Freeway Segment	C	D	D	C	C
I-20 Westbound	E. of Indiana Avenue	Freeway Segment	C	D	C	C	C
I-20 Eastbound	E. of Clay Street	Freeway Segment	F	D	C	C	C
I-20 Westbound	E. of Clay Street	Freeway Segment	D	C	B	B	B
I-20 Eastbound	E. of US 61 North	Freeway Segment	B	C	C	C	C
I-20 Westbound	E. of US 61 North	Freeway Segment	F	C	B	B	B

Source: Neel-Schaffer, Inc., June 2000

**Table 4  
YEAR 2030 INTERSECTION EVALUATION**

Intersection	Critical Movement	Alternate				
		1	2	2A	2B	3
<b>Signalized Intersections</b>						
Washington Street/North Ramps	Intersection	C	C	C	C	C
US 61 South / Pemberton Square Blvd	Intersection	C	C	C	C	C
Halls Ferry Road / North Frontage Road	Intersection	B	C	C	C	C
Halls Ferry Road / North Ramps	Intersection	B	C	C	C	B
Halls Ferry Road / South Frontage Road	Intersection	D	D	D	D	D
Indiana Avenue / North Frontage Road	Intersection	D	C*	C*	C*	C*
Indiana Avenue / North Ramps	Intersection	B	n/a	n/a	n/a	n/a
Indiana Avenue / South Ramps	Intersection	E	C*	C*	C*	C*
Indiana Avenue / South Frontage Road	Intersection	F	n/a	n/a	n/a	n/a
Clay Street / North Ramps	Intersection	n/a	B	B	B	B
Clay Street / South C-D Road	Intersection	n/a	C	C	C	C
Clay Street / Berryman Road	Intersection	B	B	B	B	B
Clay Street / MS 27	Intersection	D	C	C	C	C
<b>Unsignalized Intersections</b>						
Washington Street/ South Ramps	WB Left	B	A	A	A	A
	SB Left	A	A	A	A	A
Halls Ferry Road / South Ramps	EB Right	A	A	A	A	A
	SB Left	A	C	C	C	C
Clay Street / North Frontage Road	EB Left	F	F	F	F	F
	EB Right	F	F	F	F	F
	WB Left	F	F	F	F	F
	WB Right	F	F	F	F	F
	NB Left	C	C	C	C	C
	SB Left	D	C	C	C	C
US 61 North/ North Frontage Road	WB Left	F	F	F	F	F
	SB Left	C	C	C	C	C

n/a - Intersection does not exist

\* - Ramp and Frontage Road are combined in a single ramp.

Source: Neel-Schaffer, Inc., June 2000

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## 6.2 Evaluation of Results

The analysis for each study alternate was evaluated to identify capacity related deficiencies for the Year 2030 volumes. The evaluation included the interstate mainline operation, weaving areas, frontage roads and surface street intersections.

### 6.2.1 Alternate 1

Weaving area deficiencies include the I-20 westbound merge at Washington Street (D), diverge at Halls Ferry Road (E), merge at Indiana Avenue (D), diverge at Clay Street (D) and the southbound merge (D) and northbound diverge (F) at US 61 North. I-20 eastbound deficiencies include the merge movement at Halls Ferry Road (D), diverge at the C-D road east of Indiana Avenue (D), and the diverge movement at US 61 North (F).

Mainline interstate level of service deficiencies for Year 2030 volumes included westbound I-20, east of Halls Ferry Road (D), east of Clay Street (D) and east of US 61 North (F). Eastbound I-20 deficiencies are forecast to exist east of Washington Street (D), east of Halls Ferry Road (D), and east of Clay Street (F).

Surface street intersection delays are anticipated to exceed design thresholds at Indiana Avenue and the intersections with the south interstate on/off ramps (E) and the south Frontage Road (F) signalized intersections. The minor street turning volumes at the north Frontage Road intersections with Clay Street (F) and US 61 North (F) are forecast to operate with significant delays as unsignalized intersections.

The close proximity of the freeway interchanges combined with the Year 2030 volumes impact the weaving areas and mainline freeway segments such that seven of nine areas evaluated for Alternate 1 have deficient weaving area movements. The majority of the mainline interstate corridor is forecast to operate below design levels of service for the geometrics outlined in Alternate 1.

### 6.2.2 Alternate 2

The capacity analysis of Year 2030 volumes and the geometry outlined for Alternate 2 revealed capacity deficiencies of weaving areas, interstate mainline travel lanes and surface street intersections.

Weaving area deficiencies were identified at Washington Street, Halls Ferry Road, slip ramps east of Halls Ferry Road, Indiana Avenue, one slip ramp east of Indiana Avenue and Clay Street. Mainline interstate levels of service are anticipated to be below design standards between Washington Street and Clay Street.

Geometric improvements between Alternates 1 and 2 revealed that weaving area levels of service did not improve at most interchanges with the exception of the US 61 North interchange. Merge/diverge movements at US 61 North are shown to operate at levels superior to those identified in Alternate 1. At-grade surface street intersections are shown to operate at acceptable levels except the unsignalized intersections of the north frontage roads at Clay Street and US 61 North.

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### 6.2.3 Alternate 2A

Modifications to the geometrics outlined in Alternate 2 were conducted to arrive at the Alternate 2A design. Three weaving area deficiencies are forecast to occur with these improved geometrics. The weaving area deficiencies are the I-20 westbound merge (E) and diverge (D) movements at Washington Street and the I-20 eastbound merge (D) at Indiana Avenue. Mainline interstate levels of service are anticipated to improve to acceptable levels at three of the eight deficient segments identified in Alternate 2. The five remaining deficient segments of I-20 are each at level of service D between Washington Street and Indiana Avenue.

### 6.2.4 Alternate 2B

Mainline freeway improvements were identified to improve the deficient levels of service from Alternate 2A without significantly impacting the Mississippi River Bridge or widening beyond the existing frontage road system. The additional improvements identified include constructing an eastbound auxiliary lane on I-20 between the Indiana Avenue on-ramp and the Clay Street off-ramp, eliminating one of the slip ramps in each direction east of Halls Ferry Road and providing a westbound to eastbound connection between the north and south frontage roads at Indiana Avenue. The results indicate that two weaving areas would still be deficient. The weaving areas are the I-20 westbound merge (E) and diverge (D) at Washington Street. Westbound I-20 is forecast to operate at level of service D from the Mississippi River Bridge east to Halls Ferry Road.

### 6.2.5 Alternate 3

Mainline freeway improvements were identified that would increase the through lanes on I-20 to evaluate the improvements necessary to mitigate the level of service deficiencies in Alternate 2B. Geometric improvements included widening I-20 to three eastbound and three westbound through lanes at the Washington Street interchange and five westbound through lanes between Halls Ferry Road and US 61 South. The results indicate that with these additional interstate travel lanes, widening the Mississippi River Bridge, to three eastbound and three westbound lanes reconstructing portions of the Washington Street interchange and extending the westbound merge lane from the Washington Street on-ramp onto the Mississippi River Bridge, all deficient levels of service within the interstate corridor would be mitigated for the Year 2030 traffic volume projections.

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### **6.3 Single Point Urban Interchange**

The interchange located at I-20 and US 61 North was evaluated to determine if a Single Point Urban Interchange (SPUI) could accommodate the Year 2030 traffic volumes in a more efficient manner than with loop and diamond ramps. The analysis of future volumes revealed a level of service F for a SPUI due to the significant volume of traffic between eastbound I-20 and northbound US 61 North. Additionally, the median width on I-20 would need to be redesigned and the mainline interstate lanes reconstructed to allow for a bridge structure across a compressed median for the SPUI.

### **6.4 Extension of North Frontage Road**

An evaluation of the continuation of the north frontage road was conducted to determine if this frontage road should be connected between US 80/Clay Street and US 61 North. The areas currently served by these two-way frontage roads are mostly residential in nature and are not projected to have the same levels of traffic in Year 2030 projections as the frontage roads to the west that provide access to multiple commercial properties. The continuation of the three lane one-way frontage road system is not recommended to be extended east to include the north frontage road between Clay Street/US 80 and US 61 North because the future traffic volumes do not warrant the extension based on the 2030 projections in this analysis.

## 7.0 ALTERNATE SELECTION

### 7.1 Evaluation Criteria

Each design alternate was evaluated based on the level of service criteria outlined by MDOT of level of service C for the interstate, interstate ramps and weaving areas and level of service D for individual movements at intersections.

### 7.2 Comparison of Delays

The alternate level of service deficiencies were compiled for the six mile study corridor and are summarized in Table 5 from the results listed previously in Tables 2, 3 and 4.

Table 5  
ALTERNATE EVALUATION

Alternate	Deficient Level of Service Locations				Total Deficient Locations
	Interstate	Weaving Areas	Signalized Intersections	Unsignalized Intersections	
1	6	9	2	2	19
2	8	12	0	2	22
2A	5	3	0	2	10
2B	4	2	0	2	8
3	0	0	0	2	2

Source: Neel-Schaffer, Inc., June 2000

The results reveal that Alternates 1 and 2 have similar benefits and alternates 2A and 2B yield similar benefits. Alternates 2B and 3 provide the most improvement to I-20 interstate mainline capacity, weaving areas and surface street intersections.

### 7.3 Constructability and Maintenance of Traffic

Alternates 1, 2 and 3 were evaluated based on the design parameters outlined in Section 5.1 and the existing locations of commercial businesses, roadway rights-of-way, and study area interchanges.

#### 7.3.1 *Alternate 1*

Two-way, three lane, frontage roads, ramp improvements and widening portions of the mainline interstate travel lanes could be accommodated without widening beyond the existing frontage roads. Maintenance of traffic would be limited to one lane, one-way operation by diverting traffic to the eastbound or westbound interstate lanes during construction of the opposing directions.

#### 7.3.2 *Alternates 2, 2A & 2B*

One-way, three lane frontage roads, ramp improvements and the mainline interstate widening are anticipated to be accommodated within the limits of the existing frontage road system. Significant impacts to or relocations of commercial businesses adjacent to the frontage roads are not anticipated as part of these construction alternates. Maintenance of traffic could be shifted to one lane, one-way operation on the opposing directions of interstate lanes or preferably on the newly constructed portions of the one-way, three lane frontage road system.

### 7.3.3 *Alternate 3*

Widening the mainline interstate west through the Washington Street interchange would create significant impacts to adjacent commercial businesses. Acquisition of additional rights of way from commercial property adjacent to I-20 concurrent with widening the Mississippi River Bridge and reconstructing the Washington Street interchange would potentially escalate construction costs by tens of millions of dollars. Maintenance of traffic could be handled on the three lane, one-way frontage road system or on the opposing directions of interstate travel lanes.

### 7.4 **Recommended Alternate**

The delay analysis revealed that alternates 2B and 3 provide the most benefits to mainline interstate operations, weaving areas, frontage roads, and ramp intersections. The evaluation of the constructibility of Alternates revealed that Alternate 3 requires a wider cross-section for the mainline interstate that would potentially effect the commercial areas adjacent to the existing frontage roads. This impact, concurrent with widening the Mississippi River Bridge and reconstruction of the Washington Street interchange would escalate the construction costs beyond the benefits anticipated from these improvements. Based on the delay analysis and corresponding estimate of impacts to adjacent businesses and construction costs, Alternate 2B is the preferred Alternate.

### 7.5 **Level of Service Deficiencies**

The deficiencies identified in Alternate 2B for the level of service design criteria outlined by MDOT were evaluated to determine what improvements would be necessary to mitigate the substandard levels. The evaluation is listed in Table 6.

**Table 6**  
**IMPROVEMENTS NEEDED TO ELIMINATE DEFICIENT LEVELS OF SERVICE**  
**ALTERNATE 2B – YEAR 2030 TRAFFIC**

Roadway	Critical Movement	Level of Service	Improvement Needed to Reach Appropriate LOS
<b>Weaving Area</b>			
I-20 WB at Washington Street	Merge	E	Construct an acceleration lane on the Mississippi River Bridge 1500 ft in length.
I-20 WB at Washington Street	Diverge	D	Widen WB I-20 to three through lanes west of Washington Street.
<b>Interstate</b>			
I-20 Westbound			
- west of Washington Street	Freeway Segment	D	Provide 3 WB Interstate lanes west through the Washington St. interchange.
- east of Washington Street	Freeway Segment	D	
- east of US 61 South	Freeway Segment	D	Provide 5 WB Interstate lanes west from Halls Ferry Rd to US 61 South.
- east of Halls Ferry Road	Freeway Segment	D	
<b>Unsignalized Intersections</b>			
Clay Street/North Frontage Rd	EB Approach	F	Signalize intersections, however, warrants are not anticipated to be met
	WB Approach	F	
US 61 North/N. Frontage Rd.	WB Approach	F	

Source: Neel-Schaffer, Inc., June 2000

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## 8.0 Construction Phasing and Estimated Costs

### 8.1 Construction Phasing

The reconstruction of the six miles of I-20 throughout the study area will be a significant construction effort. The magnitude of this project is such that the corridor is recommended to be split into segments for more manageable projects of approximately equal size and estimated construction costs. The proposed phasing of the six-mile I-20 corridor is detailed as follows:

- Phase 1: US 61 North interchange and I-20 mainline from east of Clay Street to east of US 61 North. Includes widening the existing westbound interstate lanes, constructing new eastbound interstate lanes and collector-distributor (CD) Road construction, a new bridge structure over I-20 for US 61 North/MS 27, a new structure from eastbound I-20 to northbound US 61 North, and 0.75 miles of US 61 North reconstruction. (1.3 miles of I-20)
- Phase 2: New construction of frontage roads and widening of existing frontage roads to 3 lanes north and south of I-20 between Halls Ferry Road and Clay Street. Construct frontage road fly-over connections east and west of Indiana Avenue between the north and south frontage roads. Construct temporary connections to I-20 for on/off ramps that will be reconstructed to the ultimate grade concurrent with I-20 improvements.
- Phase 3: Widen Clay Street north and south of the frontage road intersections. Construct frontage roads at the Clay Street interchange. Construct a temporary connection between I-20 eastbound and westbound with the frontage roads east of Halls Ferry Road.
- Phase 4: I-20 mainline construction from Clay Street to east of Halls Ferry Road. Through interstate traffic will be shifted to adjacent three lane, one-way frontage road system. (3.1 miles of I-20)
- Phase 5: Halls Ferry Road interchange reconstruction. I-20 mainline from 0.3 miles east of Washington Street (east of the KCS Railway bridge structure) to the east side of the Halls Ferry Road interchange. Reconstruction of the US 61 South interchange and 0.5 miles of US 61 South. (one mile of I-20)

The location of each phase is graphically depicted in a conceptual construction phasing plan. This plan is included as 24"x36" plan sheets. A more detailed construction phasing plan is provided in the Appendix.

## 8.2 Opinion of Costs

The opinion of probable costs includes major work items such as pavement, excavation and bridges. Other items such as striping, signals and lighting are lumped together as miscellaneous costs. Estimates were also based on the assumption of replacing the existing concrete pavement along this corridor with 13 inches of concrete over six inches of bituminous base. The cost estimate is listed summarized in Table 7. The detailed cost estimate sheets are contained in the Appendix.

**Table 7**  
**OPINION OF PROBABLE COST SUMMARY**

Phase	Construction Costs			Right-of-Way & Utilities	Project Total
	Roadway & Bridge Construction	Roadway Design (10%)	Subtotal		
1	\$ 27,461,000	\$ 2,747,000	\$ 30,208,000	\$ 500,000	\$ 30,708,000
2	\$ 30,013,750	\$ 3,002,000	\$ 33,016,000	\$ 3,000,000	\$ 36,016,000
3	\$ 2,689,250	\$ 269,000	\$ 2,959,000	\$ 1,250,000	\$ 4,209,000
4	\$ 43,811,950	\$ 4,382,000	\$ 48,194,000	\$ 750,000	\$ 48,944,000
5	\$ 19,658,600	\$ 1,966,000	\$ 21,625,000	\$ 2,500,000	\$ 24,125,000
<b>Totals</b>	<b>\$ 123,634,550</b>	<b>\$ 12,366,000</b>	<b>\$ 136,002,000</b>	<b>\$ 8,000,000</b>	<b>\$ 144,002,000</b>

Source: Neel-Schaffer, Inc., June 2000

The total project cost is estimated to be approximately \$145,000,000 for the six-mile study corridor.

## 9.0 FUNCTIONAL PLANS

The recommended Alternate 2B was further developed from the Concept Plan utilized in the capacity analysis to develop a preliminary set of Functional Plans. The Functional Plans were developed with 24"x36" plan and profile sheets using MDOT criteria.

### 9.1 Criteria

The criteria utilized in this analysis were based on the Department's design requirements for new construction and reconstruction of urban freeways and are listed in Table 8.

**Table 8**  
**GEOMETRIC DESIGN CRITERIA FOR FREEWAYS**

Design Element		Urban Freeway
Design Speed		60 mph
Control of Access		Full (Type 1)
Level of Service		Minimum: C
Lane Width		12'
Outside Shoulder Width	Usable	12'
	Surfaced	10'
Median Shoulder Width	Usable	8'
	Surfaced	4'
Travel Lane Cross Slope		2.0%
Auxiliary Lanes	Lane Width	12'
	Shoulder Width	Surfaced: 10', Usable: 12'
Median Width		Min: 22' (4 Lane); 22' (6 Lane)
New & Reconstructed Bridges	Structural Capacity	HS-20
	Minimum Width	Travel Way + 12' (Outside) + 6' Median
Existing Bridges to Remain in Place	Structural Capacity	HS-20
	Minimum Width	Travel Way + 10' (Outside) + 4' Median
Minimum Right of Way Width		Depends on Adjacent Development
Desirable ROW Border Width		15'
Roadside Clear Zone	Guardrail	Usable Shoulder Width
	Obstruction	30'
Slope Schedule - Cut	Fore slope	6:1
	Depth of Ditch	4'
	Back slope	3:1
Slope Schedule - Fill	Safety Slope	6:1
	Fill Slope	3:1
Stopping Sight Distance		505'
Max. Degree of Curvature (e = 0.100)		5 degree 15 minute
Super-elevation Rate		$E_{max} = 0.100$
Horizontal Sight Distance		See Section 3-5.0 of MDOT manual
Maximum Grades	Level	3%
	Rolling	4%
Vertical Curvature (K-values)		Crest: 192 Sag: 118
Minimum Vertical Clearance	New & Reconstructed Over passing Bridges	16'-6"
	Existing Over passing Bridges to Remain	16'-0"

Source: MDOT Design Manual, September 2001

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## 9.2 Typical Sections

Cross sections were developed for Alternate 2B using the MDOT criteria. The geometric design criteria was utilized to develop a functional plan using improved cross sections. These cross sections were developed to improve the mainline interstate and frontage road vehicle capacity. The major components of the typical sections identified include: lane width, auxiliary lane width, usable shoulder width, surfaced shoulder width, median width, right-of-way width, bridge width, roadway width at bridge ends, roadside clear zone, vertical clearance, surface and shoulder cross slope, and side slopes. The typical sections identified in this analysis are shown in 24"x36" plan sheets.

## 9.3 Plan and Profile

The plan and profile sheets for the recommended alternate were developed based on the concept design outlined for Alternate 2B and the MDOT design criteria. The plan view and profile sheets were compiled as 24"x36" sheets that supplement this report.

## 9.4 Signing Plan

A conceptual signing plan was developed to determine if acceptable sign locations and directions could be applied to route traffic through the corridor for the recommended alternate. Interstate, highway and local street signs were utilized in the conceptual signing plan. A graphical representation of the conceptual signing plan is provided on 24"x36" plan sheets that accompany this document.

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## 10.0 RECOMMENDATIONS AND CONCLUSIONS

The results of the analysis of the 6 mile I-20 corridor revealed that significant capacity related deficiencies are forecast by Year 2030 on the existing roadway network. Reconstruction and widening of the mainline interstate to current horizontal and vertical design standards will greatly enhance future traffic volume levels of service. The improvements outlined in the recommended alternate (2B) include:

- Reconstruction and widening to 4 mainline lanes on I-20 in each direction from the KCS Railway east of Washington Street to US 61 North (total length  $\pm$  6 miles).
- Reconstruction/modification of the five existing I-20 interchanges located at US 61 South, Halls Ferry Road, Indiana Avenue, Clay Street and US 61 North.
- Redesign of all left entry and exit ramps from I-20 to right entry and exit ramps to conform with current design standards.
- Elimination of the horizontal and vertical curve design standard deficiencies in the mainline I-20 interstate travel lanes.
- Construction of a one-way three lane frontage road system between Halls Ferry Road and Clay Street on the north and south frontage roads and extending the frontage road system to Clay Street.
- Construction of structures to allow direct access between the north and south frontage roads at two locations between interchanges beneath I-20 to minimize the impact on access to adjacent businesses from the transitioning from two-way to one-way frontage roads.
- Construction of fly-over ramps for direct access between the north and south frontage roads at Indiana Avenue.

The estimated cost for this improvement is \$145 million. The improvements outlined in Alternate 2B mitigate the Year 2030 traffic volume level of service deficiencies at most locations throughout the study area. The weaving area and mainline interstate deficiencies that remain are a result of the channelization of traffic down to two westbound lanes on I-20 beneath Washington Street at the Mississippi River Bridge at the west project limits. Reconstruction of this overpass and widening mainline I-20 onto the bridge would alleviate these deficient levels of service from D and E to B and C as shown in the Alternate 3 evaluation. However, the costs associated with this improvement were deemed excessive versus the benefits received. The construction of Alternate 2B does not prevent the widening of I-20 to the west at a later date. The reconstruction of the Washington Street interchange and widening of the Mississippi River Bridge could be constructed as a separate project if deemed necessary by future traffic volumes and area developments. This widening could be designed to align directly with the west limits of this project outlined in Alternate 2B.

The construction of the improvements outlined in Alternate 2B are recommended to be split into multiple construction projects and phased as outlined in section 8.0 of this report. The priority of the phased projects is identified in the construction phasing recommendation.

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# Appendix

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## Conceptual Construction Staging Plan

### Phase 1

#### US 61 North Interchange

- Extend northeast frontage road to the north.
- Widen US 61 northbound northward to the new frontage road connection.
- Widen on-ramp in northwest quadrant and construct new loop off-ramp in northwest quadrant.
- Construct new eastbound CD Road on-ramp and segment of northbound US 61 in southeast quadrant. (Route eastbound I-20 traffic onto new ramp to remove existing southeast quadrant ramp.)
- Construct new northbound US 61 bridge and roadway.
- Construct temporary connection of southbound US 61 to northbound US 61 (2-lane, 2-way) with connections to loops in southwest and northwest quadrants.
- Construct new southbound US 61 bridge (to allow for construction of new I-20 eastbound lanes.)
- Modify ramp location in southwest quadrant at termini to MS 27.
- Construct new bridge (E.B. I-20 to N.B. US 61) (fly-over).
- Construct new I-20 eastbound lanes and approach to directional ramp (E.B. I-20 to N.B. US 61) (Existing E.B. I-20 to N.B. US 61 directional ramp to remain open until the new one is open for traffic.)
- Widen I-20 westbound lanes.

### Phase 2

#### North and South Frontage Roads

- Construct access road on south side of I-20 between Porter's Chapel Road and Old Highway 27 near the railroad.
- Construct the north and south frontage road bridges over Old Highway 27 and the railroad.
- Construct the north and south frontage roads from Porter's Chapel Road to Clay Street along with the southwest ramp at Clay Street and also the access road to the outlet mall in the southeast quadrant. (Do not disturb traffic within the Clay Street interchange.)
- Overlay and widen existing north and south frontage roads between the Halls Ferry Road Interchange and Porter's Chapel Road near the railroad. (Frontage roads will be widened to three lanes plus any auxiliary lanes.) (Operate as two-lane, two-way traffic with a center turn lane this phase.)

- 
- Construct temporary connections between existing I-20 and the frontage roads as follows:
    - Eastbound I-20 exit @ 119+00
    - Westbound I-20 entrance @ 108+00
    - Eastbound I-20 entrance @ 175+00
    - Westbound I-20 exit @ 185+00(The south frontage road will be one-way east between 119+00 and 175+00 while the north frontage road will be one-way west between 108+00 and 185+00.)
  - The I-20 traffic exiting to and entering from Indiana Avenue will do so at the above connections so that the existing interchange ramps may be closed for constructing the two fly-over connections between the north and south frontage roads. The bridges will be built under traffic on I-20.

### **Phase 3 (Prepare to switch all traffic to one-way frontage roads)**

#### Clay Street Interchange

- Switch Clay Street to two-way two-lane traffic using existing westbound lanes.
- Existing I-20 eastbound to Clay Street eastbound exit ramp will be maintained while constructing both frontage roads through this interchange.
- Close and remove eastbound Clay Street to I-20 eastbound ramp and fly-over. (Route through Clay Street/MS27 intersection.)
- Close and remove I-20 eastbound to westbound Clay Street loop (northeast quadrant). (Route through US 61 North Interchange/MS27/Clay Street.)
- Construct portion of north frontage road from Clay Street to previously constructed ramps near the southwest quadrant ramp. (To provide left turn from Clay Street to westbound north frontage road.)
- Close and remove existing northwest quadrant loop.
- Construct north frontage road from Clay Street to the newly constructed westbound I-20.
- Construct temporary connection from south frontage road to existing southeast ramp/eastbound Clay Street ramp. (One lane only)
- Construct south frontage road from temporary connection listed above through Clay Street to existing eastbound I-20 lanes near Station 255+00, including eastbound I-20 exit ramp near Station 245+00.
- Construct temporary connections between I-20 and frontage roads near Hall's Ferry Road. (Close southeast and northeast ramps. Route southeast ramp traffic to existing South Frontage Road.)

---

#### **Phase 4 (Frontage Roads — One-way traffic and construct mainline interstate)**

##### Clay Street

- Remove existing I-20 bridges over westbound Clay Street.
- Construct new bridge on I-20.
- Construct eastbound Clay Street lanes.

##### I-20 Mainline

- Construct bridge over railroad and Old Highway 27 (215+00).
- Construct bridge (turn around between frontage roads) at 95+00.
- Construct bridge (turn around between frontage roads) at 202+00.
- Remove existing bridges at 230+00.
- Construct roadway from 80+00 to 252+00.

#### **Phase 5 (US 61 South Interchange through Hall's Ferry Road Interchange)**

##### Halls Ferry Road Interchange

- Construct northeast loop and auxiliary lane to proposed northwest loop exit.
- Widen both bridges over I-20.
- Construct northwest loop.
- Construct southeast ramp and southeast loop with auxiliary lane.

##### US 61 South Interchange

- Construct two bridges over I-20 existing westbound and proposed eastbound (while maintaining traffic).
- Construct I-20 westbound/US 61 southbound ramp, except section between existing I-20 eastbound and US 61 northbound to I-20 westbound ramp. (Do not interfere with existing traffic.)
- Construct US 61 northbound/I-20 westbound ramp-loop, north of existing I-20 eastbound lanes. (Do not interfere with existing traffic.)
- Detour I-20 westbound to US 61 southbound traffic west to Washington Street interchange. Traffic would travel south on Washington Street to I-20 eastbound on-ramp, then east on I-20 eastbound to US 61 South ramp. Close existing I-20 westbound to US 61 southbound ramp.
- Complete new I-20 eastbound lane construction east of US 61 northbound to I-20 westbound ramp. Complete new US 61 northbound to I-20 westbound ramp construction with a gap between existing I-20 eastbound lanes and existing US 61 northbound to westbound I-20 ramp.
- Detour US 61 northbound to I-20 westbound traffic west to Halls Ferry Road interchange. Traffic would travel north on Halls Ferry Road and turn right on the newly constructed loop ramp to travel west on I-20. Close existing US 61 northbound to I-20 westbound ramp.

- 
- Complete gaps in new US 61 northbound and southbound ramps and I-20 eastbound lanes across closed US 61 northbound to I-20 westbound ramp.
  - Detour I-20 eastbound traffic from existing lanes to new lanes. Close existing I-20 eastbound lanes.
  - Complete construction of US 61 ramps across closed I-20 eastbound travel lanes.
  - Divert detour traffic to new roadways.
  - Close existing US 61 northbound to I-20 eastbound ramp.

Description	Circulation Bridges		Mainline Bridges		Conc. Pvmnt Removal*		Granular Mat'l (LVM)		13" Conc. Pvmnt-Roadway		13" Conc. Pvmnt-Shoulders		Asphalt Pvmnt		4" Drainage Layer		Lime		
	\$75.00 per S.F.		\$55.00 per S.F.		\$10.00 per S.Y.		\$9.00 per C.Y.		\$35.00 per S.Y.		\$30.00 per S.Y.		\$40.00 per Ton		\$6.00 per S.Y.		\$90.00 per Ton		
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	
<b>Phase 1</b>																			
Southeast Quadrant Interstate Ramps		\$ -		\$ -	3,118	\$ 31,200	1,877	\$ 16,900	4,930	\$ 172,550	2,578	\$ 77,350		\$ -	4,930	\$ 29,600	30	\$ 2,700	
Southwest Quadrant Interstate Ramps		\$ -		\$ -	1,676	\$ 16,800	1,733	\$ 15,600	3,734	\$ 130,700	3,197	\$ 95,950		\$ -	3,734	\$ 22,450	30	\$ 2,700	
Northeast Quadrant Interstate Ramps		\$ -		\$ -	4,834	\$ 48,350		\$ -		\$ -		\$ -	6,454	\$ 258,200		\$ -		\$ -	
Northwest Quadrant Interstate Ramps		\$ -		\$ -		\$ -	2,787	\$ 25,100	8,460	\$ 296,100	2,689	\$ 80,700		\$ -	8,460	\$ 50,800	60	\$ 5,400	
US 61 North - Reconstruction		\$ -	67,200	\$ 3,696,000	2,240	\$ 22,400	2,650	\$ 23,850	6,600	\$ 231,000	4,000	\$ 120,000		\$ -	6,600	\$ 39,600	40	\$ 3,600	
I-20 Dir Ramp (EB to NB US 61 North)	91,160	\$ 6,837,000		\$ -	7,517	\$ 75,200	4,030	\$ 36,300	9,400	\$ 329,000	6,720	\$ 201,600		\$ -	9,400	\$ 56,400	60	\$ 5,400	
I-20 Westbound		\$ -		\$ -		\$ -	6,644	\$ 59,800	16,802	\$ 588,100	9,774	\$ 293,250		\$ -	16,802	\$ 100,850	110	\$ 9,900	
I-20 Eastbound		\$ -		\$ -		\$ -	13,244	\$ 119,200	33,614	\$ 1,176,500	19,360	\$ 580,800		\$ -	33,614	\$ 201,700	230	\$ 20,700	
<b>Totals Phase 1</b>	<b>91,160</b>	<b>\$ 6,837,000</b>	<b>67,200</b>	<b>\$ 3,696,000</b>	<b>19,385</b>	<b>\$ 193,950</b>	<b>32,965</b>	<b>\$ 296,750</b>	<b>83,540</b>	<b>\$ 2,923,950</b>	<b>48,318</b>	<b>\$ 1,449,650</b>	<b>6,454</b>	<b>\$ 258,200</b>	<b>83,540</b>	<b>\$ 501,400</b>	<b>560</b>	<b>\$ 50,400</b>	
<b>Phase 2</b>																			
North Frontage Rd Construction	15,680	\$ 1,176,000	23,400	\$ 1,287,000	7,702	\$ 77,050		\$ -		\$ -		\$ -	45,418	\$ 1,816,750		\$ -		\$ -	
South Frontage Rd Construction	15,680	\$ 1,176,000	23,400	\$ 1,287,000	9,120	\$ 91,200		\$ -		\$ -		\$ -	41,510	\$ 1,660,400		\$ -		\$ -	
<b>Totals Phase 2</b>	<b>31,360</b>	<b>\$ 2,352,000</b>	<b>46,800</b>	<b>\$ 2,574,000</b>	<b>16,822</b>	<b>\$ 168,250</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	<b>86,928</b>	<b>\$ 3,477,150</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	
<b>Phase 3</b>																			
Clay Street - Ramp Construction		\$ -		\$ -	24,543	\$ 245,450		\$ -		\$ -		\$ -	21,274	\$ 851,000		\$ -		\$ -	
Clay Street - Road Widening		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	9,254	\$ 370,200		\$ -		\$ -	
Temporary Ramp Conn. to Interstate		\$ -		\$ -	4,667	\$ 46,700		\$ -		\$ -		\$ -	6,618	\$ 264,750		\$ -		\$ -	
<b>Totals Phase 3</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	<b>29,210</b>	<b>\$ 292,150</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	<b>37,146</b>	<b>\$ 1,485,950</b>	<b>-</b>	<b>\$ -</b>	<b>-</b>	<b>\$ -</b>	
<b>Phase 4</b>																			
Mainline I-20 Construction		\$ -	225,600	\$ 12,408,000	168,112	\$ 1,681,150	54,760	\$ 492,850	146,027	\$ 5,110,950	73,013	\$ 2,190,400		\$ -	146,027	\$ 876,200	990	\$ 89,100	
Ramp Construction		\$ -		\$ -		\$ -	7,155	\$ 64,400	23,129	\$ 809,550	5,489	\$ 164,700		\$ -	23,129	\$ 138,800	160	\$ 14,400	
Clay Street widening		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	4,137	\$ 165,500		\$ -		\$ -	
Frontage Rd Underpass connections (2)		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -	2,479	\$ 99,200		\$ -		\$ -	
<b>Totals Phase 4</b>	<b>-</b>	<b>\$ -</b>	<b>225,600</b>	<b>\$ 12,408,000</b>	<b>168,112</b>	<b>\$ 1,681,150</b>	<b>61,915</b>	<b>\$ 557,250</b>	<b>169,156</b>	<b>\$ 5,920,500</b>	<b>78,502</b>	<b>\$ 2,355,100</b>	<b>6,616</b>	<b>\$ 264,700</b>	<b>169,156</b>	<b>\$ 1,015,000</b>	<b>1,150</b>	<b>\$ 103,500</b>	
<b>Phase 5</b>																			
Halls Ferry Rd Interchange	18,240	\$ 1,368,000		\$ -	13,056	\$ 130,600	5,021	\$ 45,200	15,125	\$ 529,400	4,960	\$ 148,800		\$ -	15,125	\$ 90,750	100	\$ 9,000	
I-20 Westbound		\$ -		\$ -		\$ -	7,242	\$ 65,200	17,220	\$ 602,700	11,749	\$ 352,500		\$ -	17,220	\$ 103,350	120	\$ 10,800	
I-20 Eastbound		\$ -		\$ -	17,600	\$ 176,000	13,207	\$ 118,900	35,000	\$ 1,225,000	17,827	\$ 534,850		\$ -	35,000	\$ 210,000	240	\$ 21,600	
US 61 South Interchange		\$ -	29,040	\$ 1,597,200	35,480	\$ 354,800	14,065	\$ 126,600	34,377	\$ 1,203,200	21,883	\$ 656,500		\$ -	34,377	\$ 206,300	230	\$ 20,700	
<b>Totals Phase 5</b>	<b>18,240</b>	<b>\$ 1,368,000</b>	<b>29,040</b>	<b>\$ 1,597,200</b>	<b>66,136</b>	<b>\$ 661,400</b>	<b>39,535</b>	<b>\$ 355,900</b>	<b>101,722</b>	<b>\$ 3,560,300</b>	<b>56,419</b>	<b>\$ 1,692,650</b>	<b>-</b>	<b>\$ -</b>	<b>101,722</b>	<b>\$ 610,400</b>	<b>690</b>	<b>\$ 62,100</b>	
<b>Totals Phases 1-5</b>	<b>140,760</b>	<b>\$ 10,557,000</b>	<b>368,640</b>	<b>\$ 20,275,200</b>	<b>299,665</b>	<b>\$ 2,996,900</b>	<b>134,415</b>	<b>\$ 1,209,900</b>	<b>354,418</b>	<b>\$ 12,404,750</b>	<b>183,239</b>	<b>\$ 5,497,400</b>	<b>137,144</b>	<b>\$ 5,486,000</b>	<b>354,418</b>	<b>\$ 2,126,800</b>	<b>2,400</b>	<b>\$ 216,000</b>	



RWD

# Reconstruction of I-20

From Washington Street To US 61 North  
Vicksburg  
Warren County  
Mississippi

Project No. 54-0020-01-106-10 P. E.

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## Attachment A Report Figures

Prepared for



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Prepared by



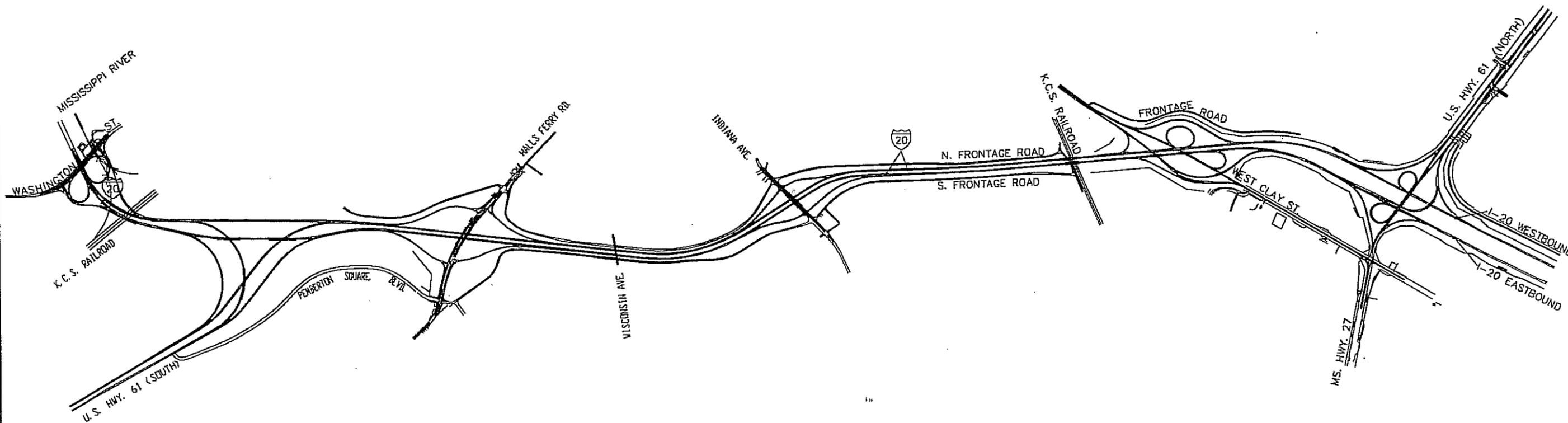
January 2002

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LEGEND:

VICKSBURG, MISSISSIPPI  
WARREN COUNTY

Prepared for the  
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TRANSPORTATION

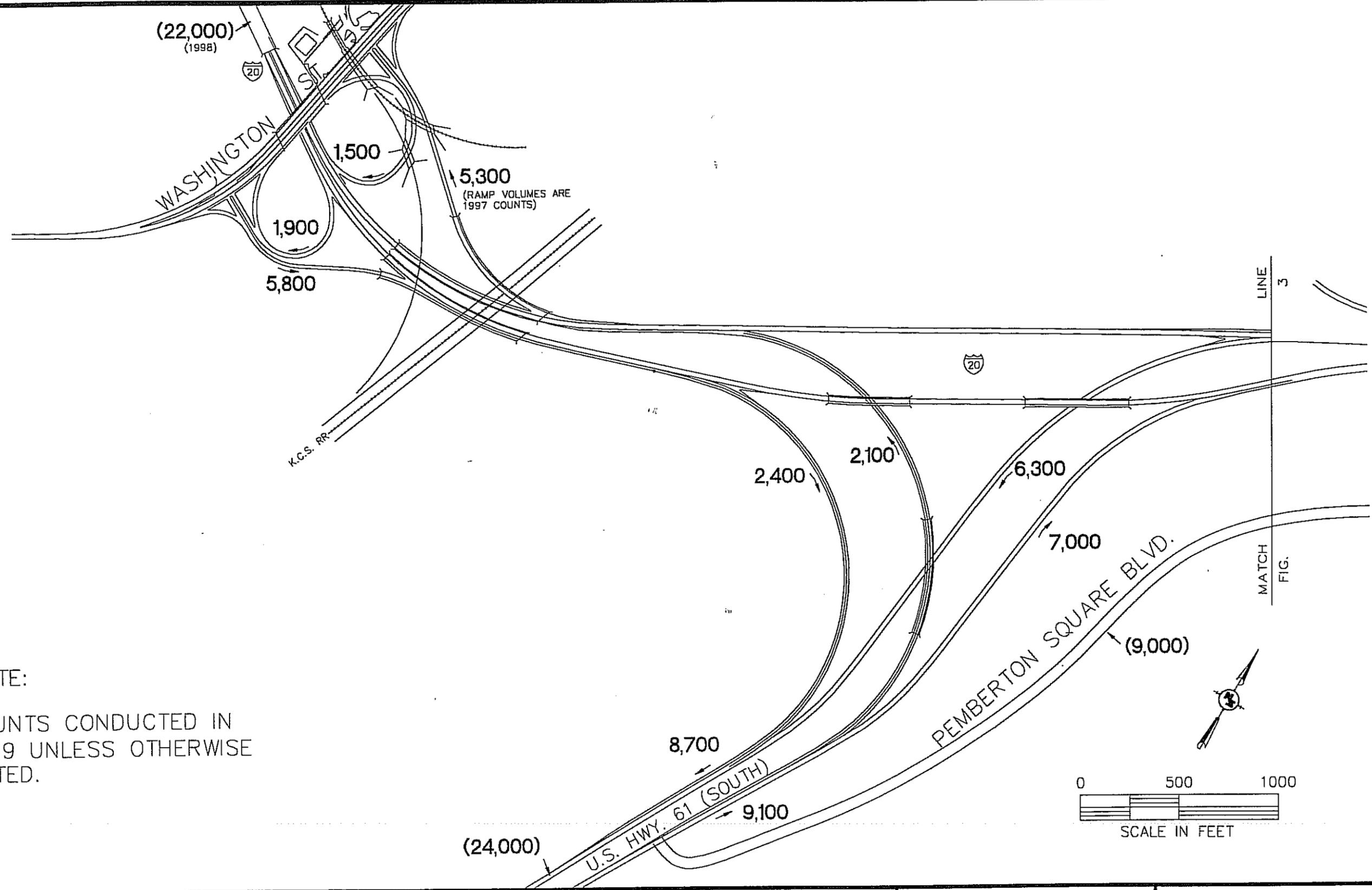
Reconstruction of I-20  
Warren County  
Project No. 54-0020-01-106-10 P.E.

I-20 CORRIDOR  
PROJECT  
LOCATION MAP

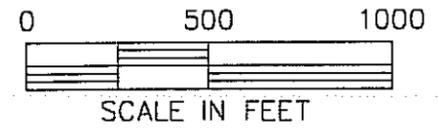
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Jackson, Mississippi

FIGURE 1

3276-07\3276-07G



NOTE:  
 COUNTS CONDUCTED IN  
 1999 UNLESS OTHERWISE  
 NOTED.



LEGEND:  
 (4375) TWO-WAY DAILY COUNT  
 13120 DIRECTIONAL DAILY COUNT

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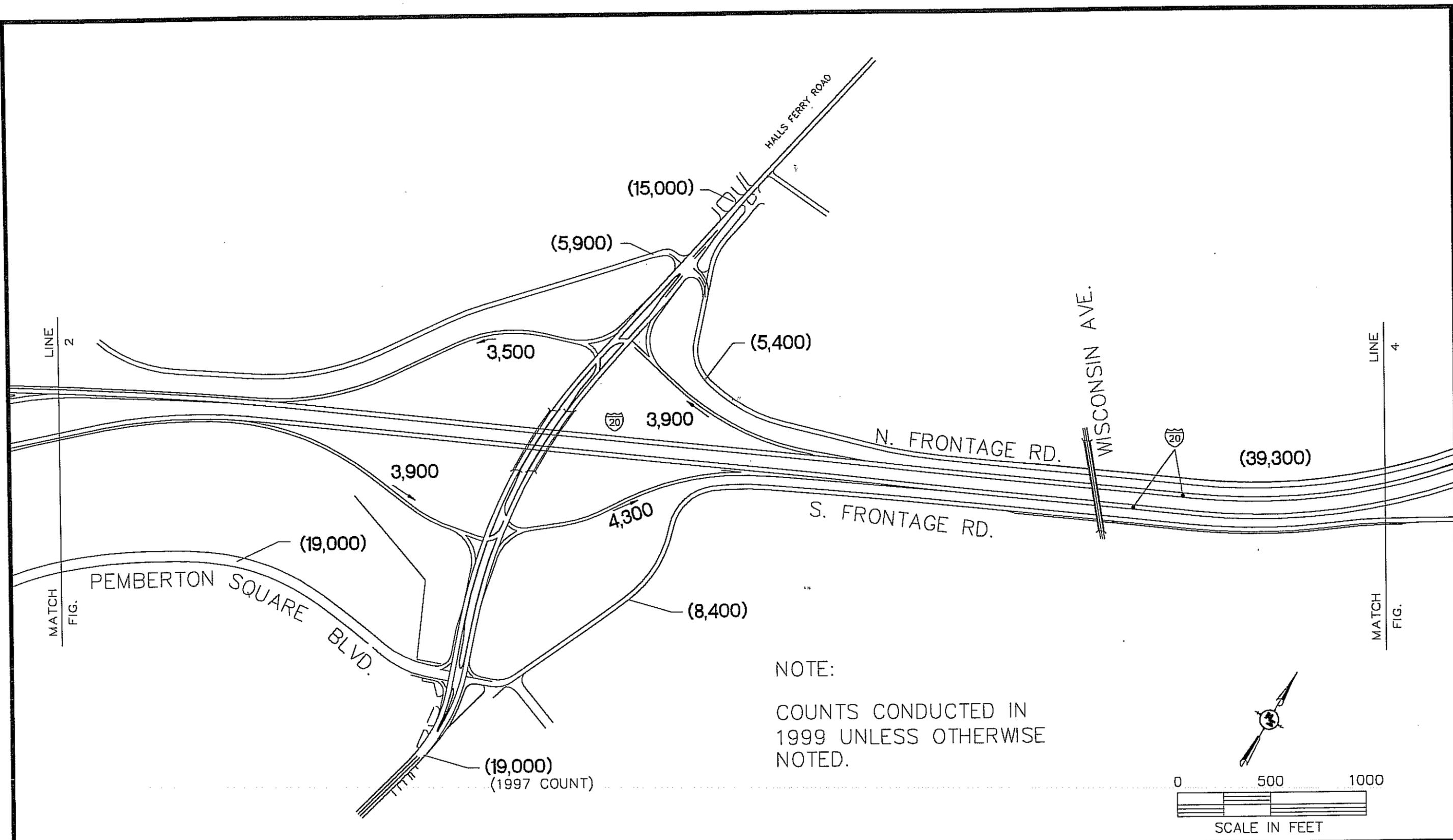
Reconstruction of I-20  
 Vicksburg  
 Warren County  
 Project No. 54-0020-01-106-10 P.E.

EXISTING  
 DAILY  
 COUNTS

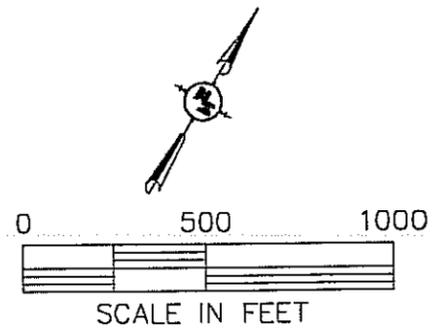
NEEL-SCHAFFER, INC.  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 2

3276-07\3276-07A



NOTE:  
 COUNTS CONDUCTED IN  
 1999 UNLESS OTHERWISE  
 NOTED.



LEGEND:  
 (4375) TWO-WAY DAILY COUNT  
 13120 DIRECTIONAL DAILY COUNT

Prepared for the  
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 TRANSPORTATION

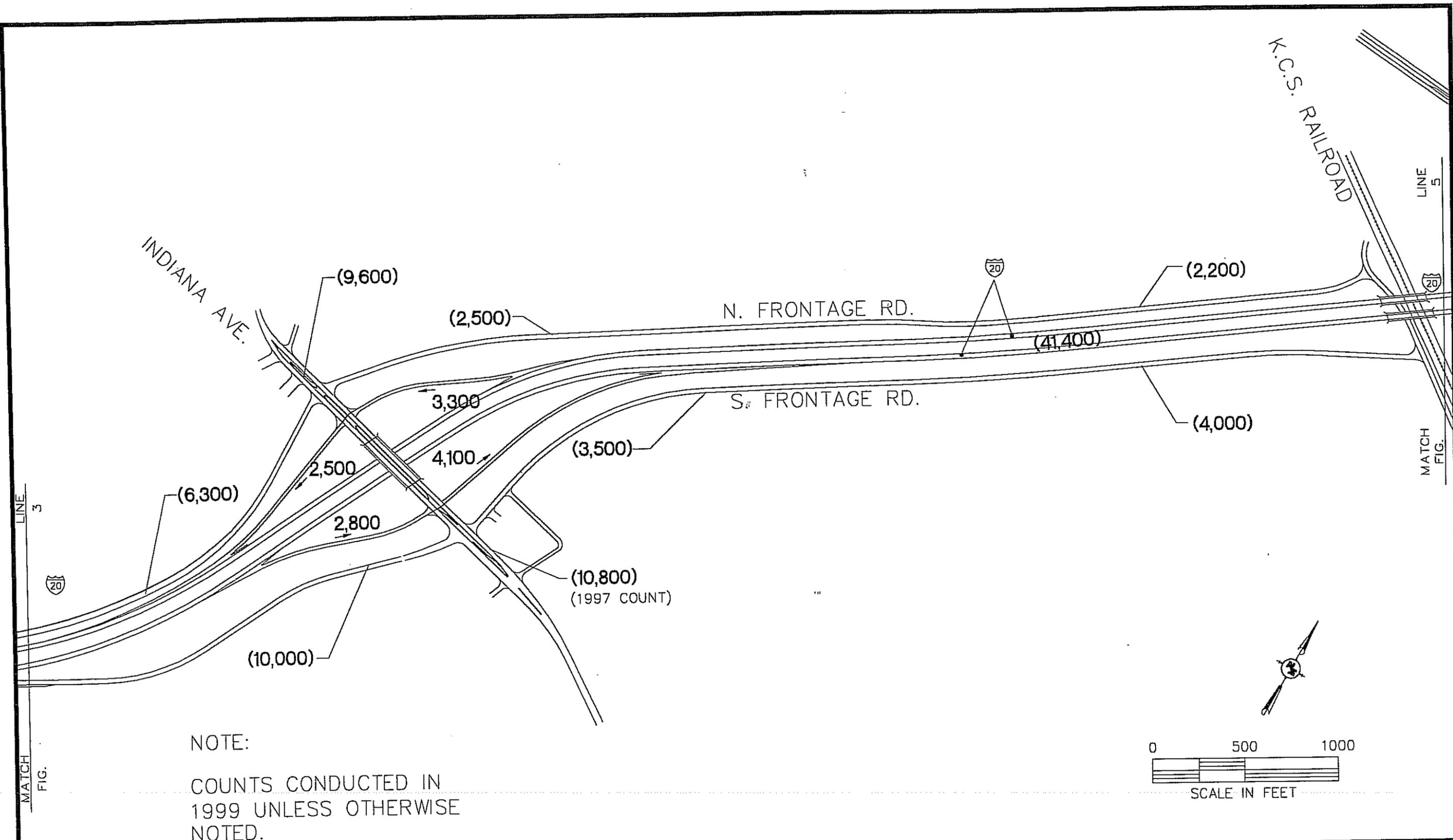
Reconstruction of I-20  
 Vicksburg  
 Warren County  
 Project No. 54-0020-01-106-10 P.E.

EXISTING  
 DAILY  
 COUNTS

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FIGURE 3

3276-07\3276-07A



LEGEND:

(4375) TWO-WAY DAILY COUNT      13120 DIRECTIONAL DAILY COUNT

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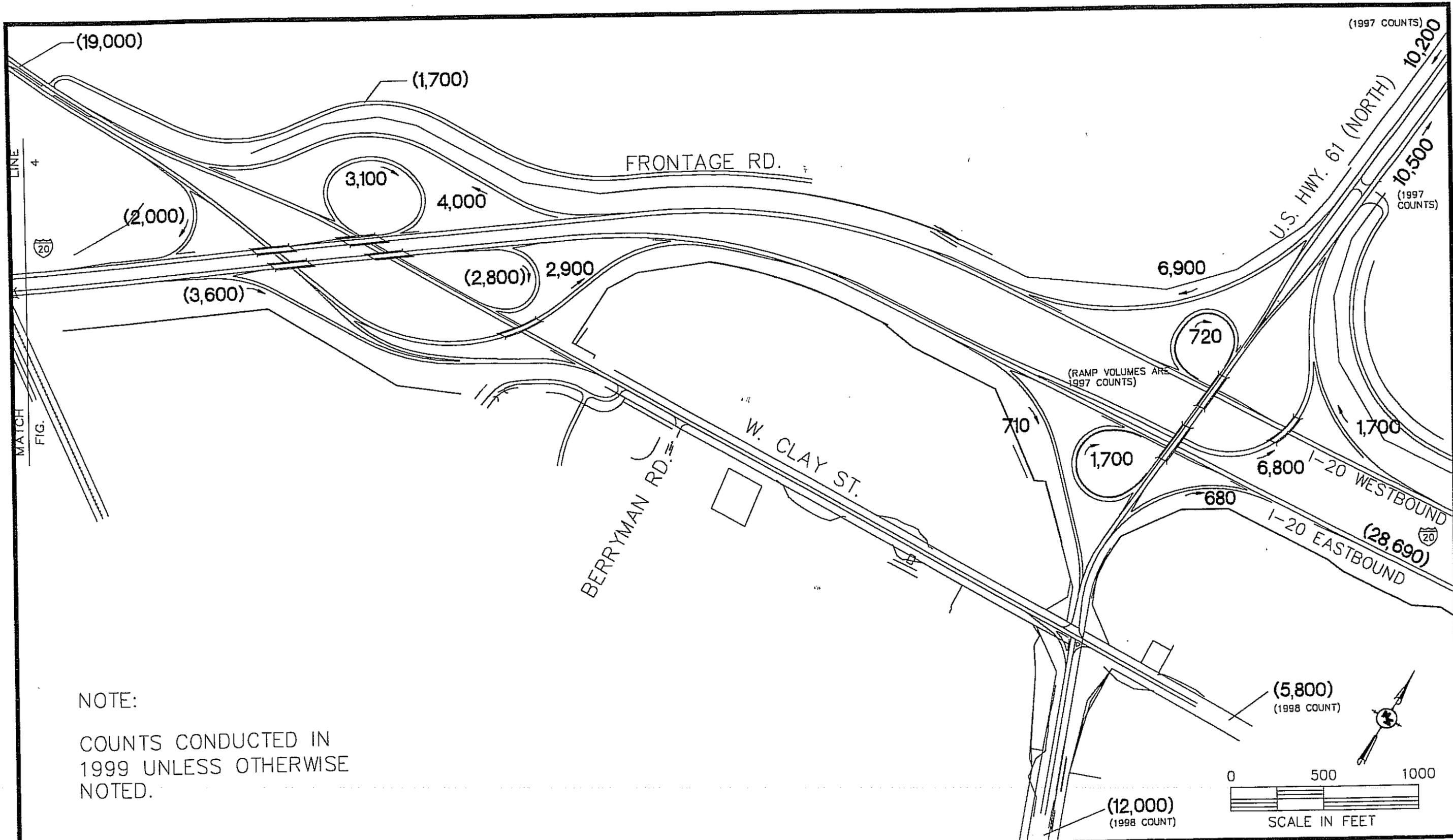
Reconstruction of I-20  
Vicksburg  
Warren County  
Project No. 54-0020-01-106-10 P.E.

EXISTING  
DAILY  
COUNTS

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Jackson, Mississippi

FIGURE 4

3276-07\3276-07A



LEGEND:

(4375) TWO-WAY DAILY COUNT      13120 DIRECTIONAL DAILY COUNT

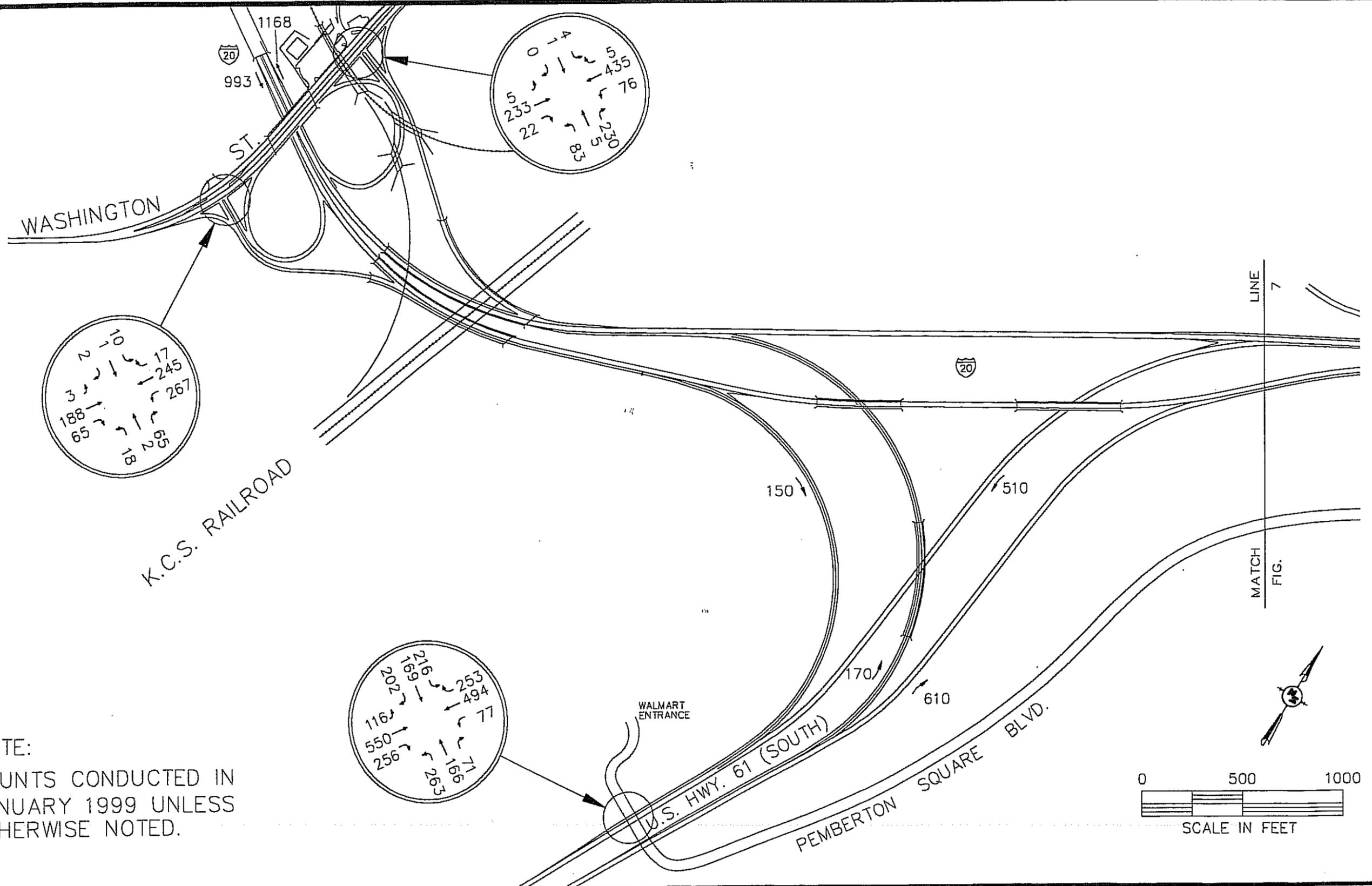
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TRANSPORTATION

Reconstruction of I-20  
Vicksburg  
Warren County  
Project No. 54-0020-01-106-10 P.E.

EXISTING  
DAILY  
COUNTS

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Jackson, Mississippi

FIGURE 5



NOTE:  
 COUNTS CONDUCTED IN  
 JANUARY 1999 UNLESS  
 OTHERWISE NOTED.

LEGEND:

347	or	468	526	511	218	91	PM PEAK HOUR VOLUMES
		184				176	
		188				141	
			129	459	148		

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 TRANSPORTATION

Reconstruction of I-20  
 Vicksburg  
 Warren County  
 Project No. 54-0020-01-106-10 P.E.

EXISTING P.M.  
 PEAK HOUR  
 VOLUMES

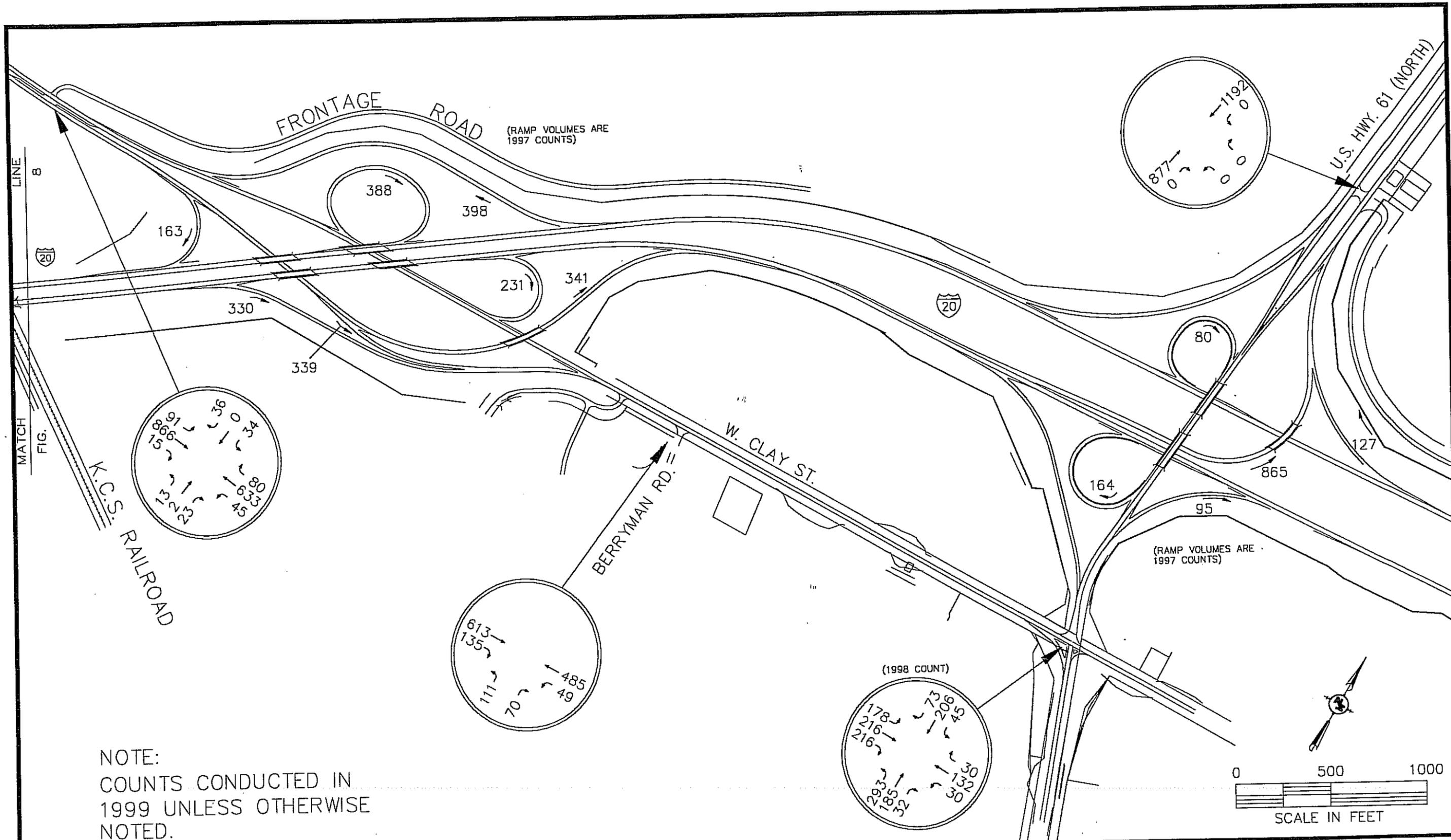
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 Jackson, Mississippi

FIGURE 6

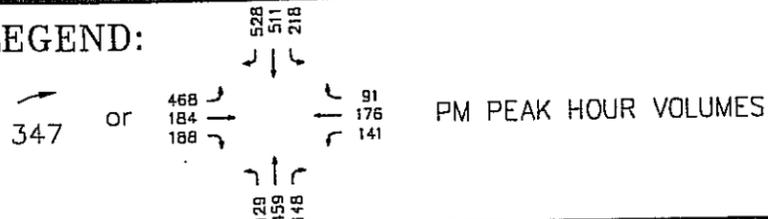
3276-07\3276-07H







LEGEND:



Prepared for the  
MISSISSIPPI DEPARTMENT OF  
TRANSPORTATION

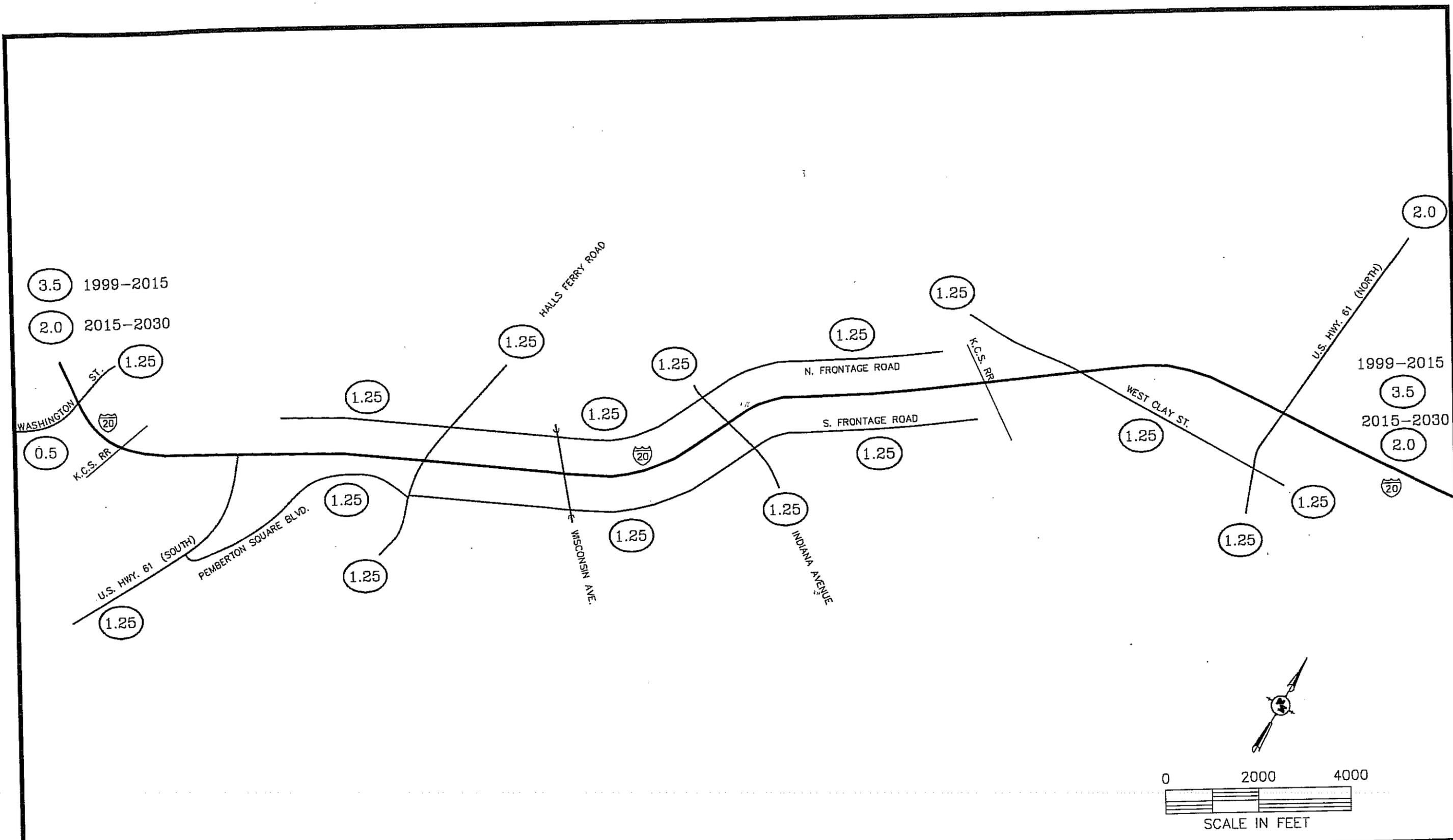
Reconstruction of I-20  
Vicksburg  
Warren County  
Project No. 54-0020-01-106-10 P.E.

EXISTING P.M.  
PEAK HOUR  
VOLUMES

NEEL-SCHAFFER, INC.  
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FIGURE 9

3276-07\3276-07H



3.5 1999-2015

2.0 2015-2030

1999-2015

3.5

2015-2030

2.0

0.5

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

1.25

LEGEND:

1.25 FUTURE GROWTH RATE PERCENTAGE

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Warren County  
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GROWTH  
RATE  
PERCENTAGES

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Jackson, Mississippi

FIGURE 10

076-07\3276-07C

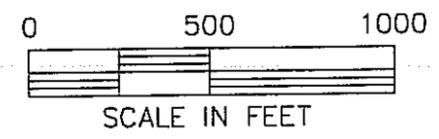
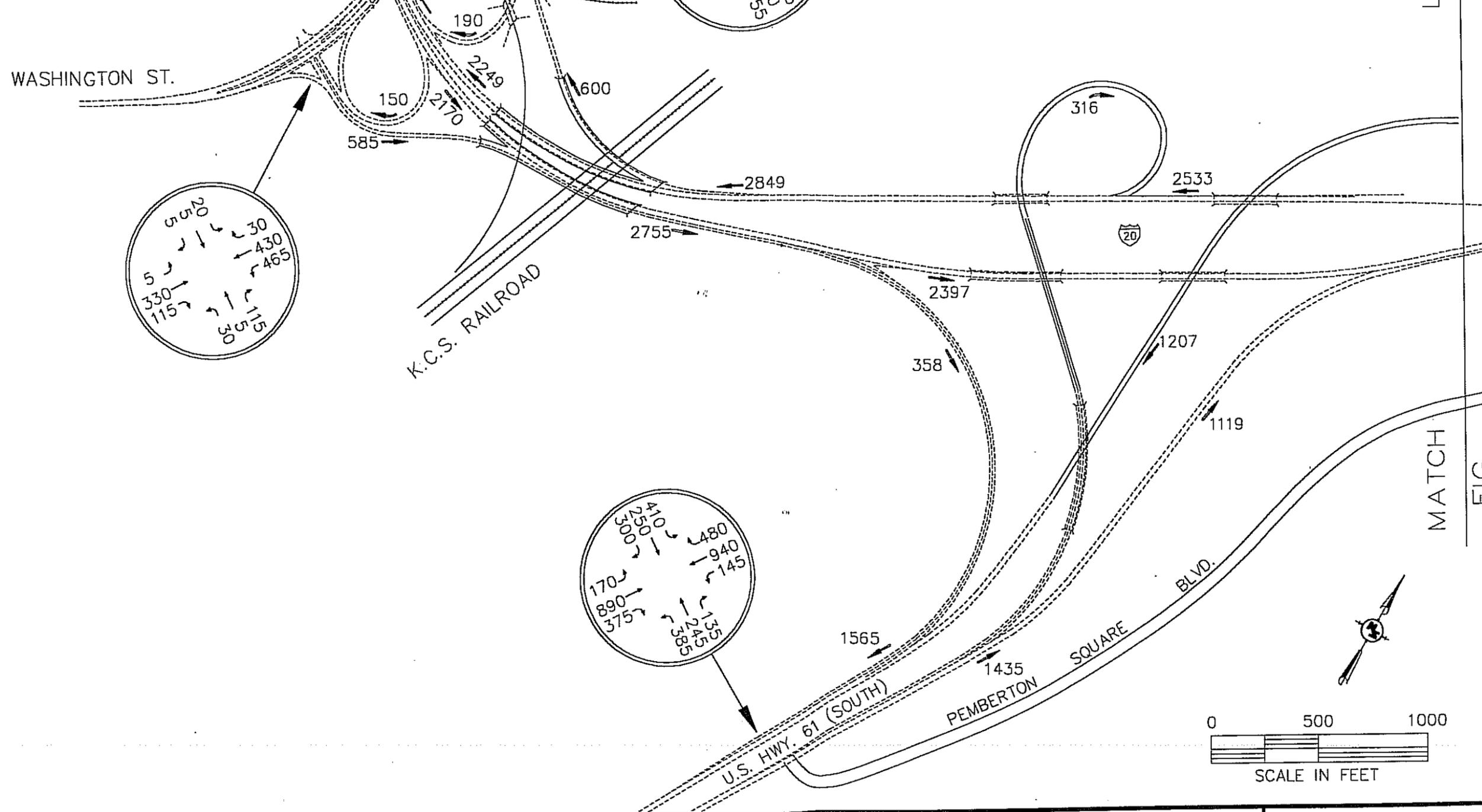
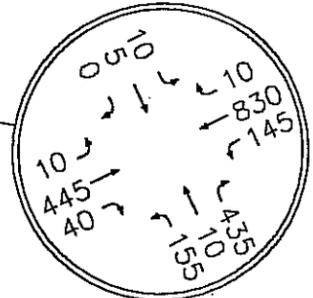
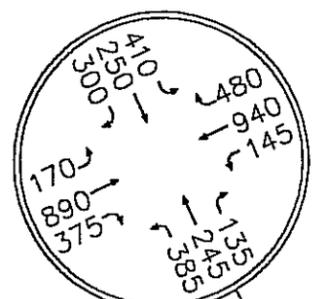
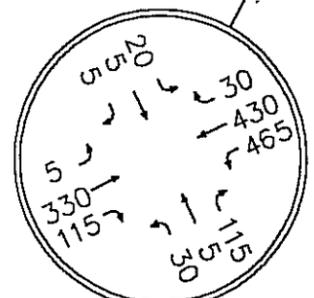
3276-07\1-6-00\VOLUMES

WASHINGTON ST.

K.C.S. RAILROAD

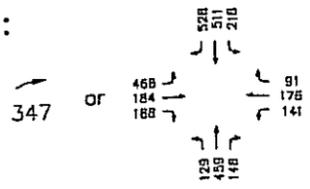
U.S. HWY. 61 (SOUTH)

PEMBERTON SQUARE BLVD.



LINE 12  
MATCH  
FIG.

LEGEND:



PM PEAK HOUR VOLUMES

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ALTERNATE 1 YEAR 2030 VOLUMES



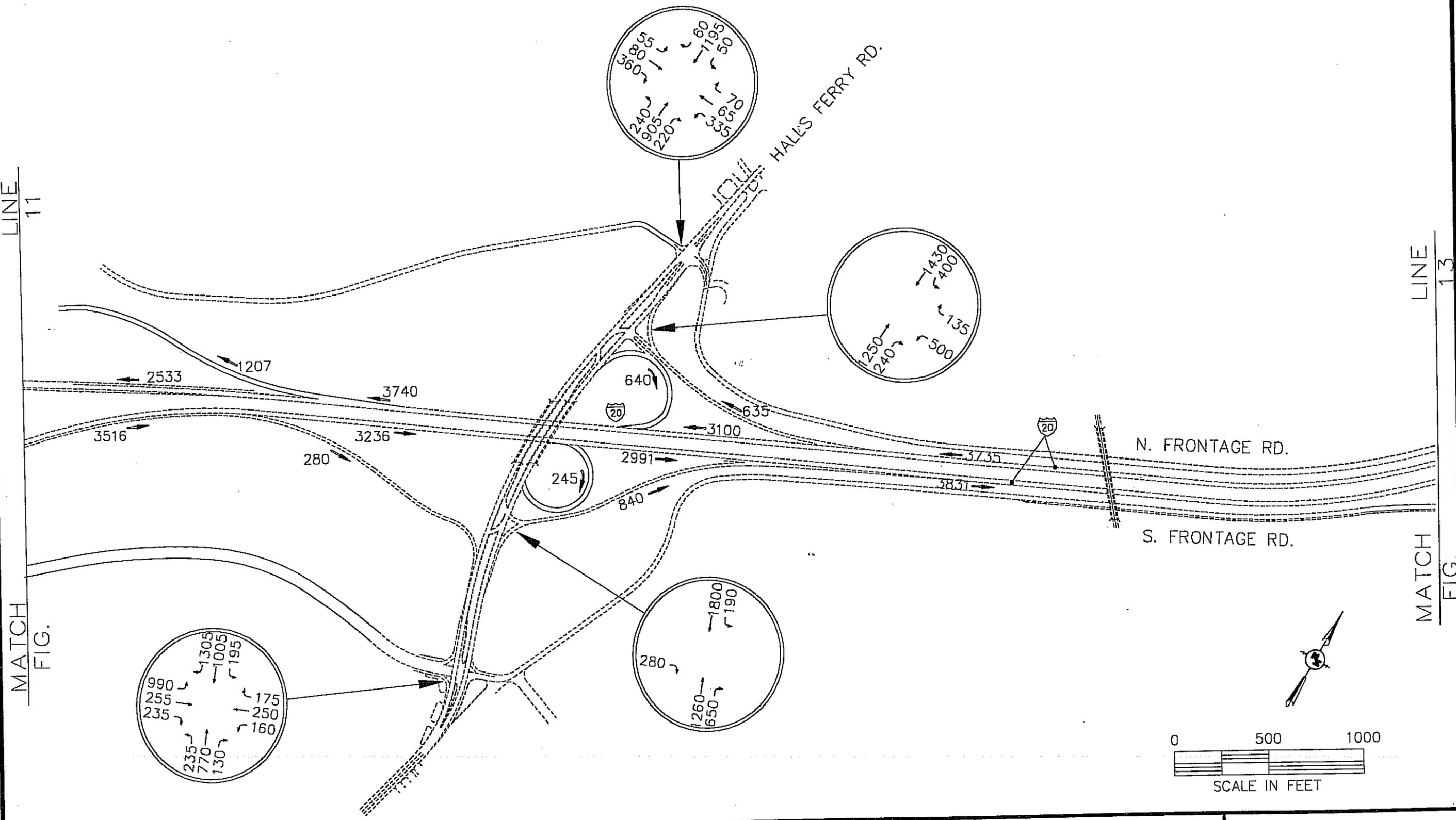
FIGURE 11

LINE 11

LINE 13

MATCH FIG.

MATCH FIG.



775-071-6-00 VOLUMES

**LEGEND:**

347	or	488 184 188	or	520 510 210	or	91 176 141	PM PEAK HOUR VOLUMES
		128 455 148					

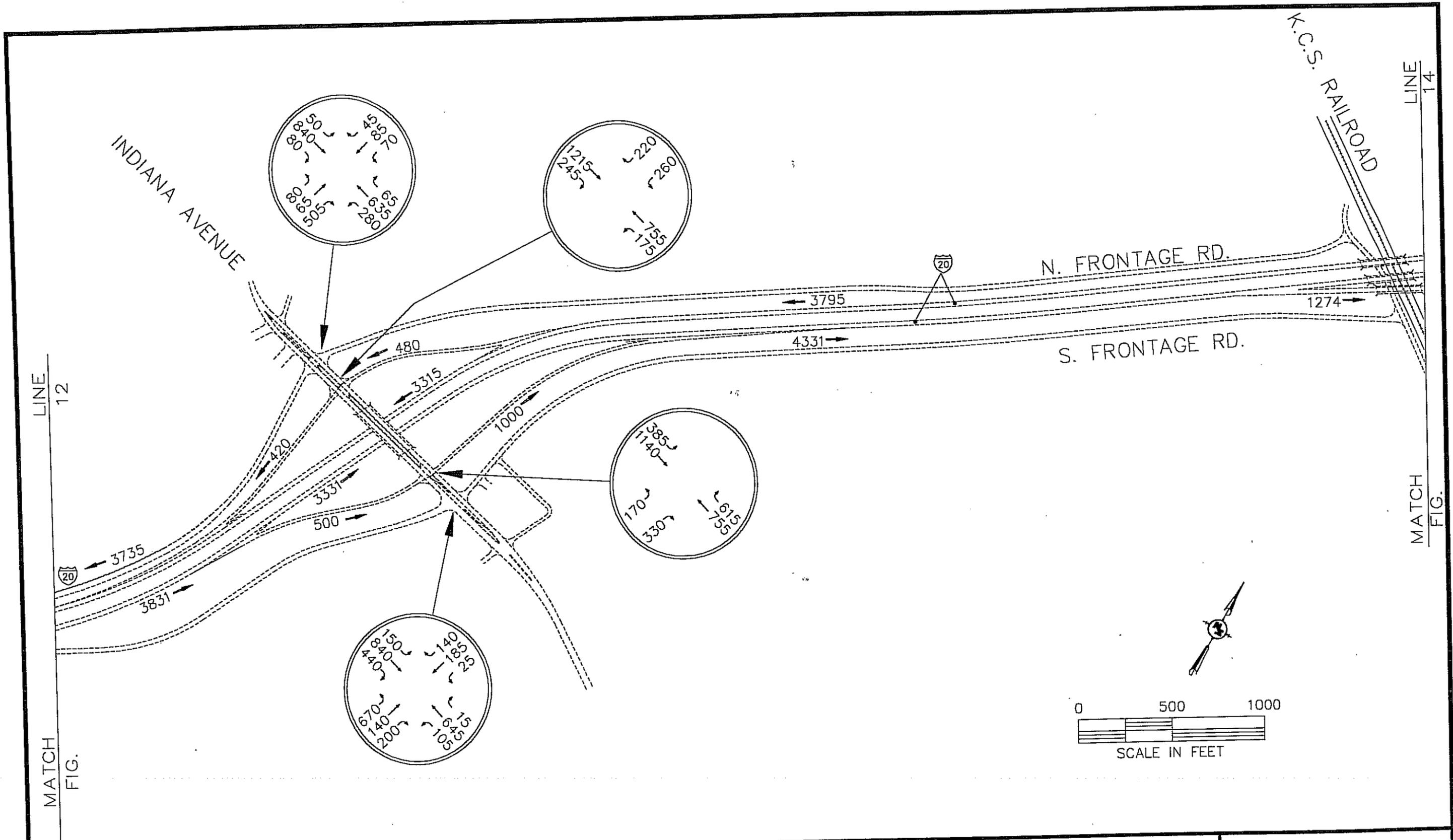
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**ALTERNATE 1  
 YEAR 2030  
 VOLUMES**

**NEEL-SCHAFFER, INC.**  
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**FIGURE 12**



76-0711-6-00 VOLUMES

**LEGEND:**

347 or PM PEAK HOUR VOLUMES

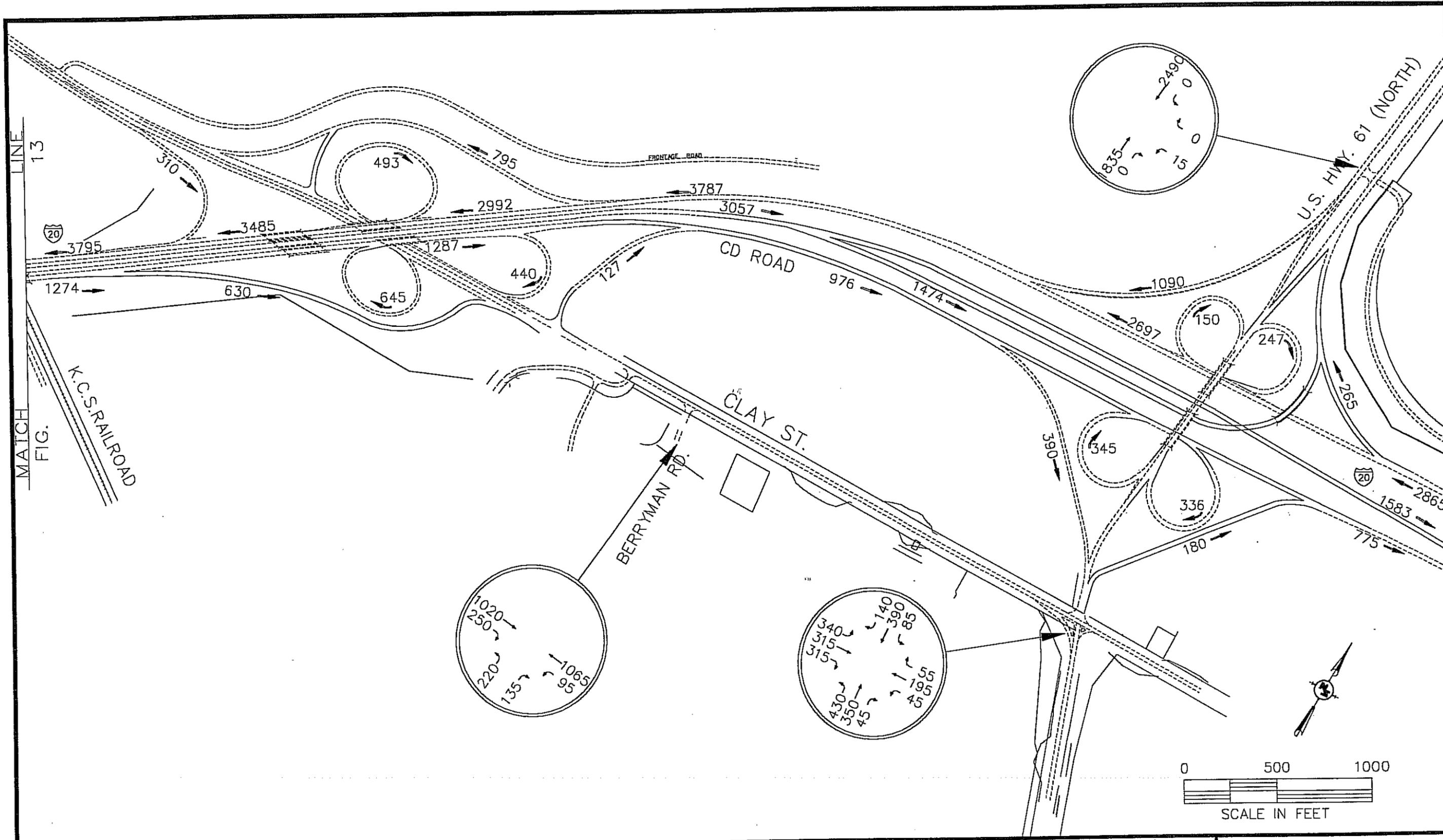
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**ALTERNATE 1  
 YEAR 2030  
 VOLUMES**

**NEEL-SCHAFFER, INC.  
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**FIGURE 13**



LEGEND:

347 or 468  
184 188

91  
176 141

PM PEAK HOUR VOLUMES

129 495 148  
528 311 210

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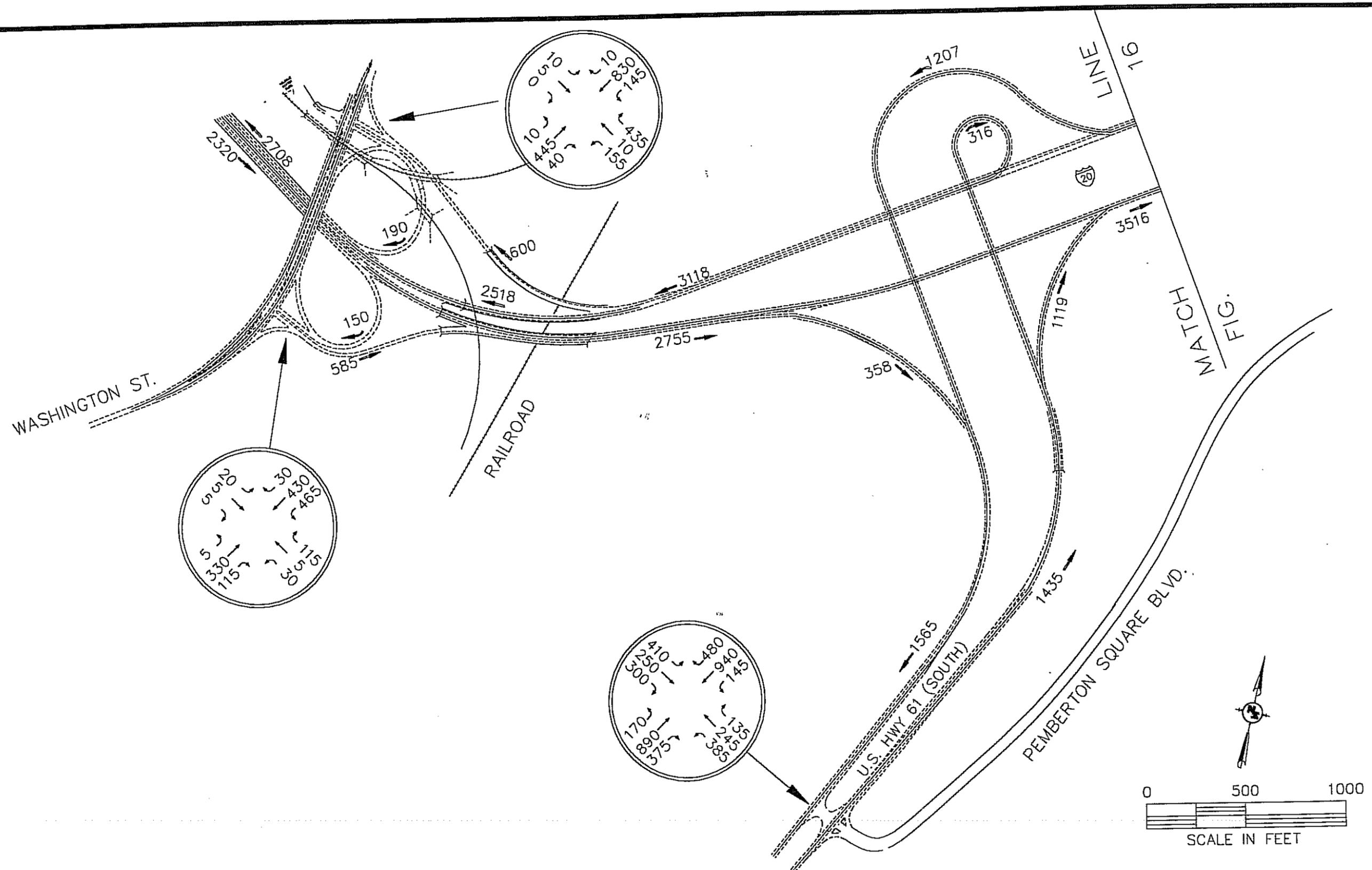
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Warren County  
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ALTERNATE 1  
YEAR 2030  
VOLUMES

**NEEL-SCHAFFER, INC.**  
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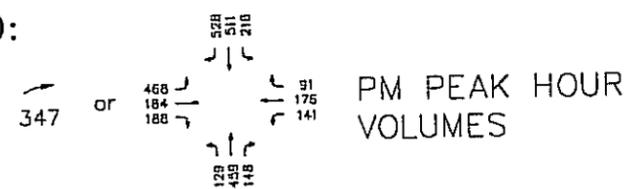
FIGURE 14

2276-07 1-6-00 VOLUMES



6-07\1-5-00\ VOLUMES

LEGEND:



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ALTERNATE  
2, 2A, 2B & 3  
YEAR 2030  
VOLUMES

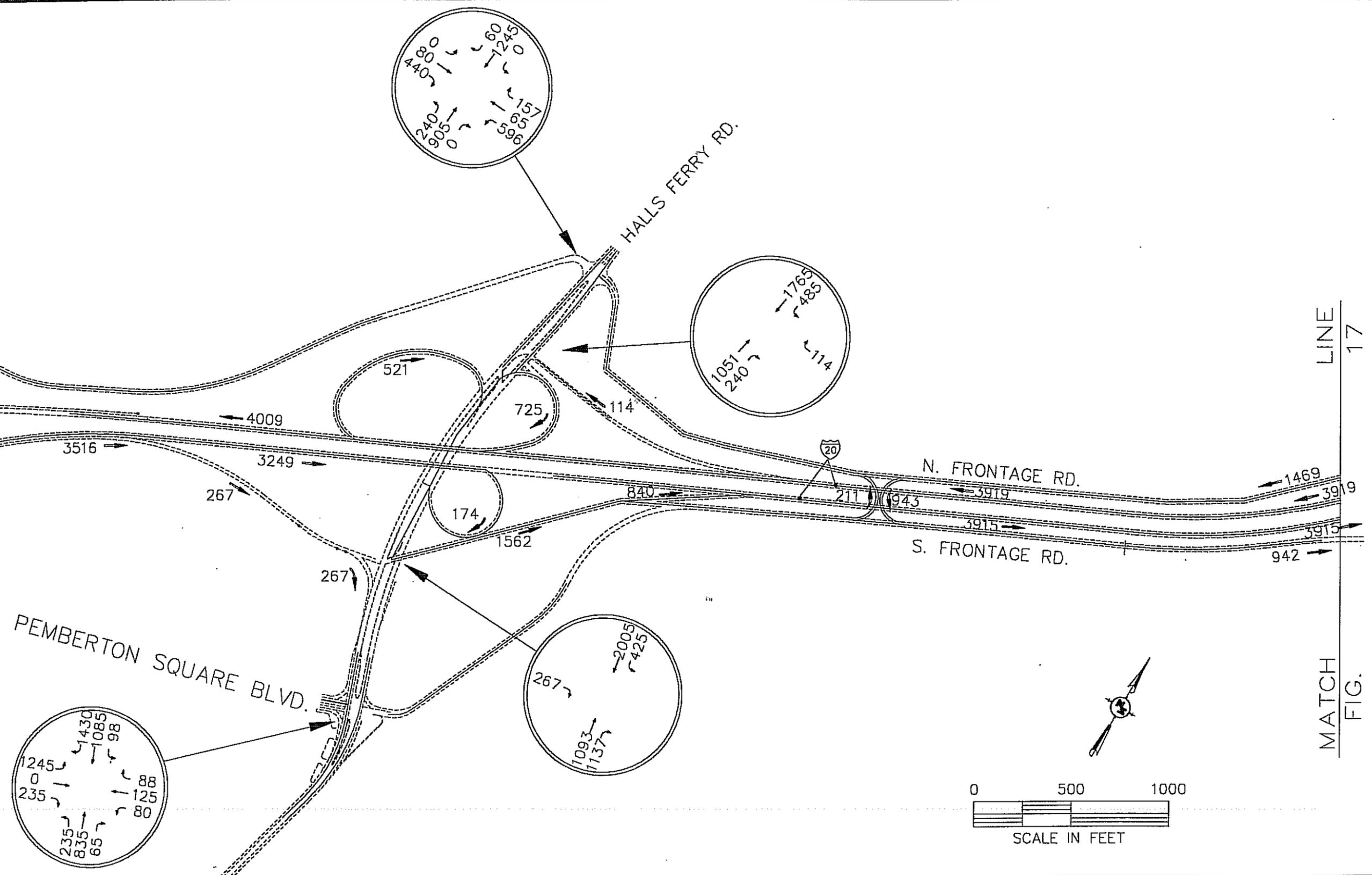
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FIGURE 15

3276-07\1-6-00\VOLUMES

LINE 15  
MATCH FIG.

LINE 17  
MATCH FIG.



**LEGEND:**

347 or PM PEAK HOUR VOLUMES

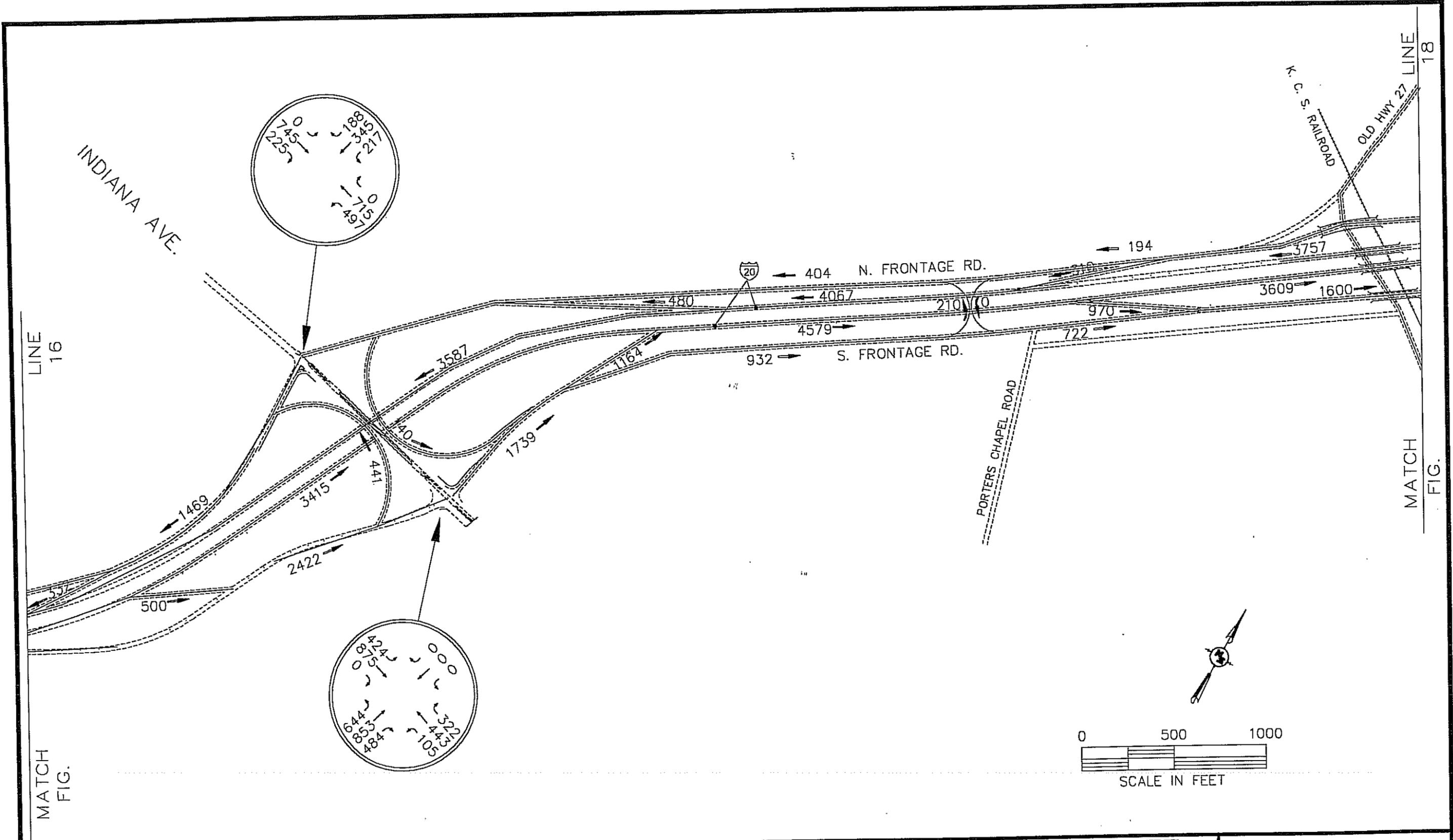
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**ALTERNATE**  
**2, 2A, 2B & 3**  
**YEAR 2030**  
**VOLUMES**

**NEEL-SCHAFFER, INC.**  
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Jackson, Mississippi

FIGURE 16



LEGEND:

347	or	488 184 188	or	558 371 210	or	91 175 141	PM PEAK HOUR VOLUMES
		125 495 146					

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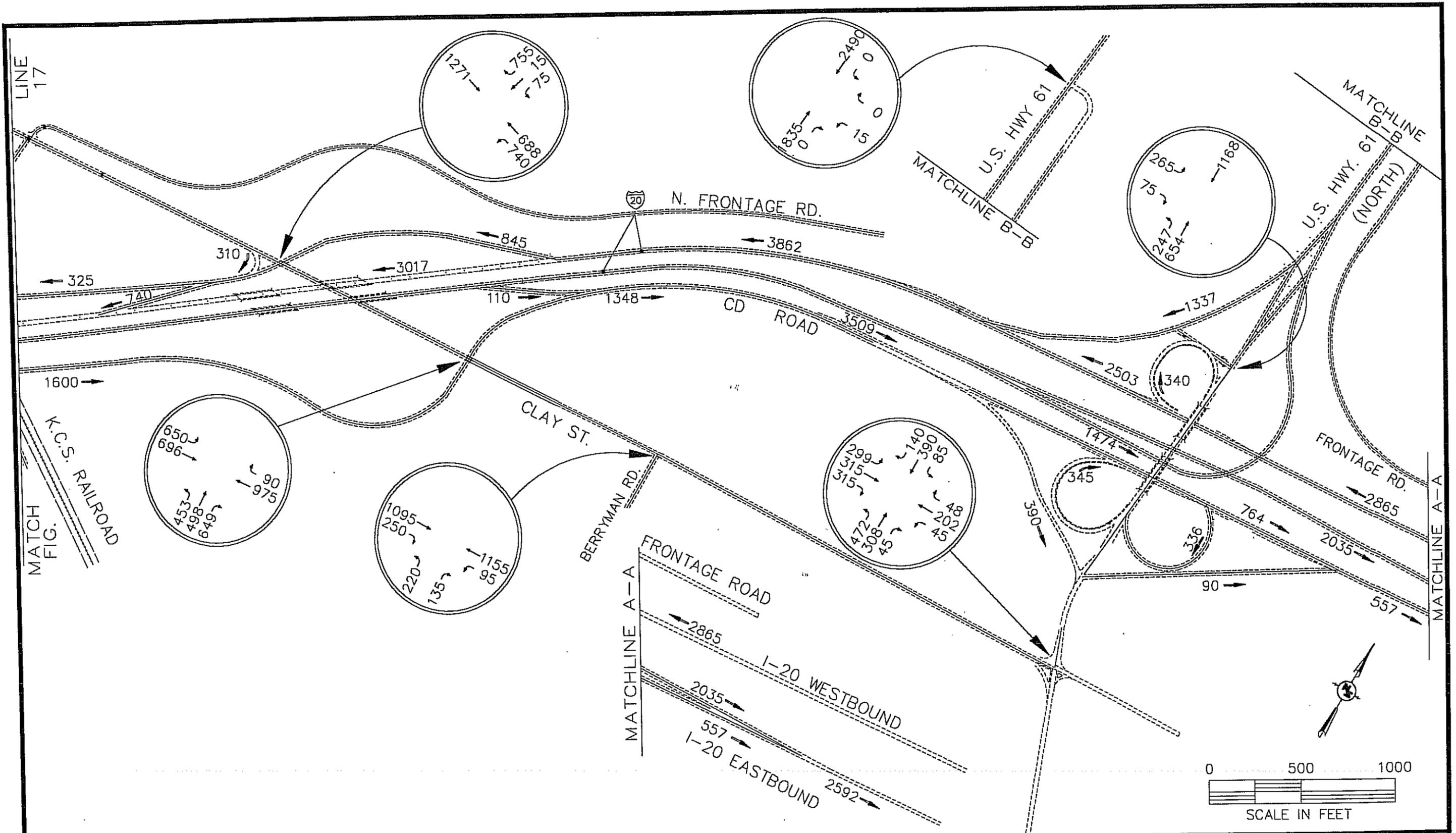
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 Warren County  
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**ALTERNATE  
 2, 2A, 2B & 3  
 YEAR 2030  
 VOLUMES**

**NEEL-SCHAFFER, INC.**  
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FIGURE 17

76-071-6-00 VOLUMES



6-07A-6-00 VOLUMES

**LEGEND:**

347 or 456 528 91  
 184 184 511 176  
 129 459 218 141  
 148

PM PEAK HOUR VOLUMES

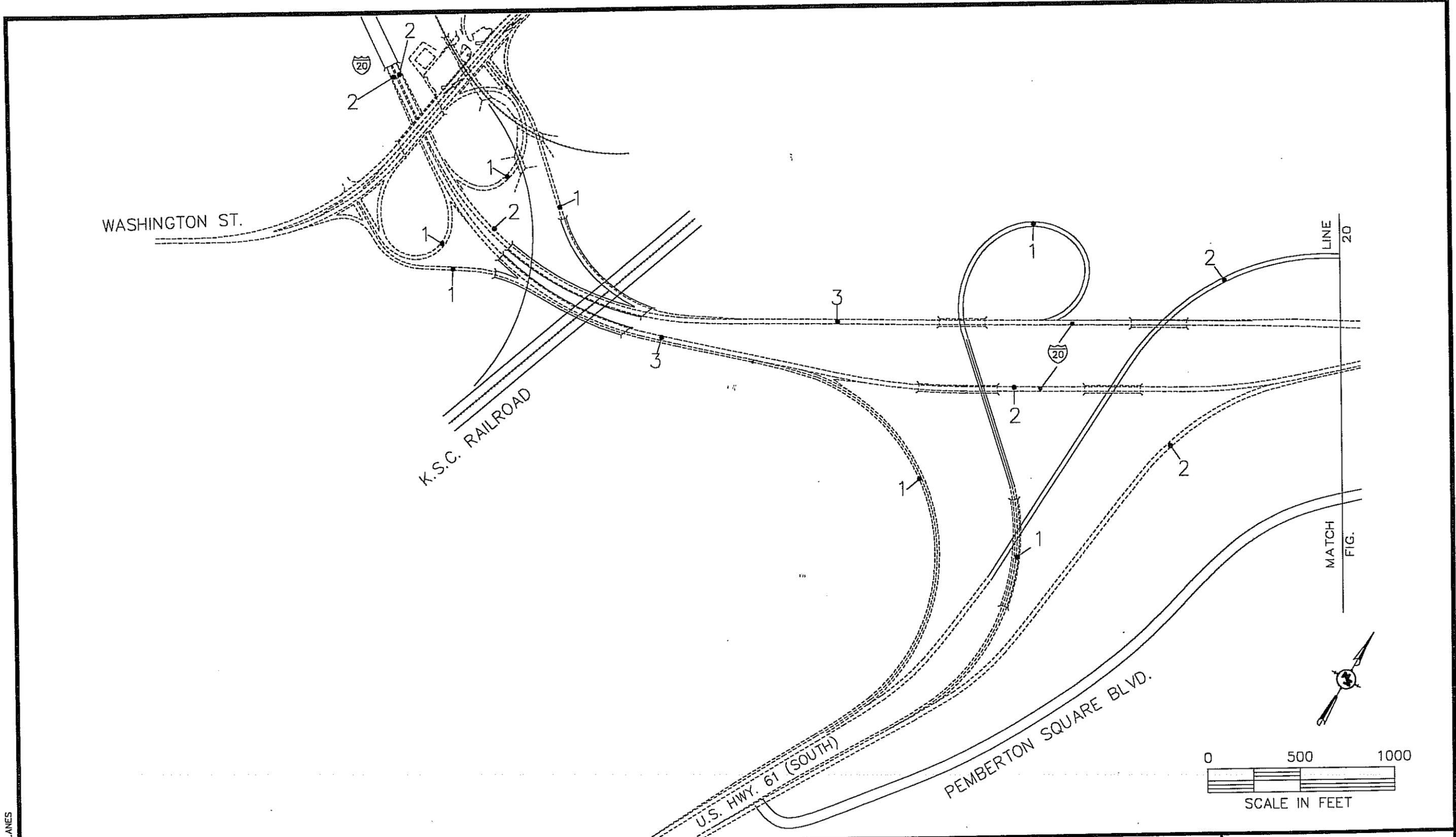
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 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE**  
**2, 2A, 2B & 3**  
**YEAR 2030**  
**VOLUMES**

**NEEL-SCHAFFER, INC.**  
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FIGURE 18



276-07\3276-07\1-6-00\LANES

**LEGEND:**

—2 NUMBER OF LANES

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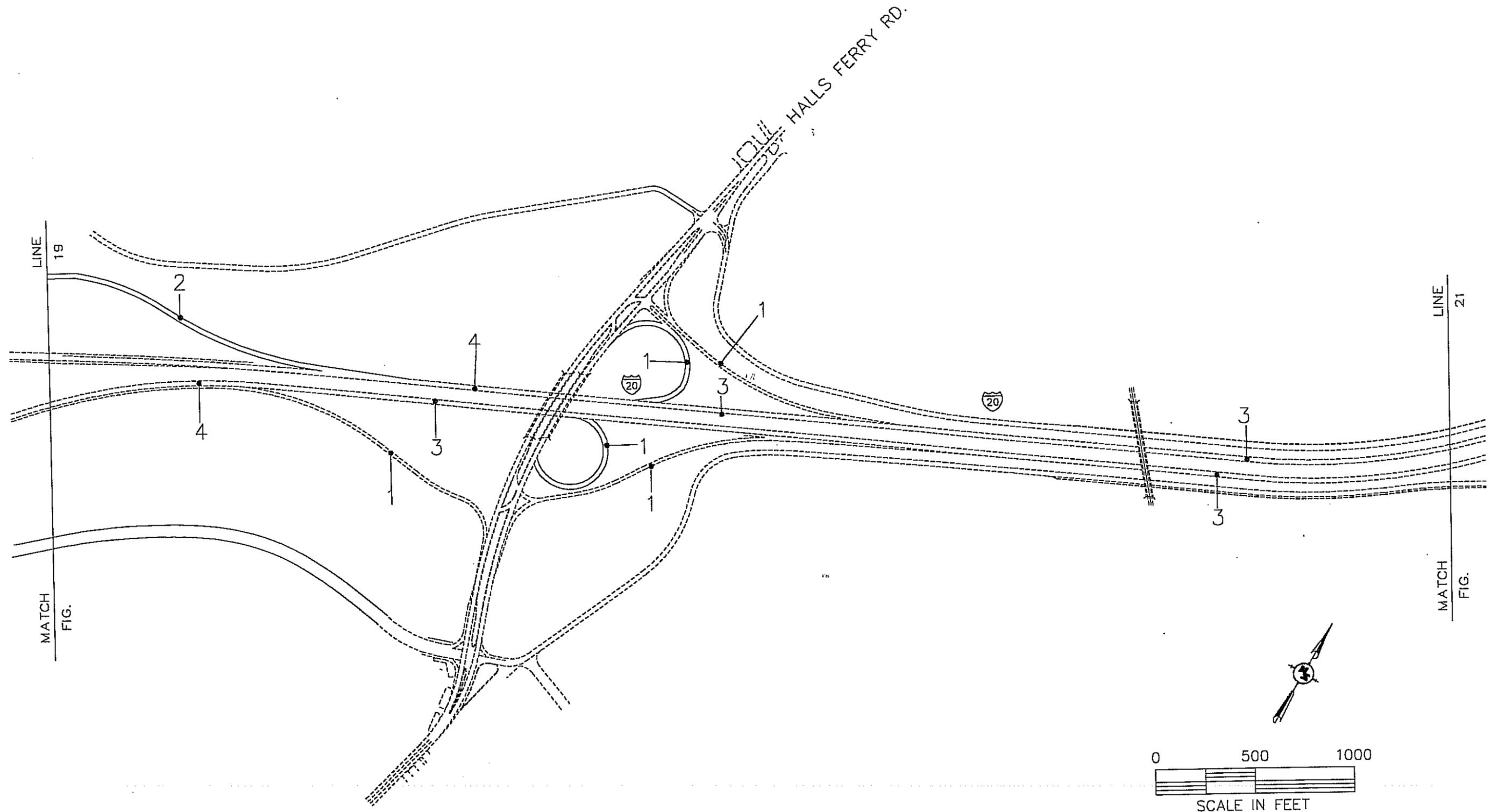
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 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 1  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
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**FIGURE 19**

76-07\3276-07\1-6-00\LANES



**LEGEND:**

●—2 NUMBER OF LANES

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Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 1  
PROPOSED  
NUMBER OF  
LANES**

**NEEL-SCHAFFER, INC.**  
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FIGURE 20

27276-07\3276-07\1-6-00\LANES

LINE 20  
MATCH FIG.

LINE 22  
MATCH FIG.

INDIANA AVENUE

N. FRONTAGE RD.

S. FRONTAGE RD.

K.C.S. RR



— 2 NUMBER OF LANES

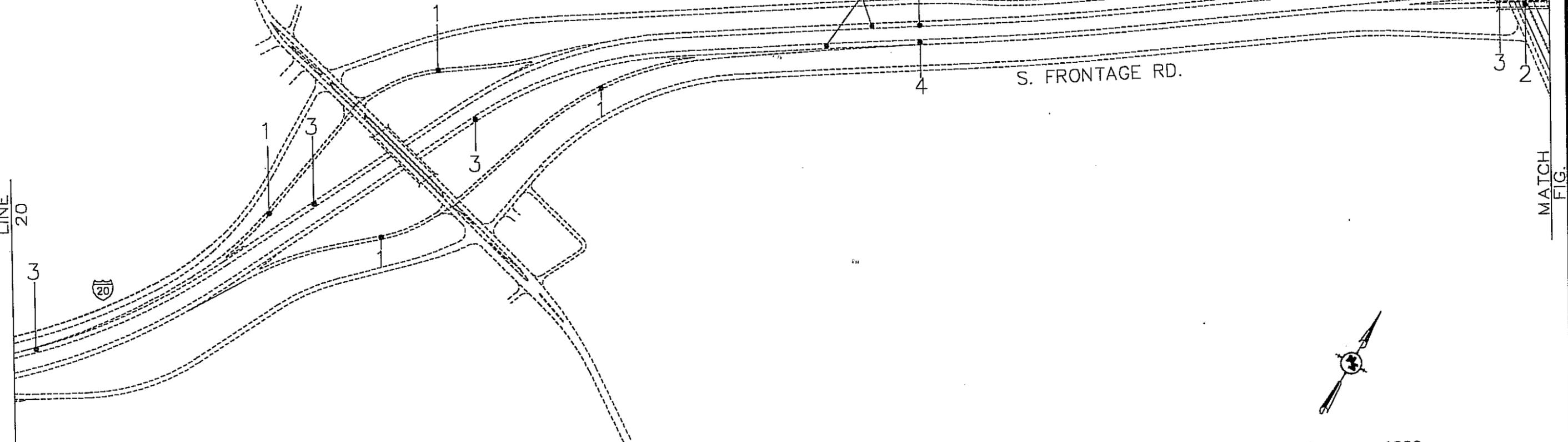
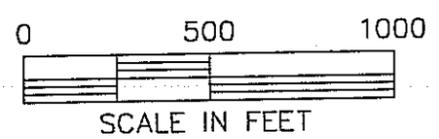
Prepared for the  
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TRANSPORTATION

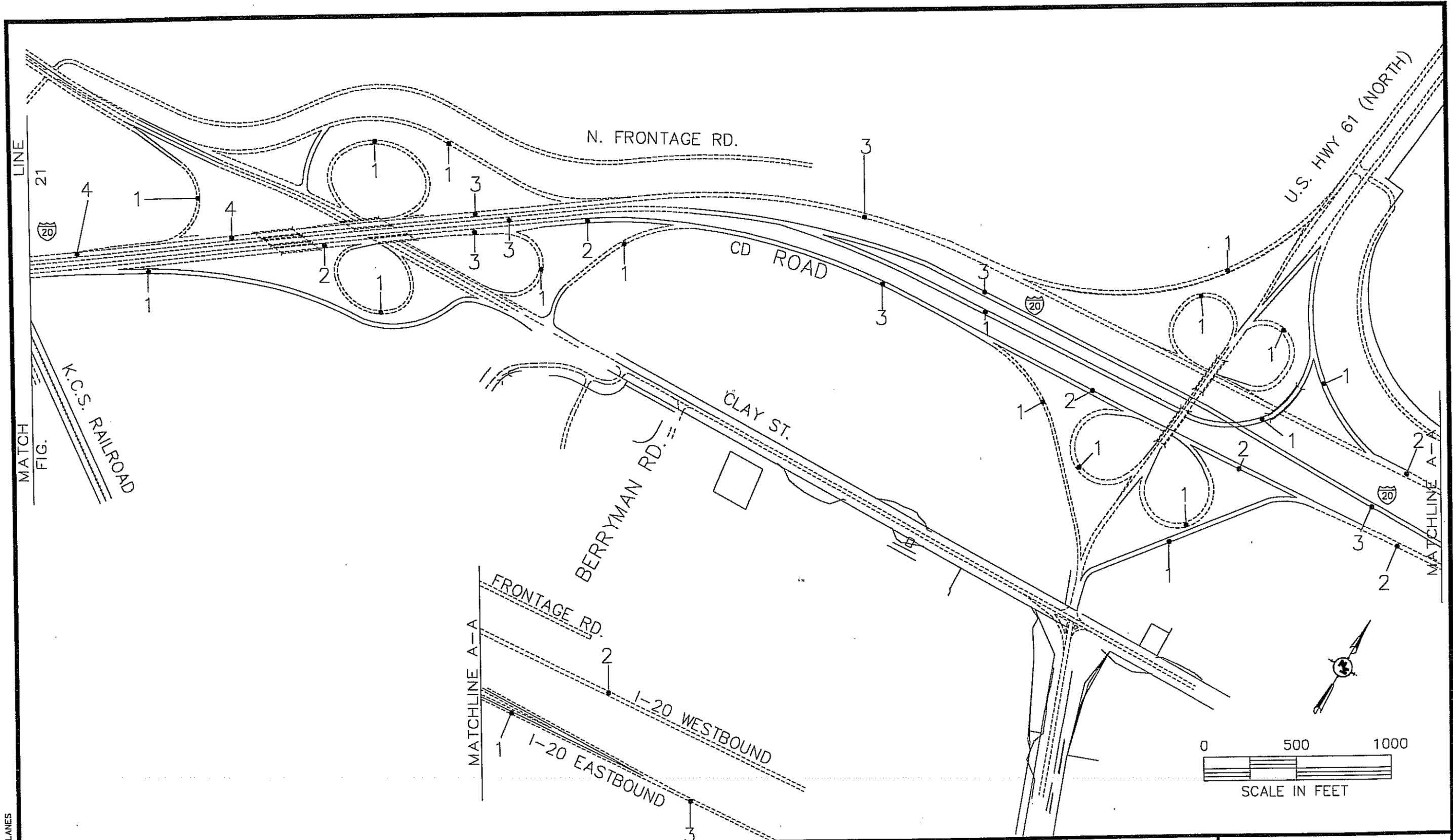
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Warren County  
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ALTERNATE 1  
PROPOSED  
NUMBER OF  
LANES



FIGURE 21





LEGEND:

—●— 2 NUMBER OF LANES

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TRANSPORTATION

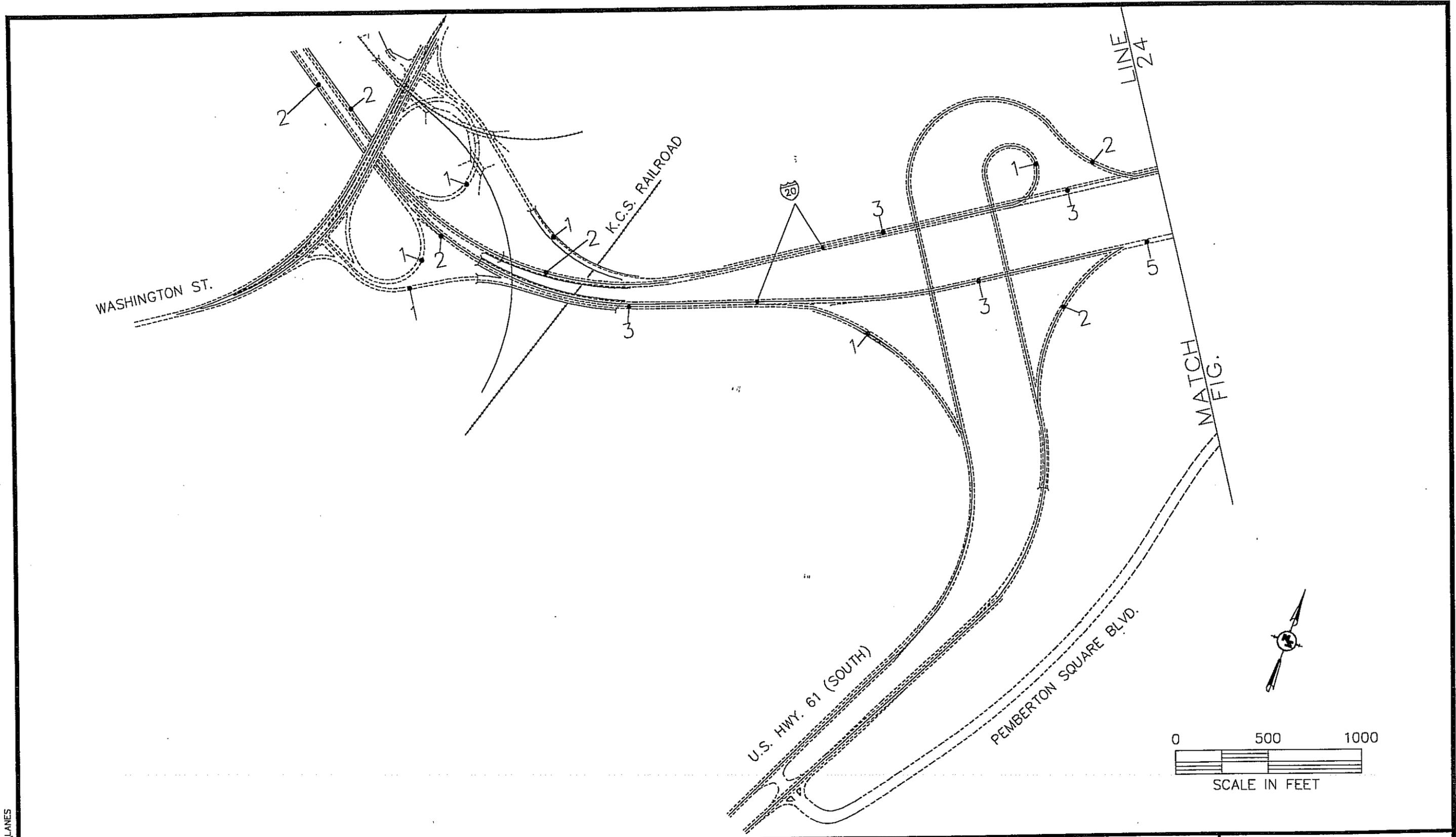
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Warren County  
Project No. 54-0020-01-106-10 P.E.

ALTERNATE 1  
PROPOSED  
NUMBER OF  
LANES



FIGURE 22

276-07\3276-07\1-6-00\LANES



1276-07\3276-07\1-6-00\LANES

**LEGEND:**

—2 NUMBER OF LANES

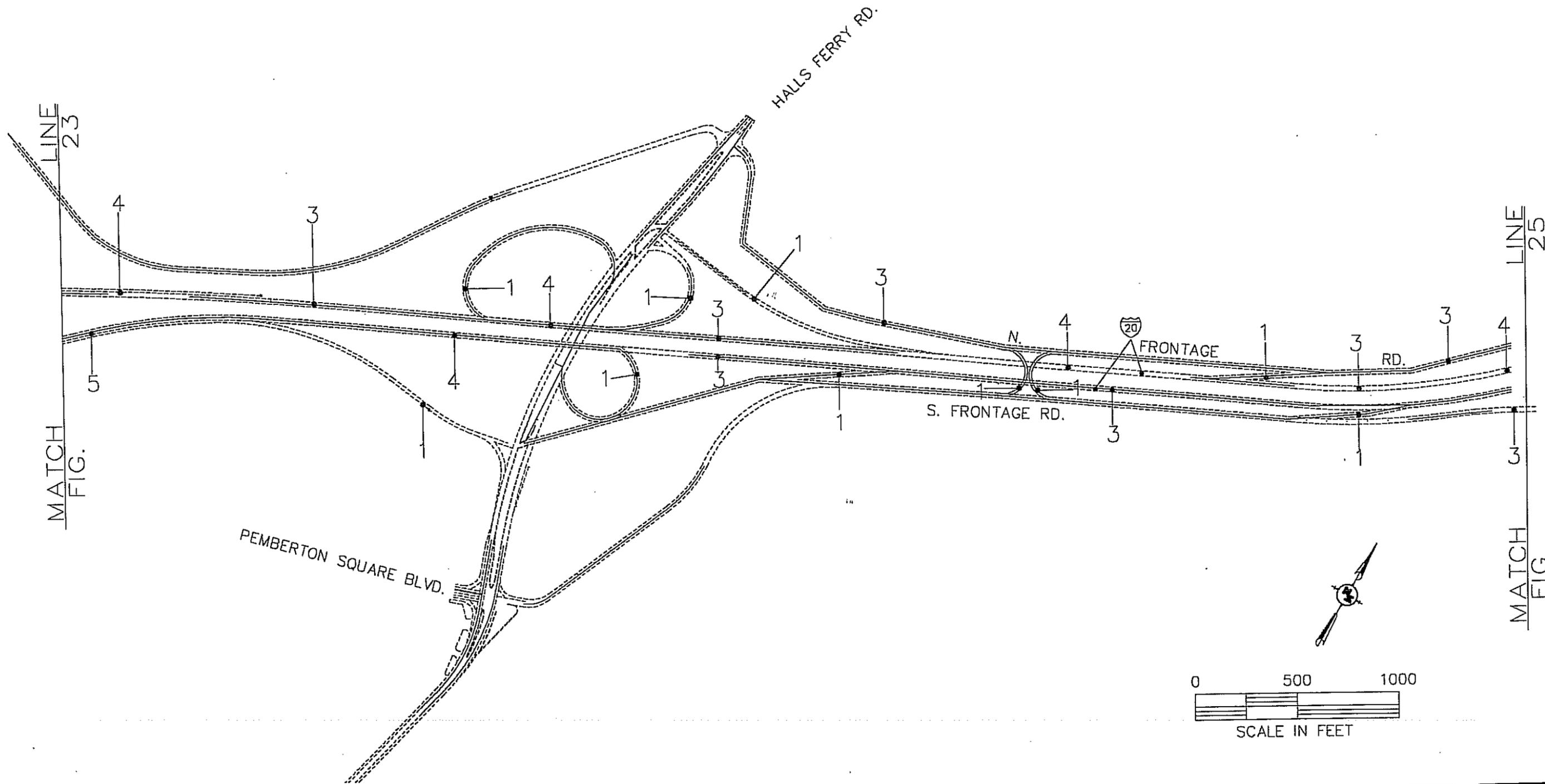
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**ALTERNATE 2**  
**PROPOSED**  
**NUMBER OF**  
**LANES**

**NEEL-SCHAFFER, INC.**  
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**FIGURE 23**



76-07\3276-07\1-6-00\LANES

**LEGEND:**

— 2 NUMBER OF LANES

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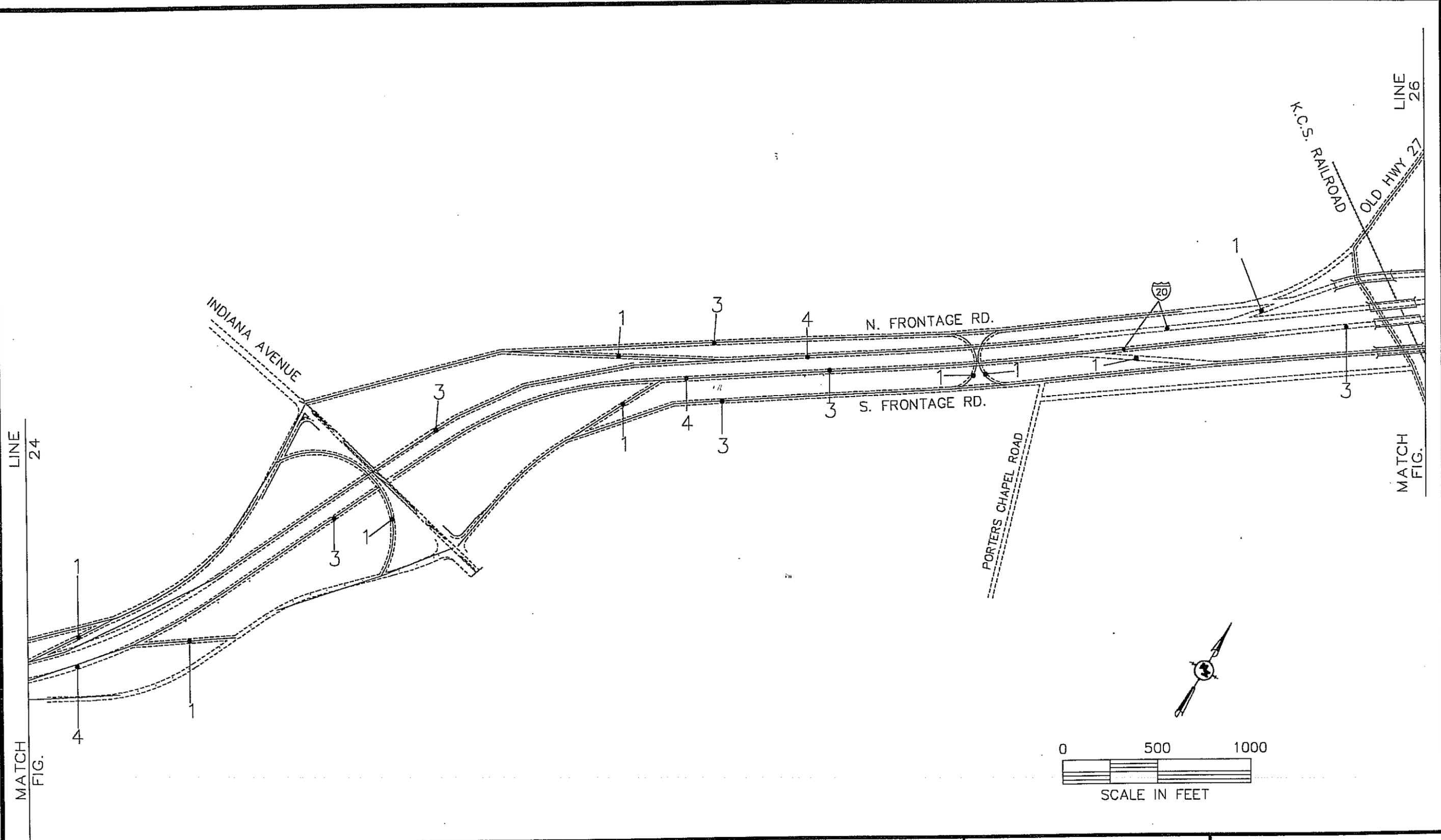
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Warren County  
Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 2**  
**PROPOSED**  
**NUMBER OF**  
**LANES**

**NEEL-SCHAFFER, INC.**  
ENGINEERS • PLANNERS  
Jackson, Mississippi

FIGURE 24

3276-07\3276-07\1-6-00\LANES



LEGEND:

— 2 NUMBER OF LANES

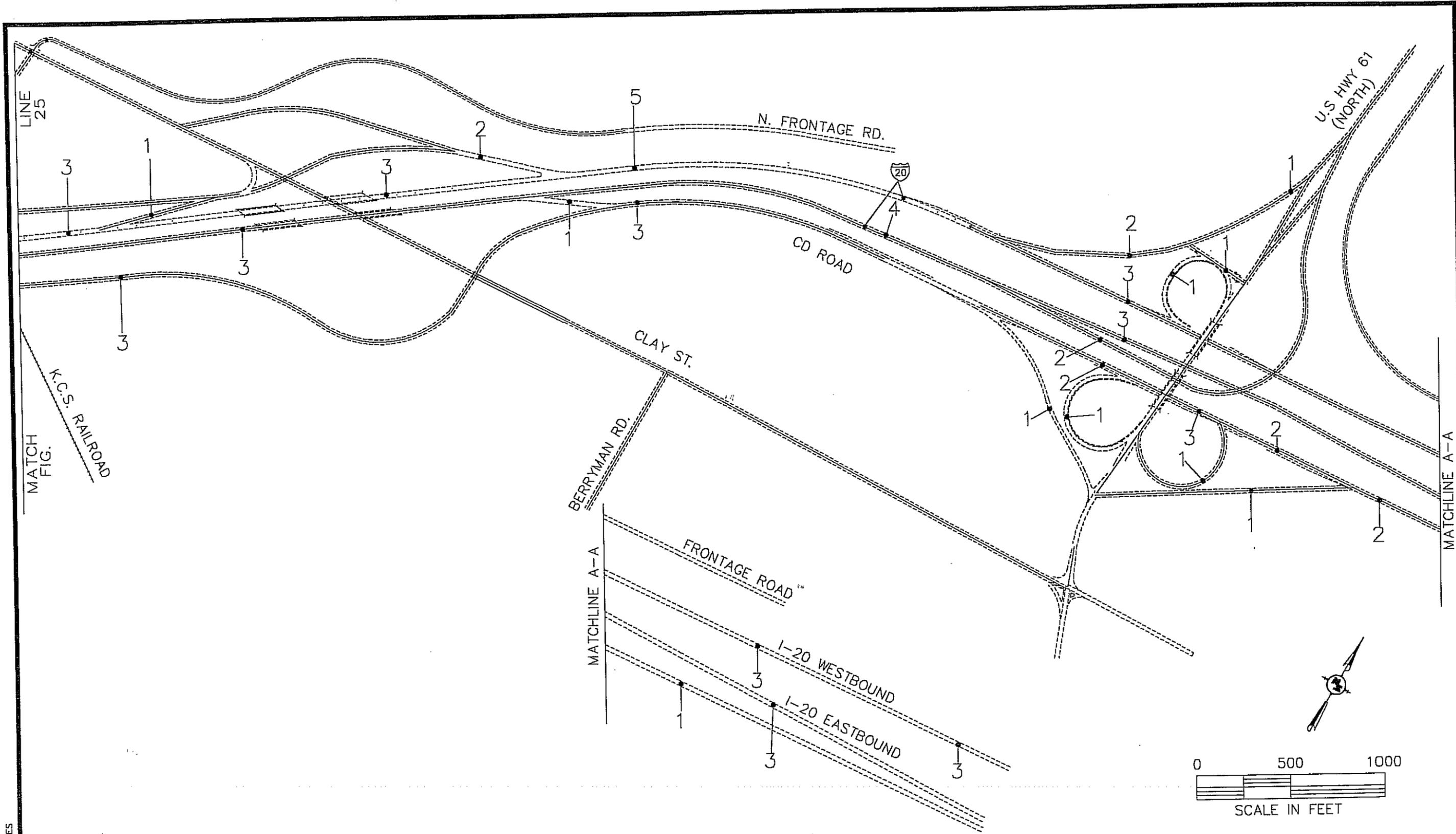
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 Project No. 54-0020-01-106-10 P.E.

ALTERNATE 2  
 PROPOSED  
 NUMBER OF  
 LANES

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 25



276-07\3276-07\1-6-00\LANES

**LEGEND:**

—2 NUMBER OF LANES

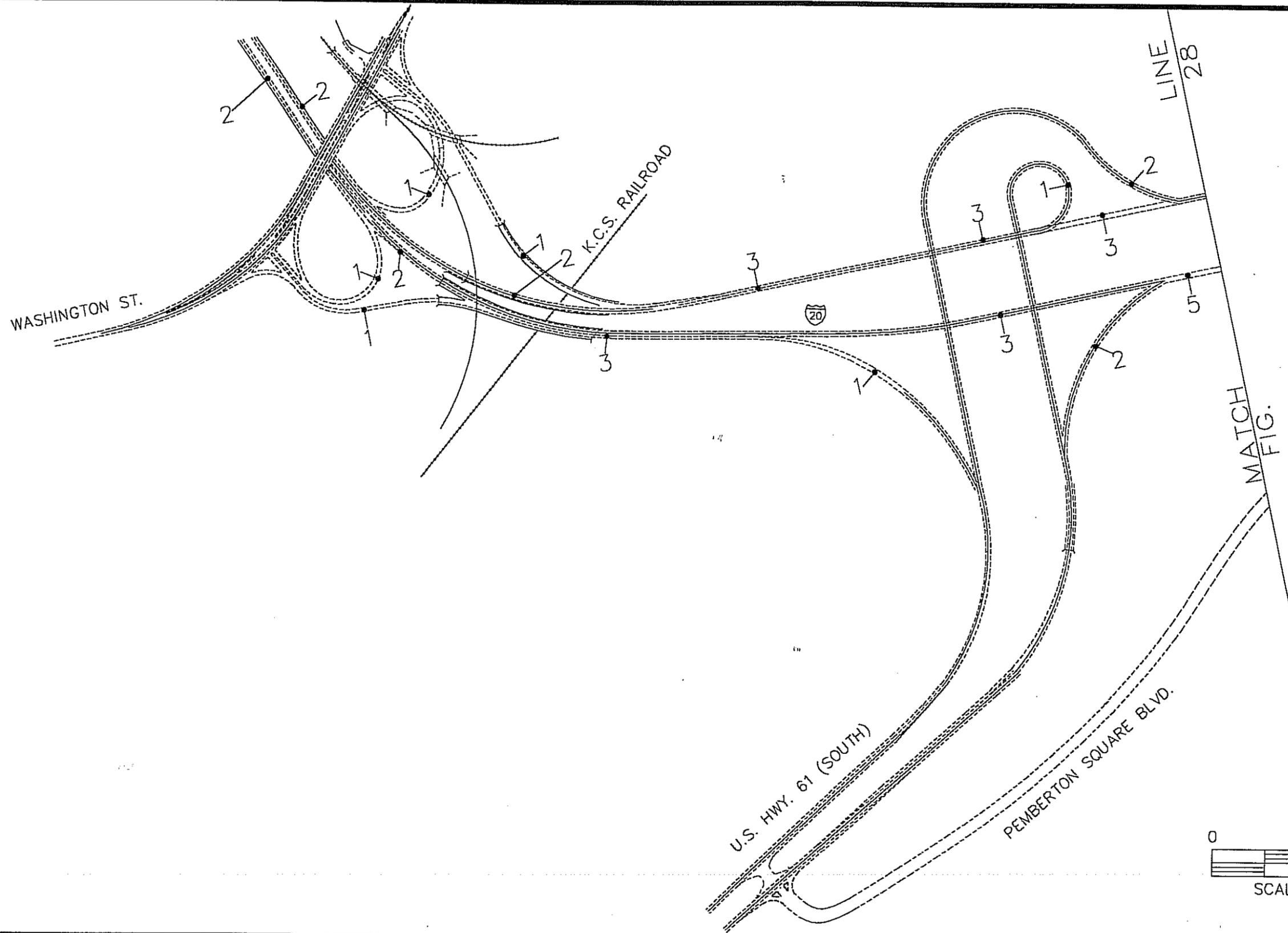
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 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 2  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 26



3276-07\3276-07\1-6-00\LANES

**LEGEND:**

— 2 NUMBER OF LANES

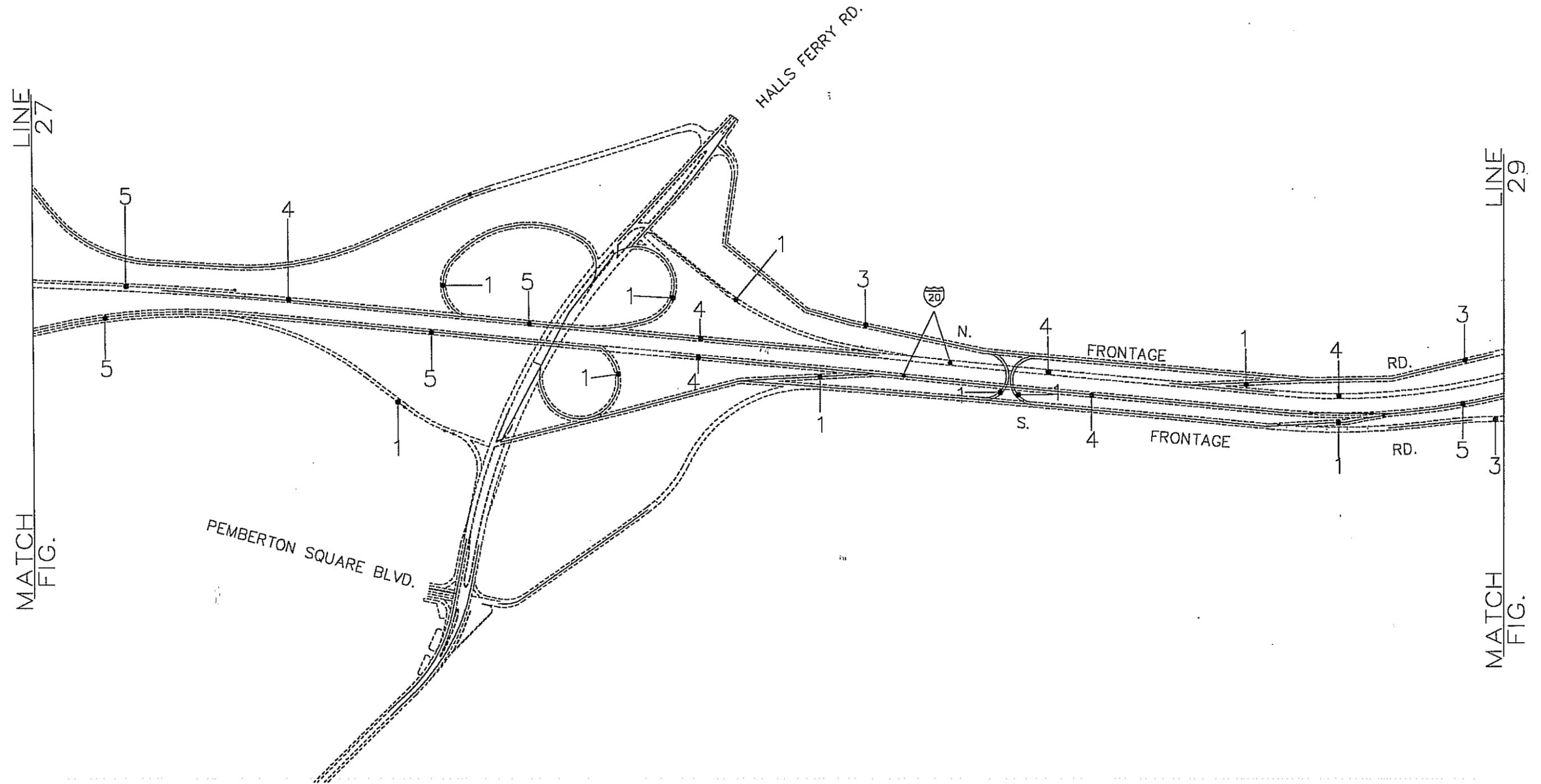
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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 2A  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 27



3276-07\3276-07\1-6-00\LANES

**LEGEND:**  
 ● — 2 NUMBER OF LANES

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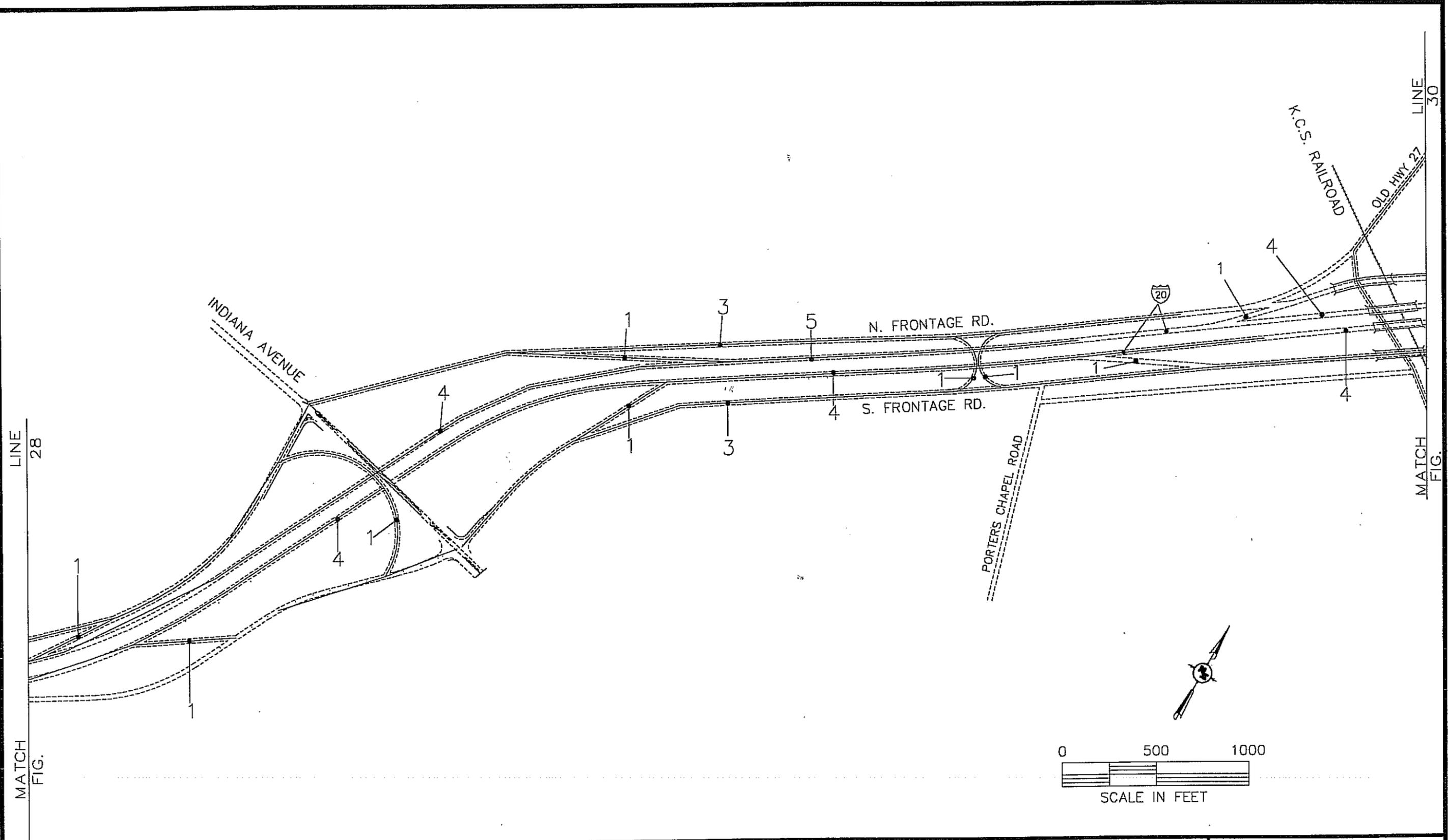
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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 2A**  
**PROPOSED**  
**NUMBER OF**  
**LANES**

**NEEL-SCHAFFER, INC.**  
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 Jackson, Mississippi

FIGURE 28

3276-07\3276-07\1-5-00\LANES



LEGEND:

— 2 NUMBER OF LANES

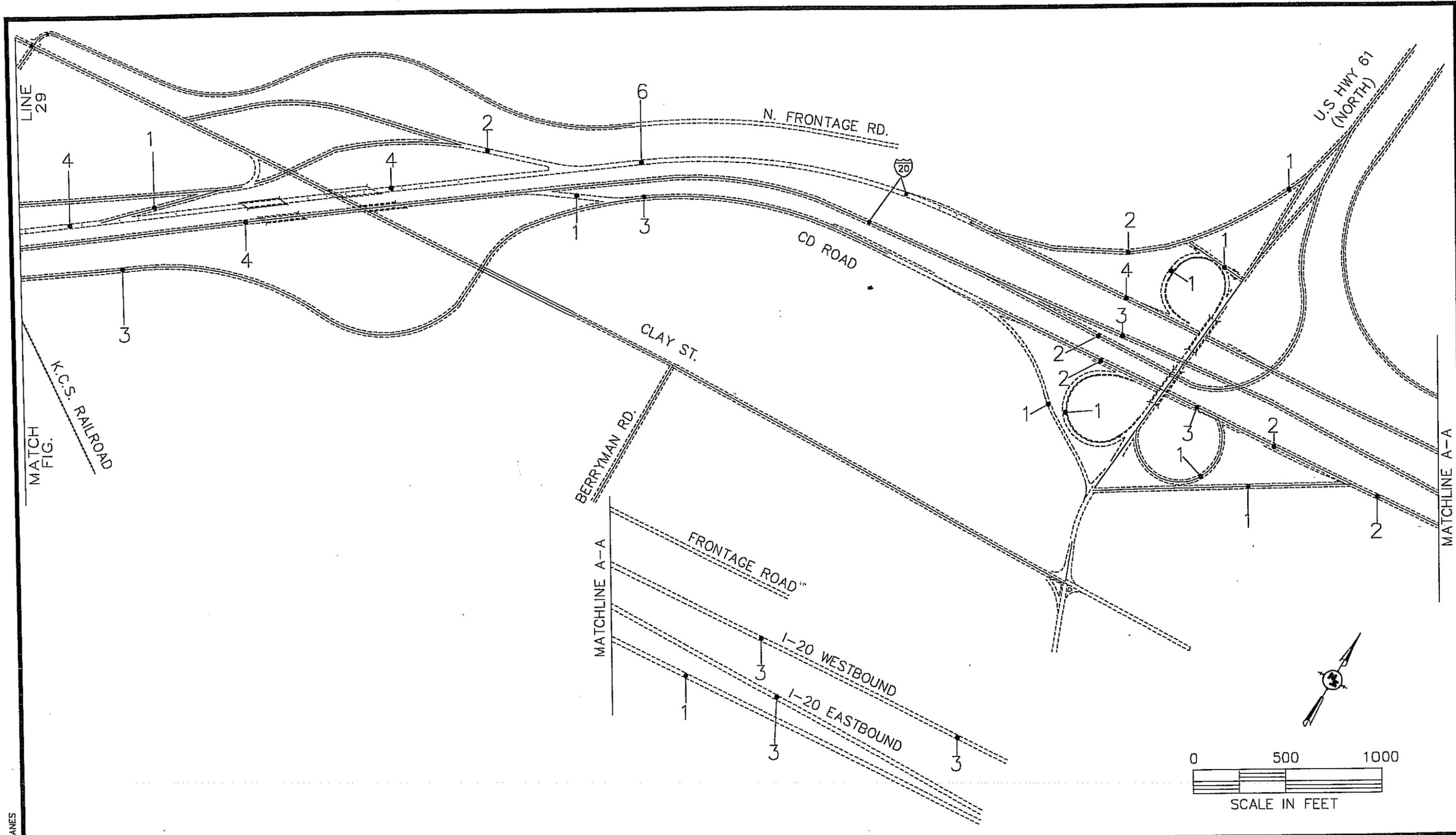
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Project No. 54-0020-01-106-10 P.E.

ALTERNATE 2A  
PROPOSED  
NUMBER OF  
LANES

**NEEL-SCHAFFER, INC.**  
ENGINEERS • PLANNERS  
Jackson, Mississippi

FIGURE 29



3276-07\3276-07\1-6-00\LANES

**LEGEND:**

— 2 NUMBER OF LANES

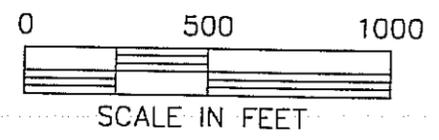
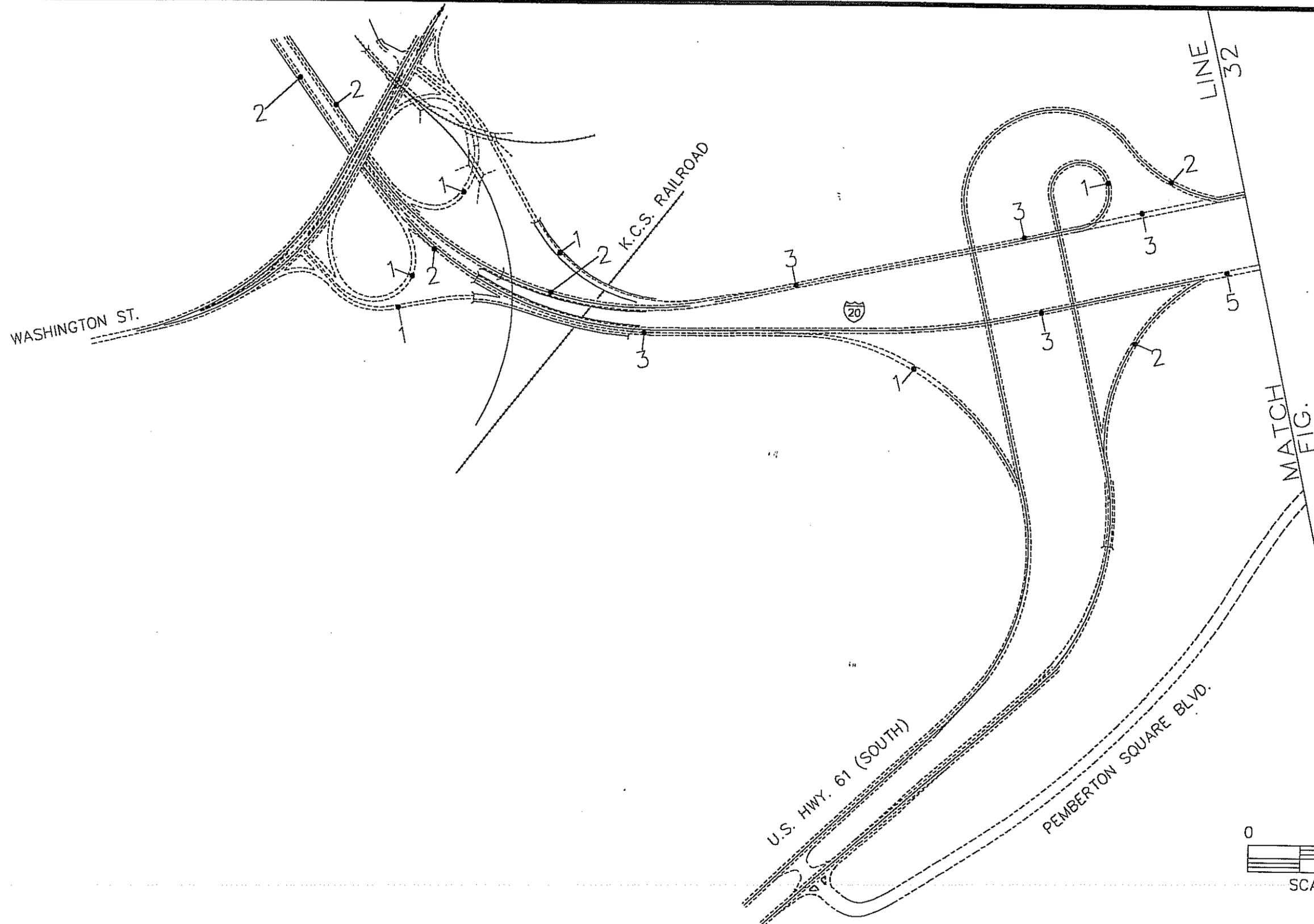
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**ALTERNATE 2A  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 30



3276-07\3276-07\1-6-00\LANES

**LEGEND:**

— 2 NUMBER OF LANES

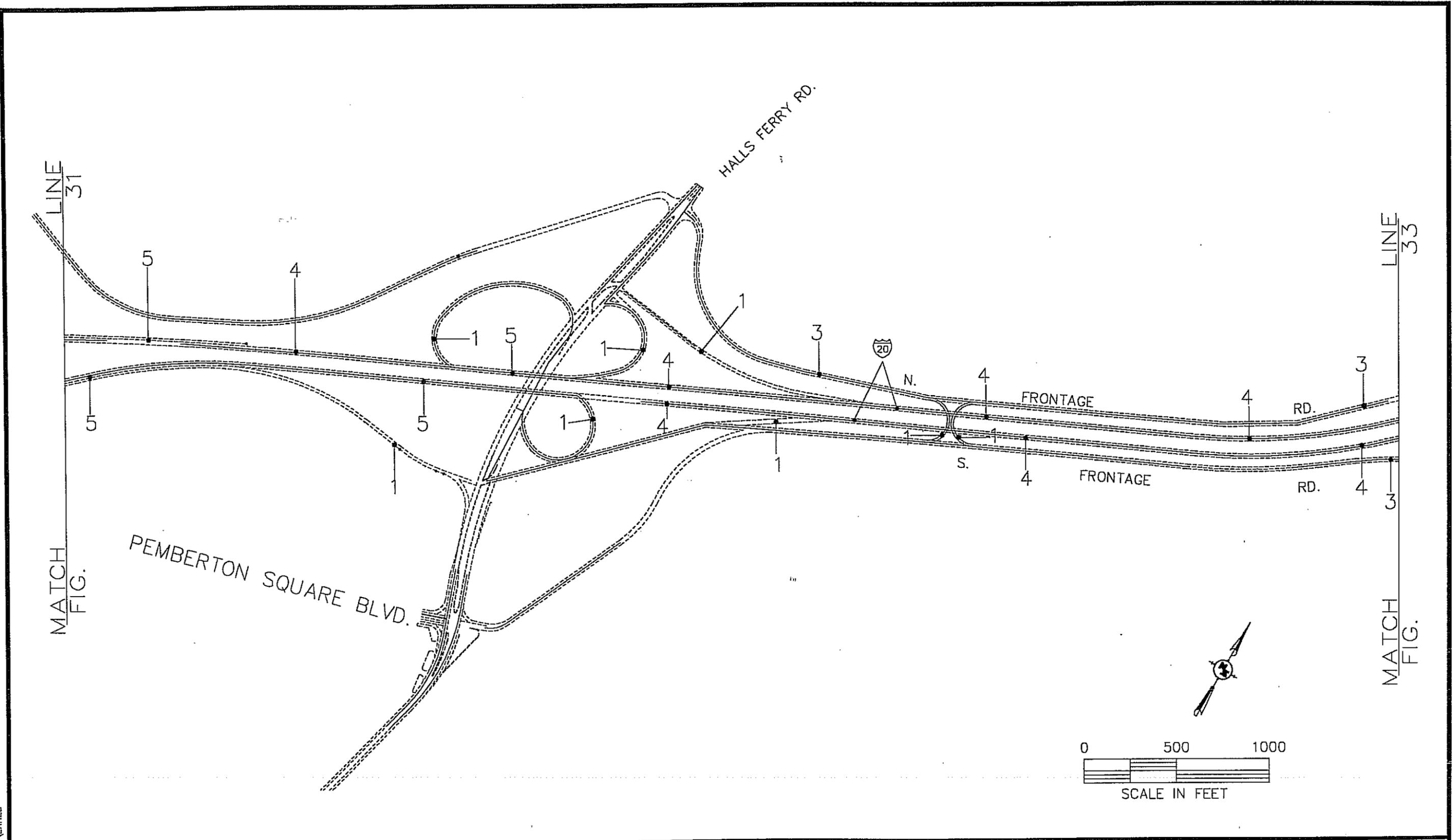
Prepared for the  
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Warren County  
Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 2B  
PROPOSED  
NUMBER OF  
LANES**



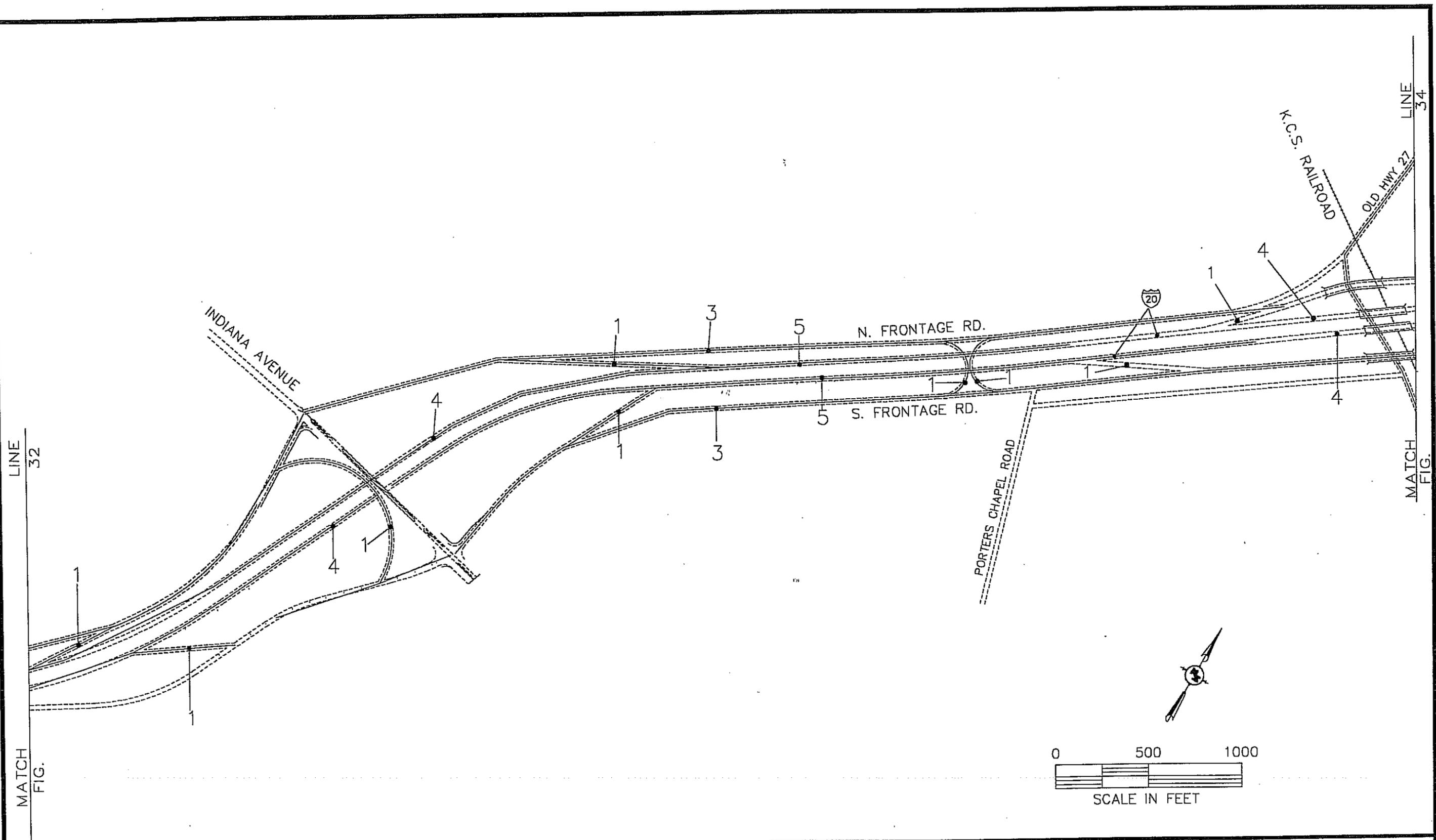
FIGURE 31



3276-07\3276-07\1-6-00\LANES

<p><b>LEGEND:</b></p> <p>— 2 NUMBER OF LANES</p>	<p>Prepared for the MISSISSIPPI DEPARTMENT OF TRANSPORTATION</p>	<p>Reconstruction of I-20 Vicksburg Warren County Project No. 54-0020-01-106-10 P.E.</p>	<p><b>ALTERNATE 2B PROPOSED NUMBER OF LANES</b></p>	 <p><b>NEEL-SCHAFFER, INC.</b> ENGINEERS • PLANNERS Jackson, Mississippi</p>
				<p>FIGURE 32</p>

276-07\3276-07\1-6-00\LANES



LEGEND:

—2 NUMBER OF LANES

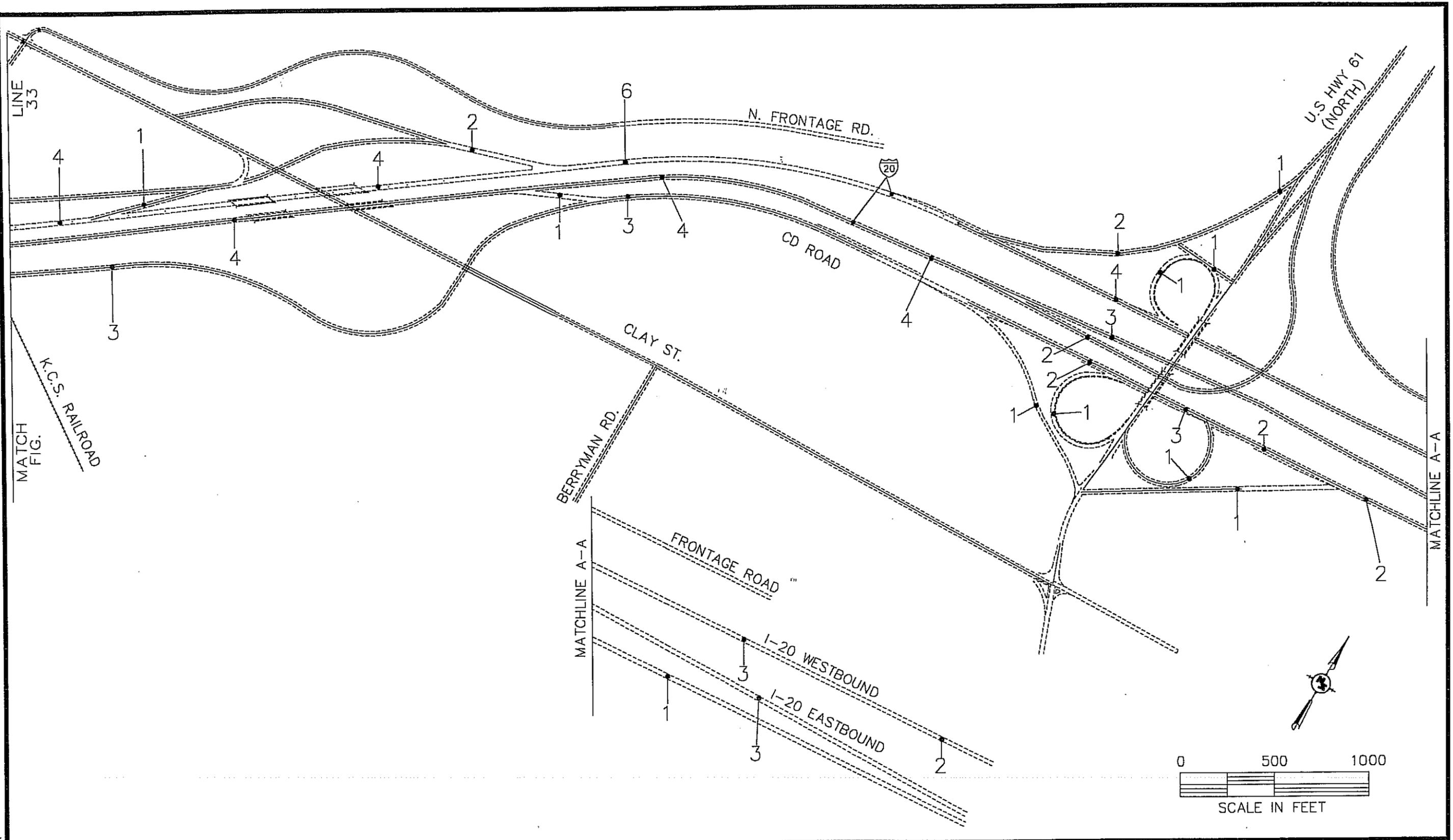
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Warren County  
Project No. 54-0020-01-106-10 P.E.

ALTERNATE 2B  
PROPOSED  
NUMBER OF  
LANES

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FIGURE 33



**LEGEND:**

— 2 NUMBER OF LANES

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 Warren County  
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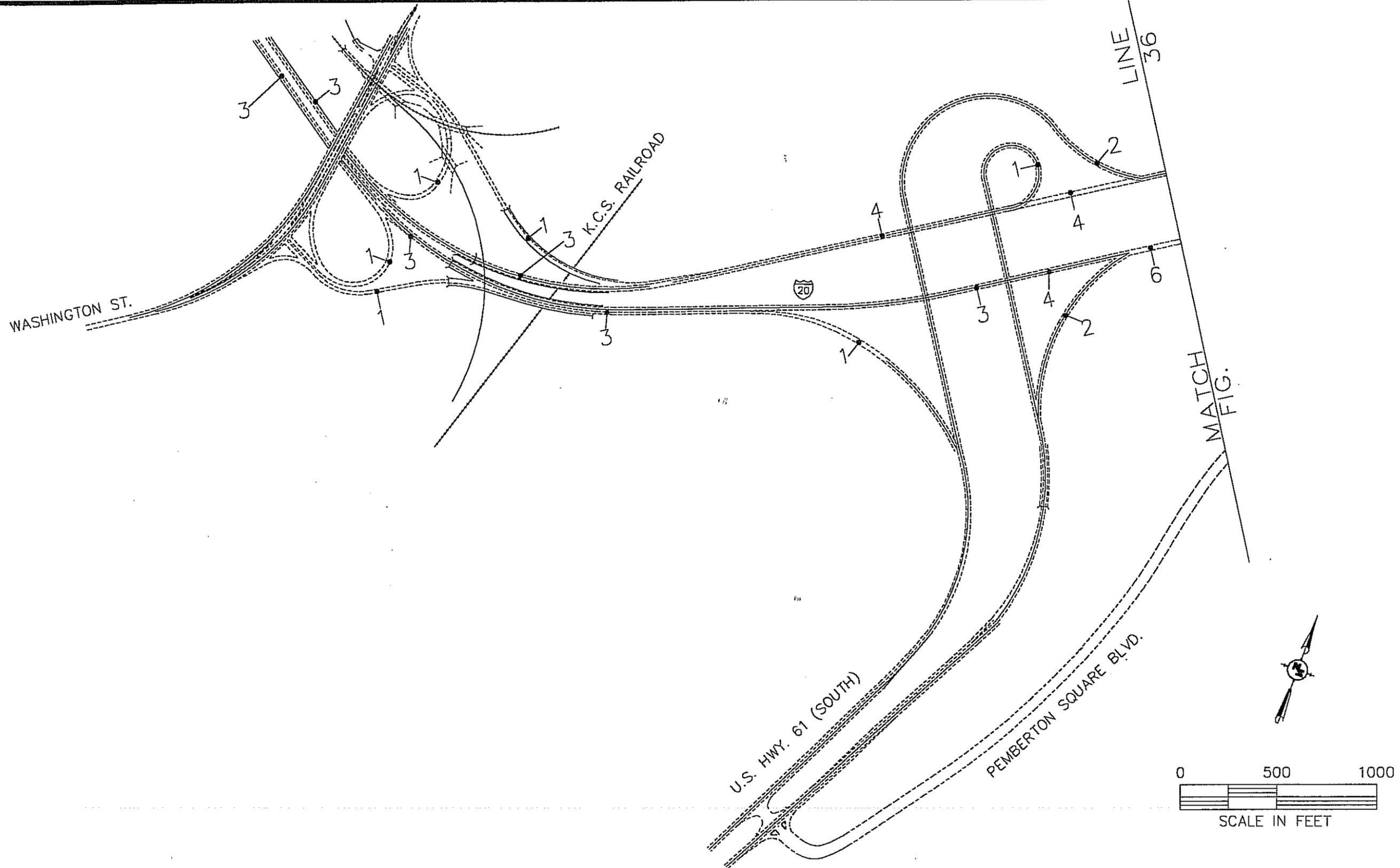
**ALTERNATE 2B  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
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 Jackson, Mississippi

FIGURE 34

0276-07\3276-07\1-6-00\LANES

3276-07\3276-07\1-6-00\LANES



**LEGEND:**

● — 2 NUMBER OF LANES

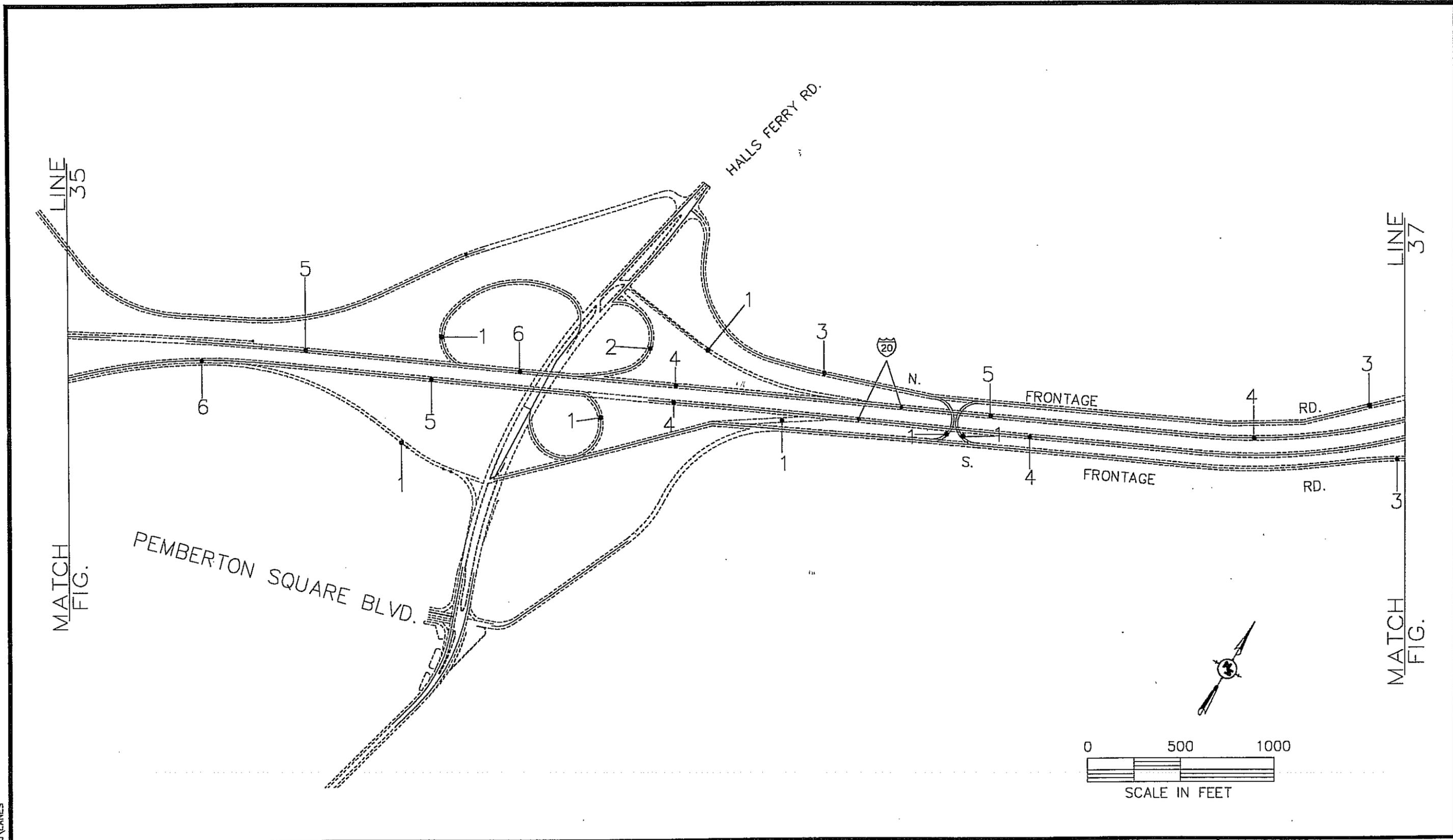
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**ALTERNATE 3  
 PROPOSED  
 NUMBER OF  
 LANES**

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 Jackson, Mississippi

**FIGURE 35**



LEGEND:

●—2 NUMBER OF LANES

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Warren County  
Project No. 54-0020-01-106-10 P.E.

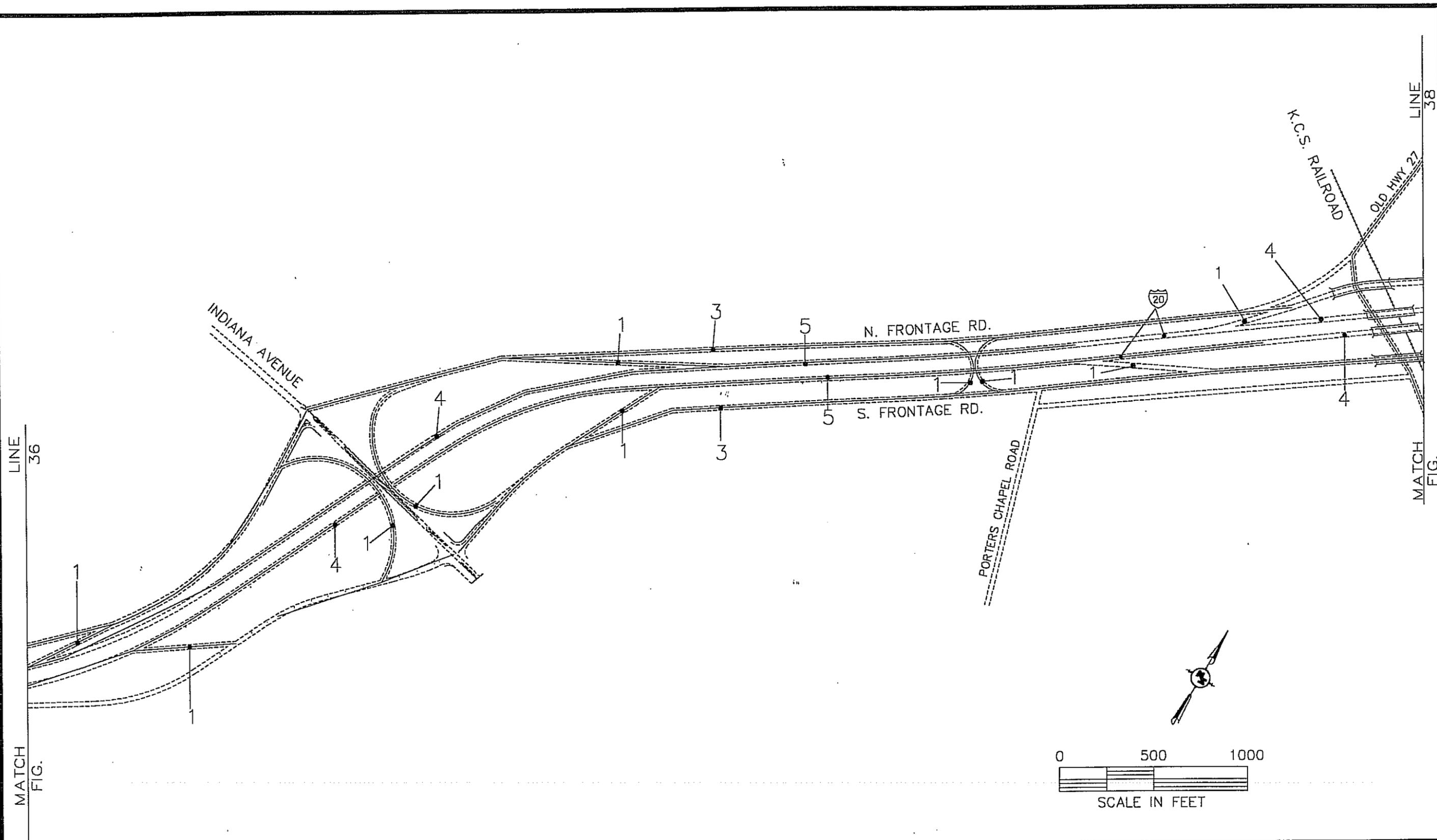
ALTERNATE 3  
PROPOSED  
NUMBER OF  
LANES

**NEEL-SCHAFFER, INC.**  
ENGINEERS • PLANNERS  
Jackson, Mississippi

FIGURE 36

3276-07\3276-07\1-6-00\LANES

3276-07\3276-07\1-6-00\LANES



**LEGEND:**

—2 NUMBER OF LANES

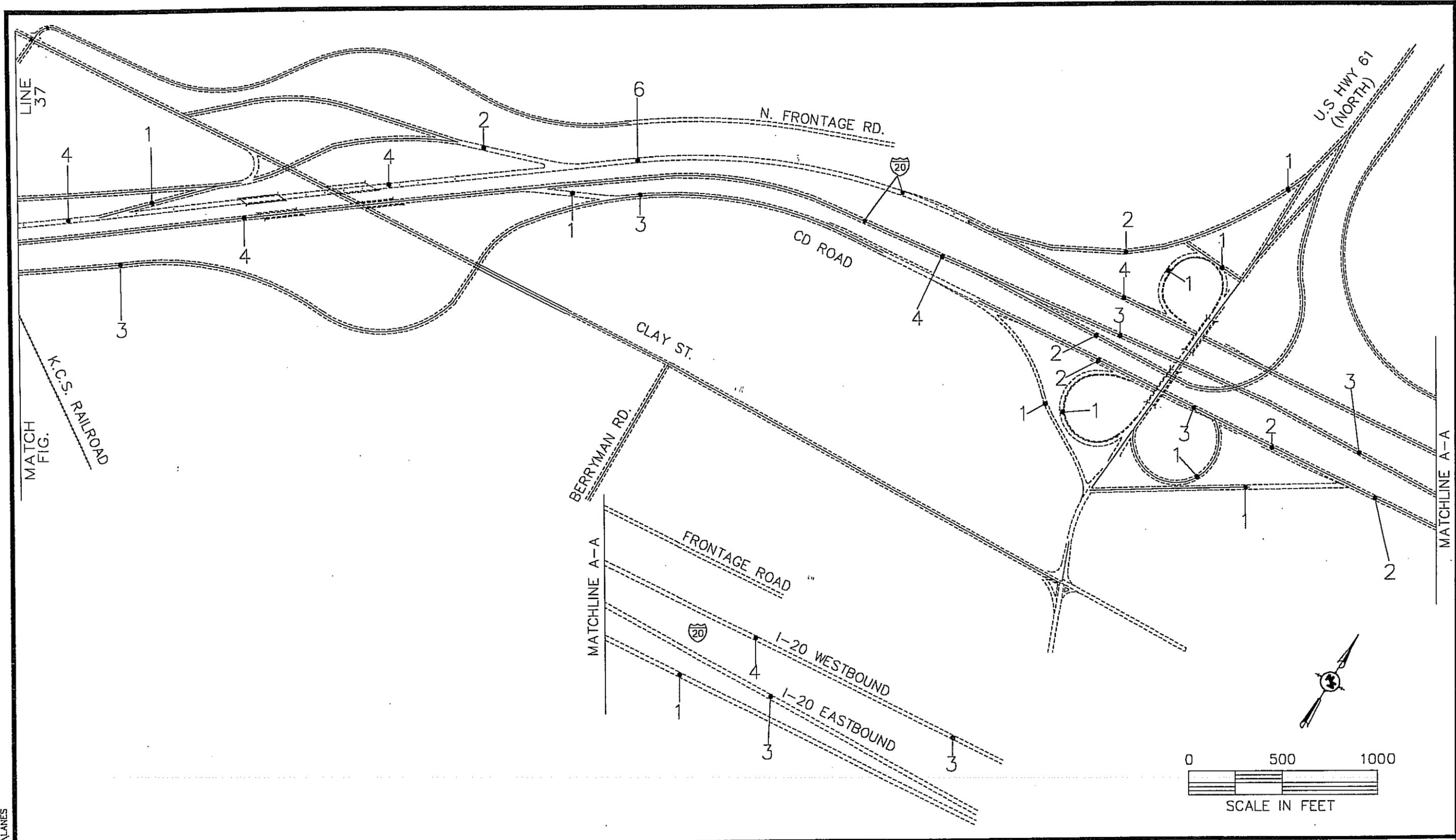
Prepared for the  
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 TRANSPORTATION

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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 3  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

**FIGURE 37**



3276-07\3276-07\1-6-00\LANES

**LEGEND:**  
 —●— 2 NUMBER OF LANES

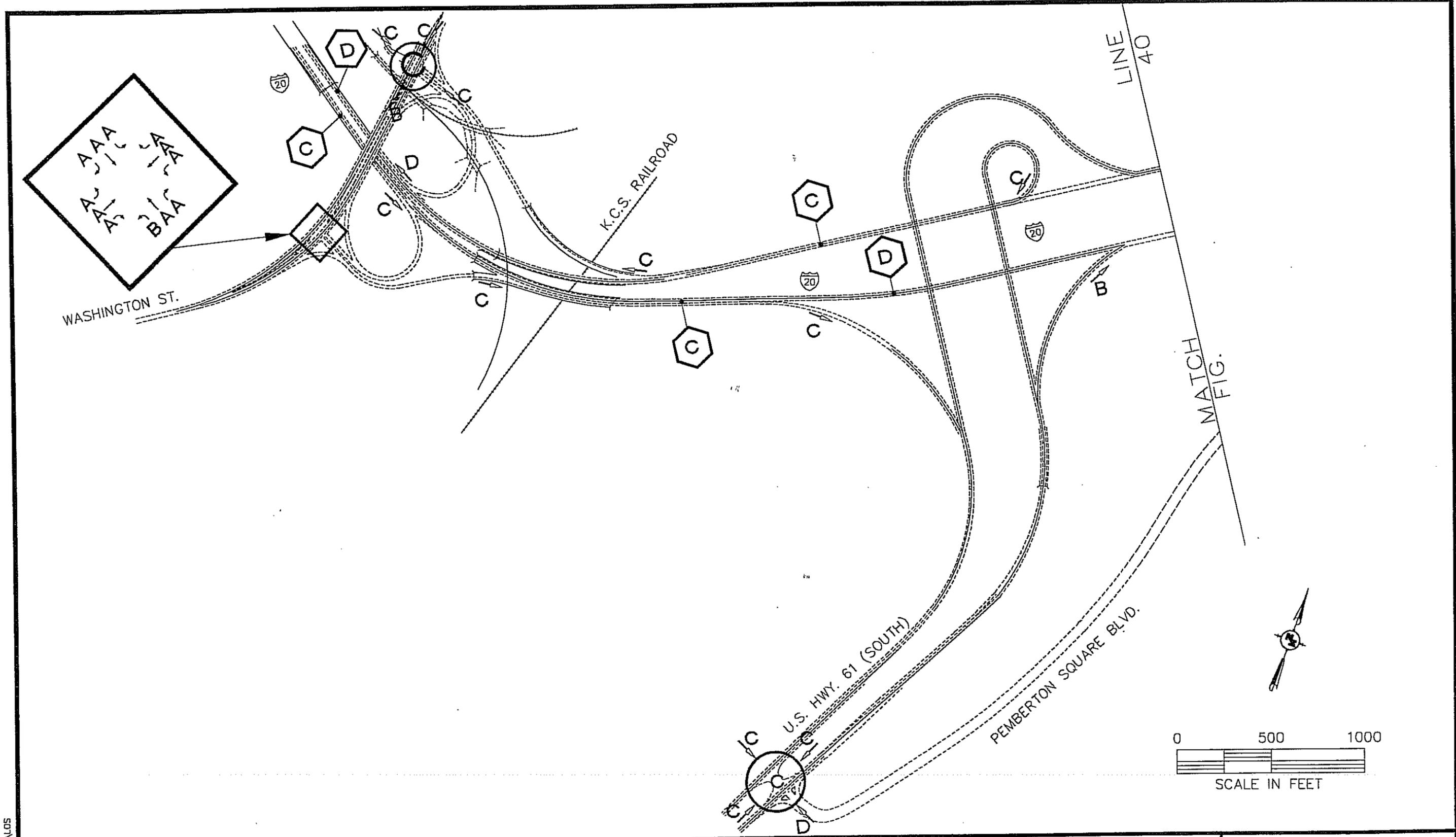
Prepared for the  
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 TRANSPORTATION**

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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 3  
 PROPOSED  
 NUMBER OF  
 LANES**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

**FIGURE 38**



3276-07\3276-07\1-6-00\LOS

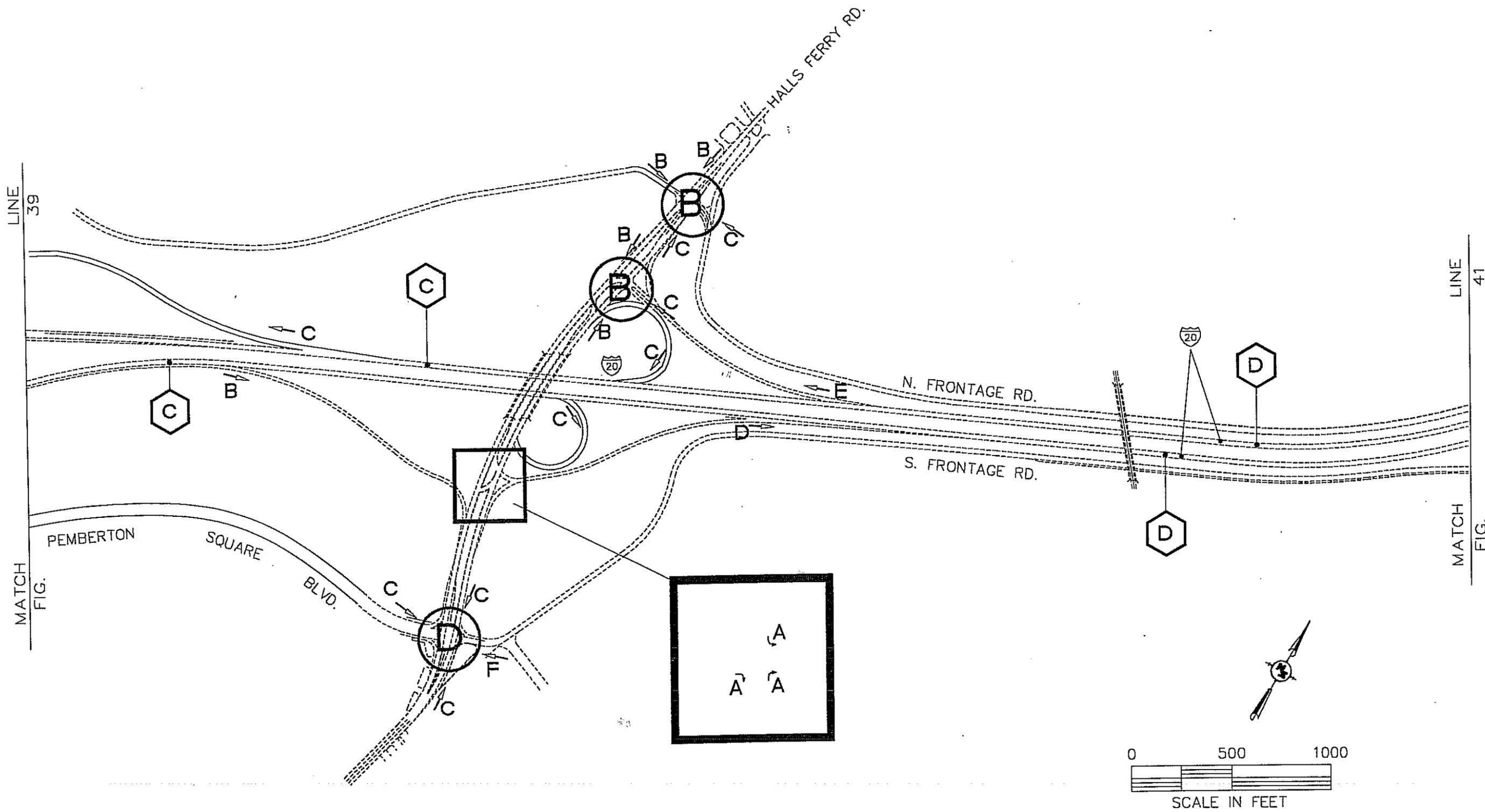
<b>LEGEND:</b>	
	FREEWAY SEGMENT LEVEL OF SERVICE
	SIGNALIZED INTERSECTION LEVEL OF SERVICE
	WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 1  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

	<b>NEEL-SCHAFFER, INC.</b> ENGINEERS • PLANNERS Jackson, Mississippi
	<b>FIGURE 39</b>



276-07\3276-07\1-6-00\05

**LEGEND:**

-  FREEWAY SEGMENT LEVEL OF SERVICE
-  SIGNALIZED INTERSECTION LEVEL OF SERVICE
-  WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

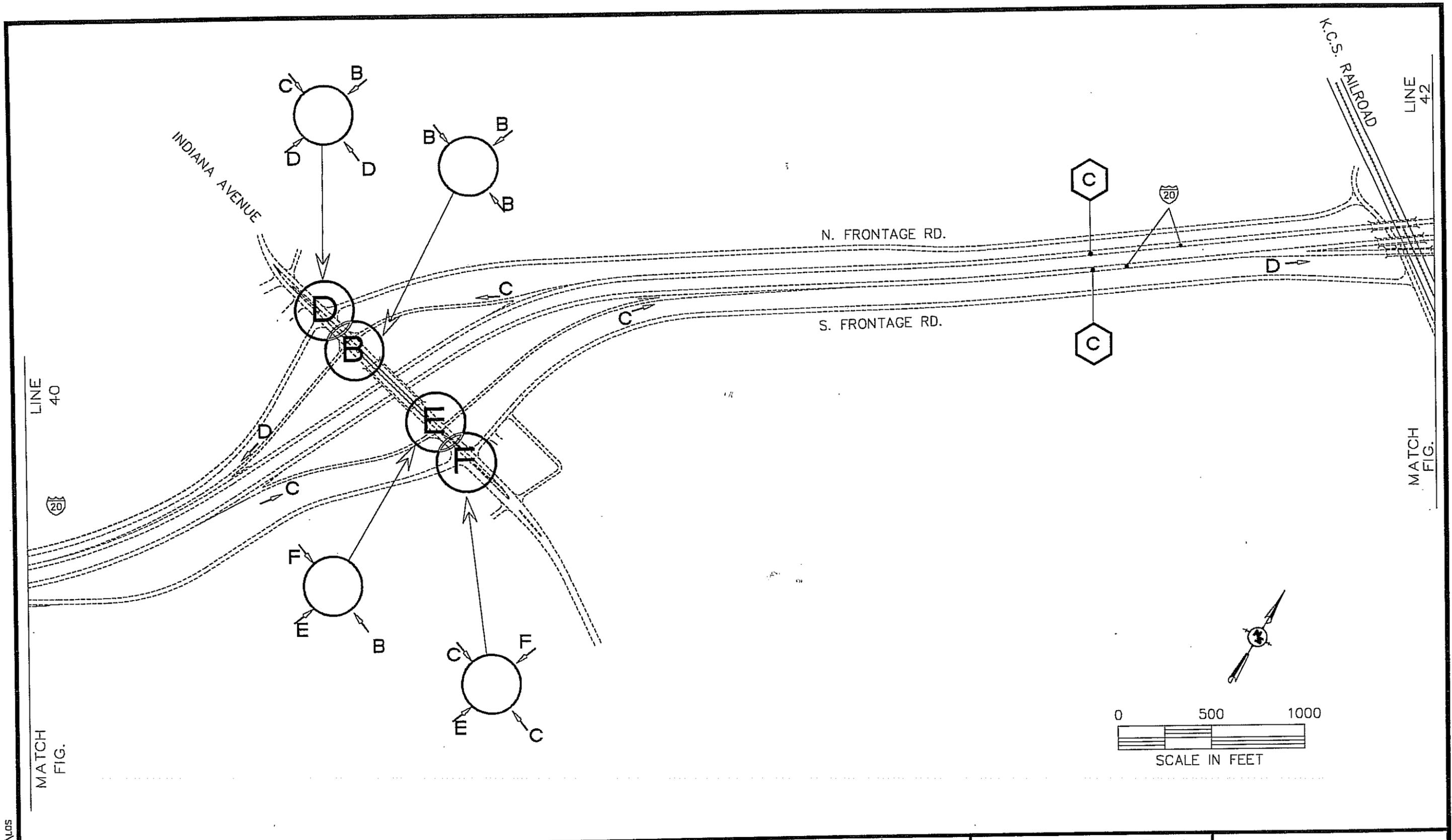
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 Warren County  
 Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 1**  
**YEAR 2030**  
**LEVELS OF**  
**SERVICE**

 **NEEL-SCHAFFER, INC.**  
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 Jackson, Mississippi

FIGURE 40



**LEGEND:**



FREEWAY SEGMENT  
LEVEL OF SERVICE



SIGNALIZED INTERSECTION  
LEVEL OF SERVICE



WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

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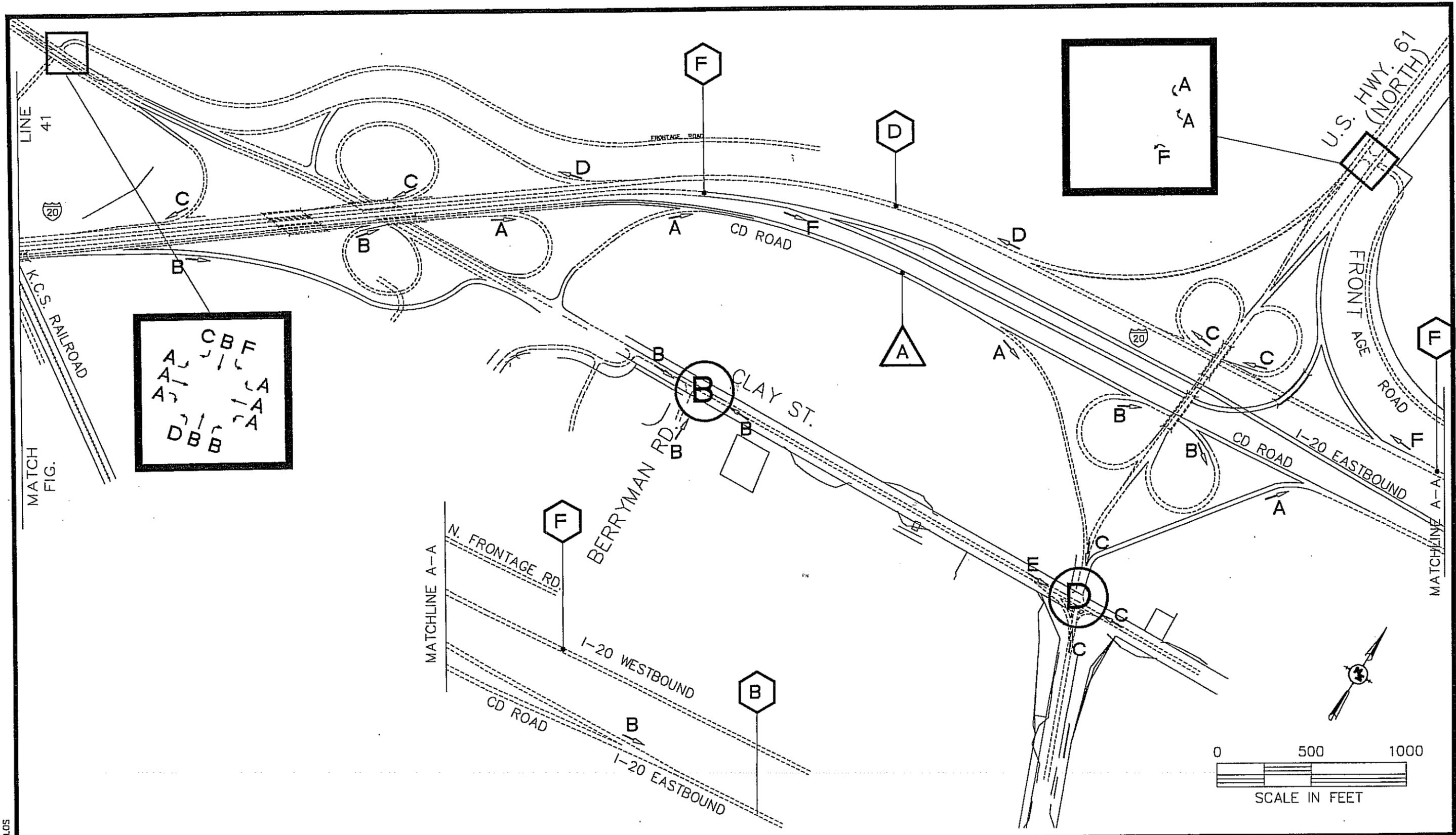
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Warren County  
Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 1  
YEAR 2030  
LEVELS OF  
SERVICE**



FIGURE 41

S:\3276-07\3276-07\1-6-00\LOS



276-07\3276-07\1-6-00\05

**LEGEND:**

**B** FREEWAY SEGMENT  
LEVEL OF SERVICE

**A** SIGNALIZED INTERSECTION  
LEVEL OF SERVICE

**B** WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

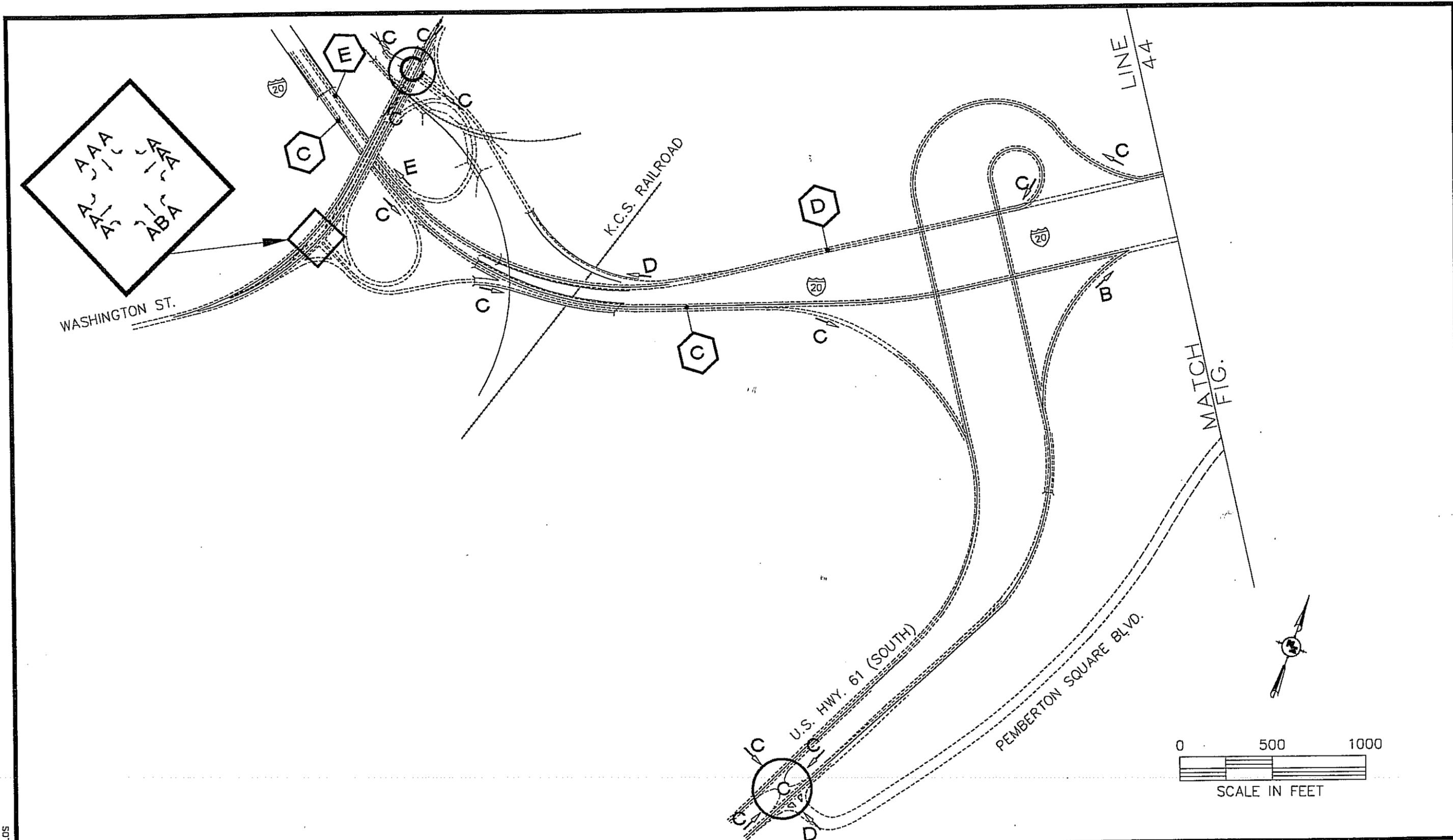
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**ALTERNATE 1  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
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Jackson, Mississippi

FIGURE 42



**LEGEND:**

-  FREEWAY SEGMENT  
LEVEL OF SERVICE
-  WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE
-  SIGNALIZED INTERSECTION  
LEVEL OF SERVICE

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**ALTERNATE 2  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

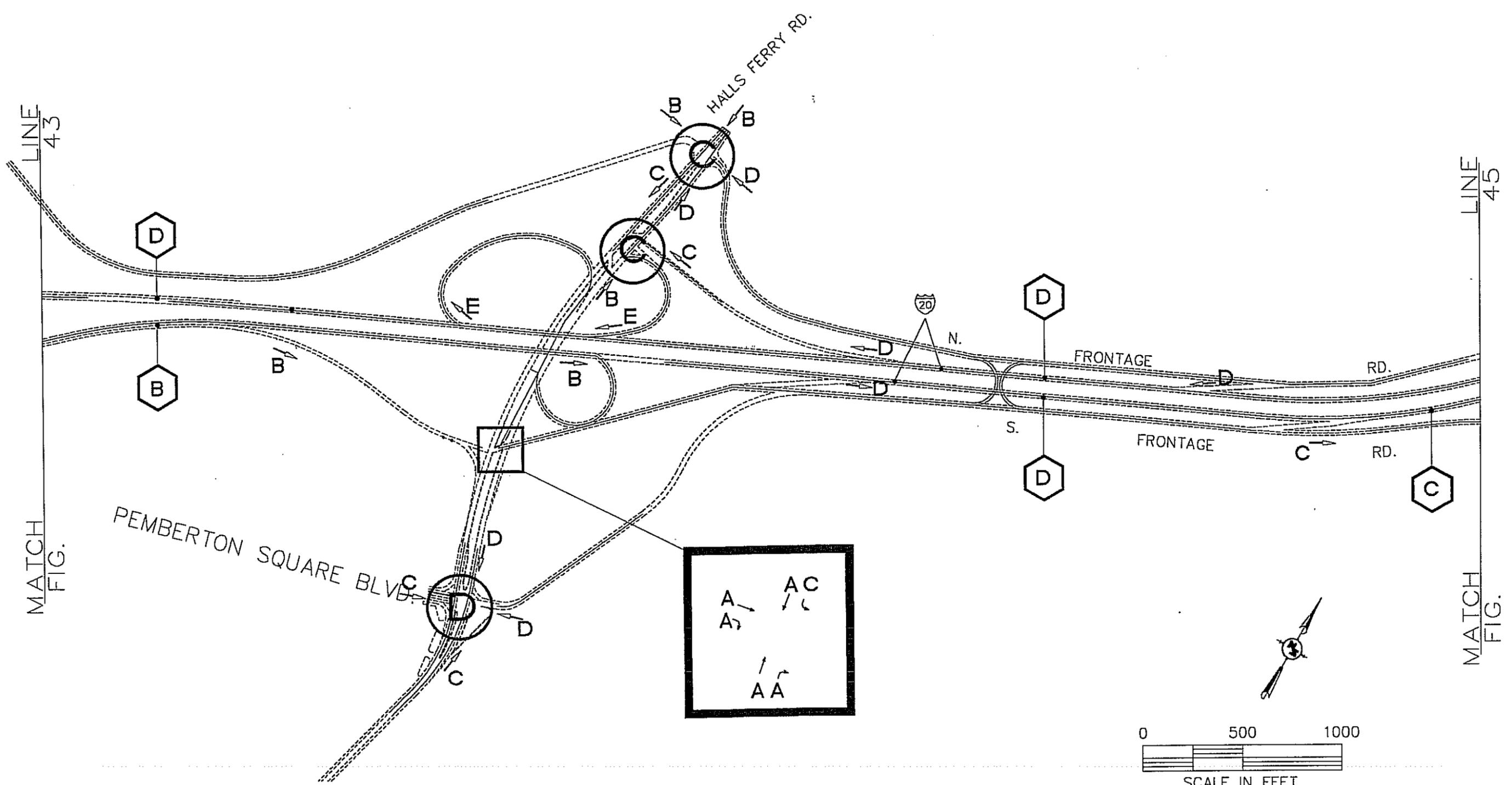


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**FIGURE 43**

276-07\3276-07\1-6-00\1.05

3276-07\3276-07\1-6-00\LOS



LEGEND:



FREWAY SEGMENT  
LEVEL OF SERVICE



SIGNALIZED INTERSECTION  
LEVEL OF SERVICE



WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

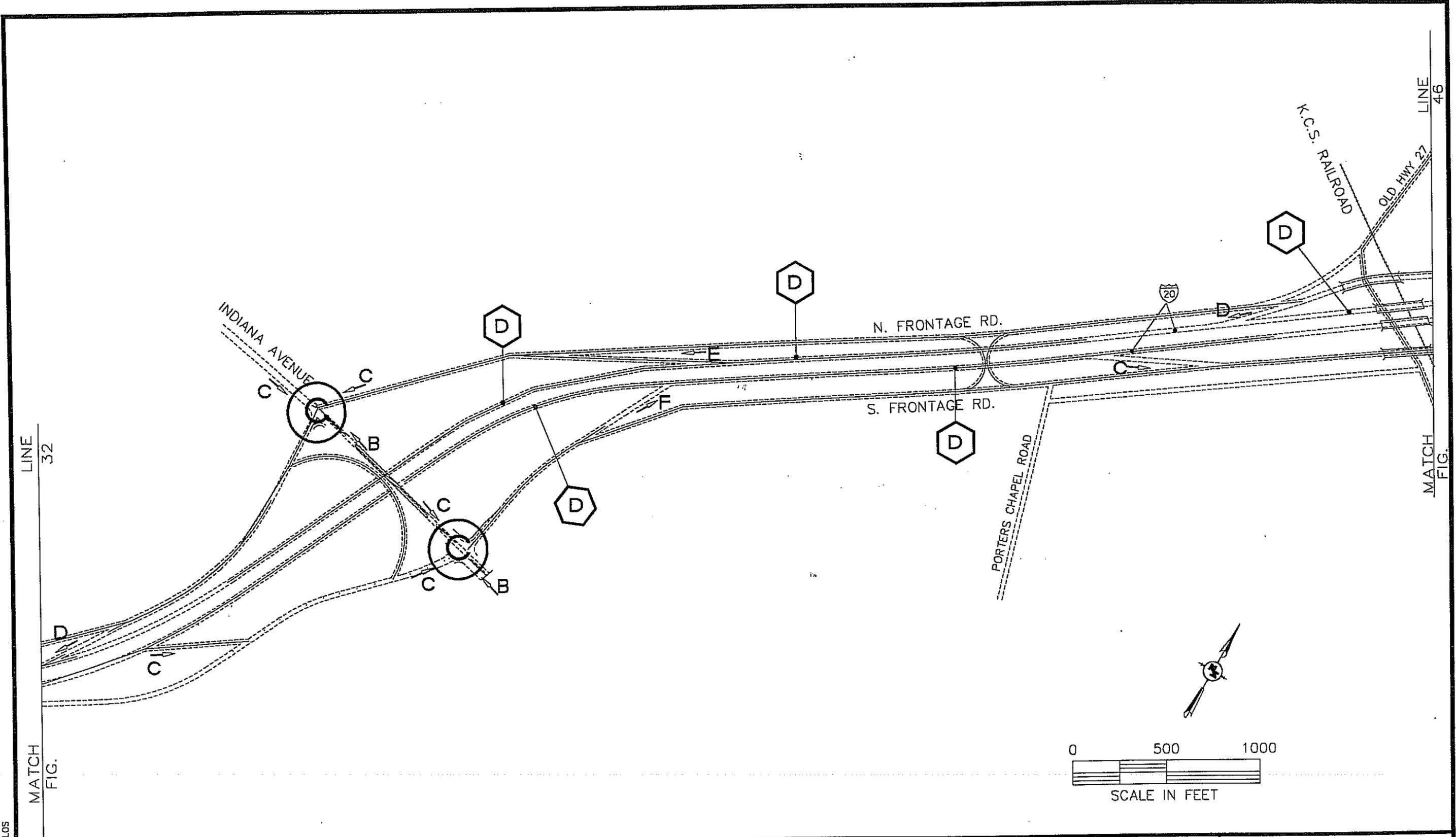
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ALTERNATE 2  
YEAR 2030  
LEVELS OF  
SERVICE

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FIGURE 44



276-07\3276-07\1-6-00\LOS

**LEGEND:**

**(B)** FREEWAY SEGMENT  
LEVEL OF SERVICE

**(A)** SIGNALIZED INTERSECTION  
LEVEL OF SERVICE

**(B)** WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

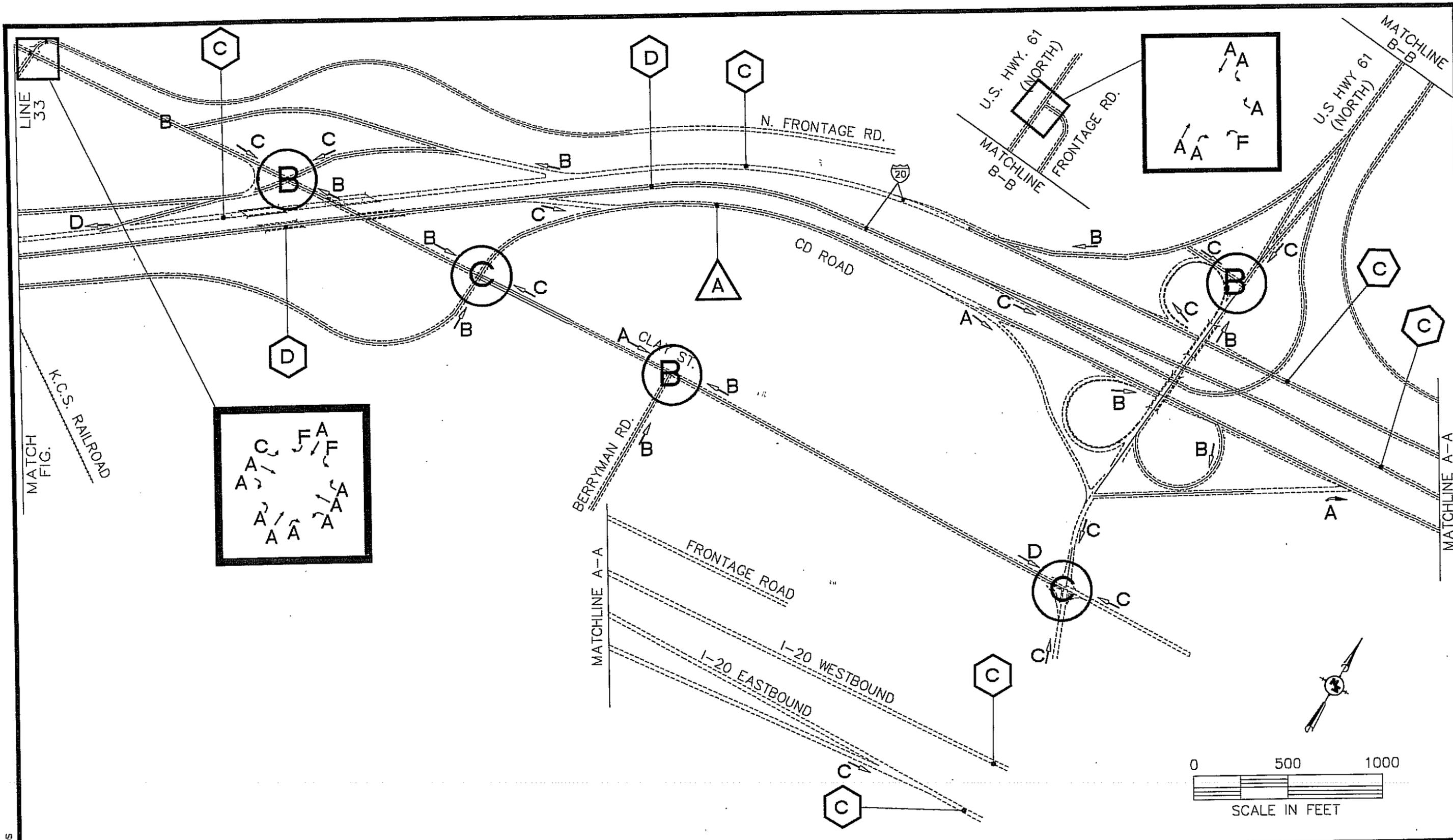
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**ALTERNATE 2  
YEAR 2030  
LEVELS OF  
SERVICE**

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FIGURE 45



76-07\3276-07\1-6-00\LOS

**LEGEND:**

**(B)** FREEWAY SEGMENT LEVEL OF SERVICE

**(A)** SIGNALIZED INTERSECTION LEVEL OF SERVICE

**(B)** WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

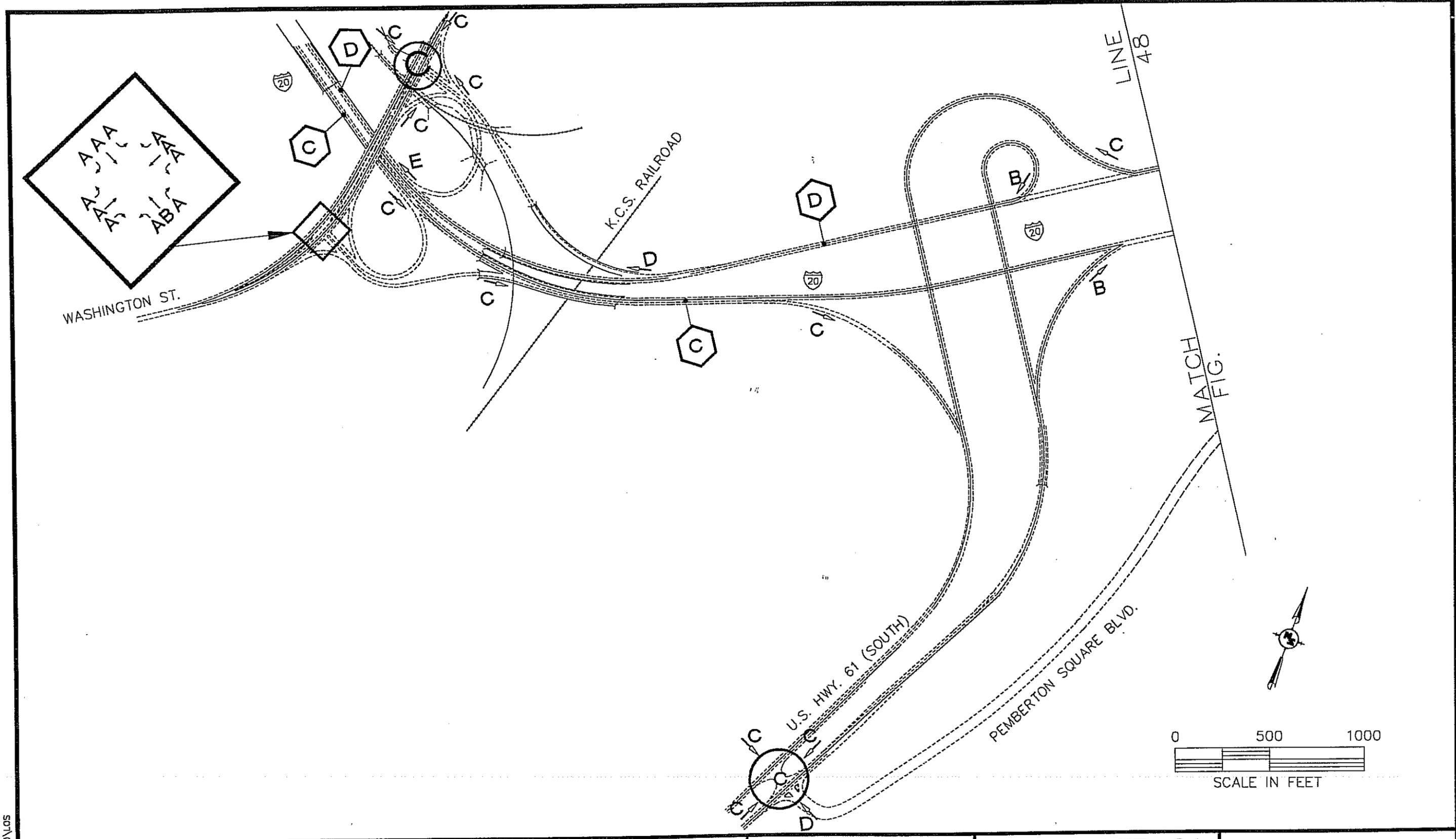
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**ALTERNATE 2  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

**NEEL-SCHAFFER, INC.**  
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**FIGURE 46**



3276-07\3276-07\1-6-00\LOS

**LEGEND:**

**B** (hexagon symbol) FREEWAY SEGMENT  
LEVEL OF SERVICE

**A** (circle symbol) SIGNALIZED INTERSECTION  
LEVEL OF SERVICE

**B** (weaving symbol) WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

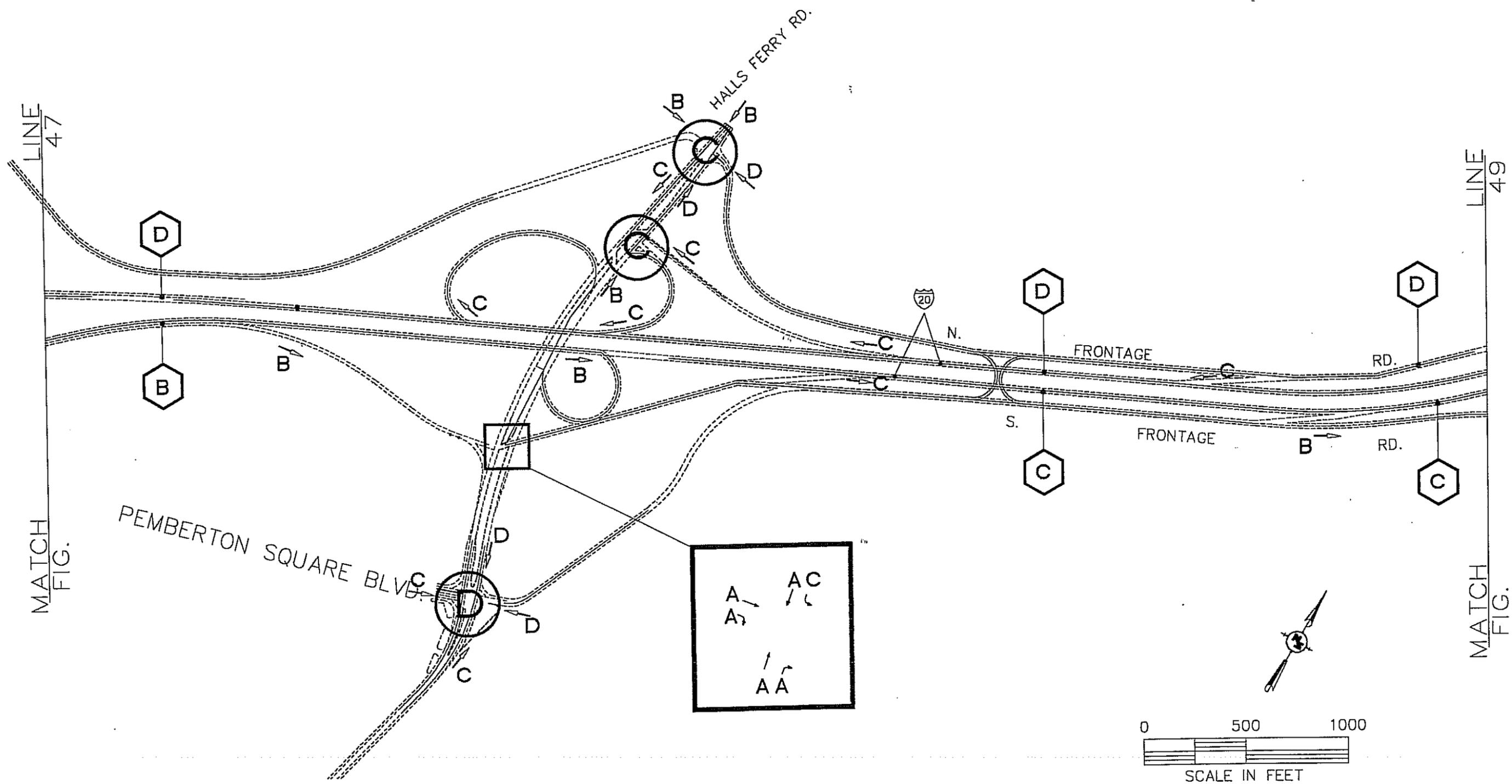
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**ALTERNATE 2A  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
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FIGURE 47



176-07\3276-07\1-6-00\LOS

**LEGEND:**

-  FREEWAY SEGMENT LEVEL OF SERVICE
-  WEAVING OR RAMP JUNCTION LEVEL OF SERVICE
-  SIGNALIZED INTERSECTION LEVEL OF SERVICE

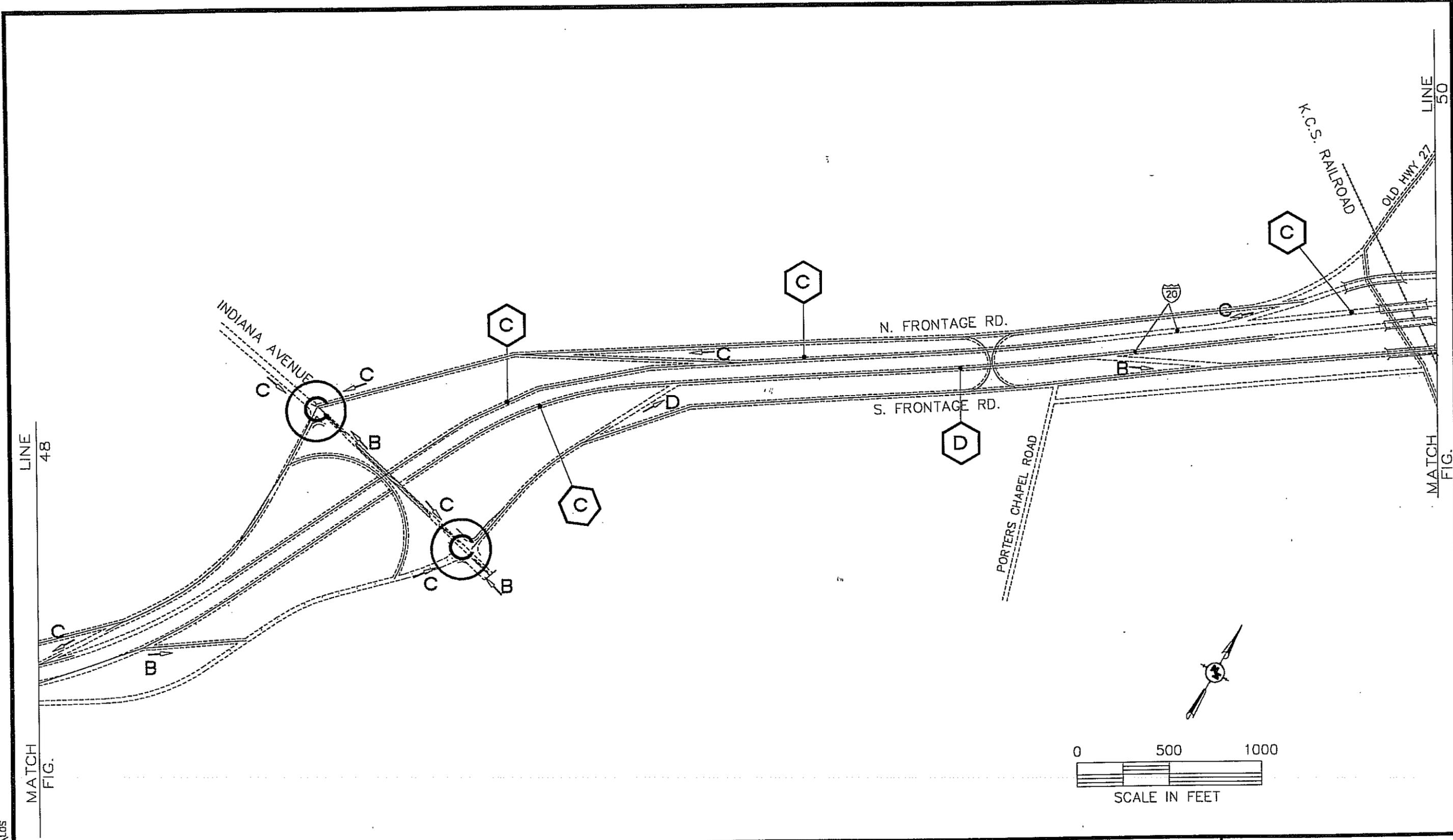
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**ALTERNATE 2A**  
 YEAR 2030  
 LEVELS OF  
 SERVICE

 **NEEL-SCHAFFER, INC.**  
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FIGURE 48



3276-07\3276-07\1-6-00\05

**LEGEND:**



FREEWAY SEGMENT  
LEVEL OF SERVICE



SIGNALIZED INTERSECTION  
LEVEL OF SERVICE



WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

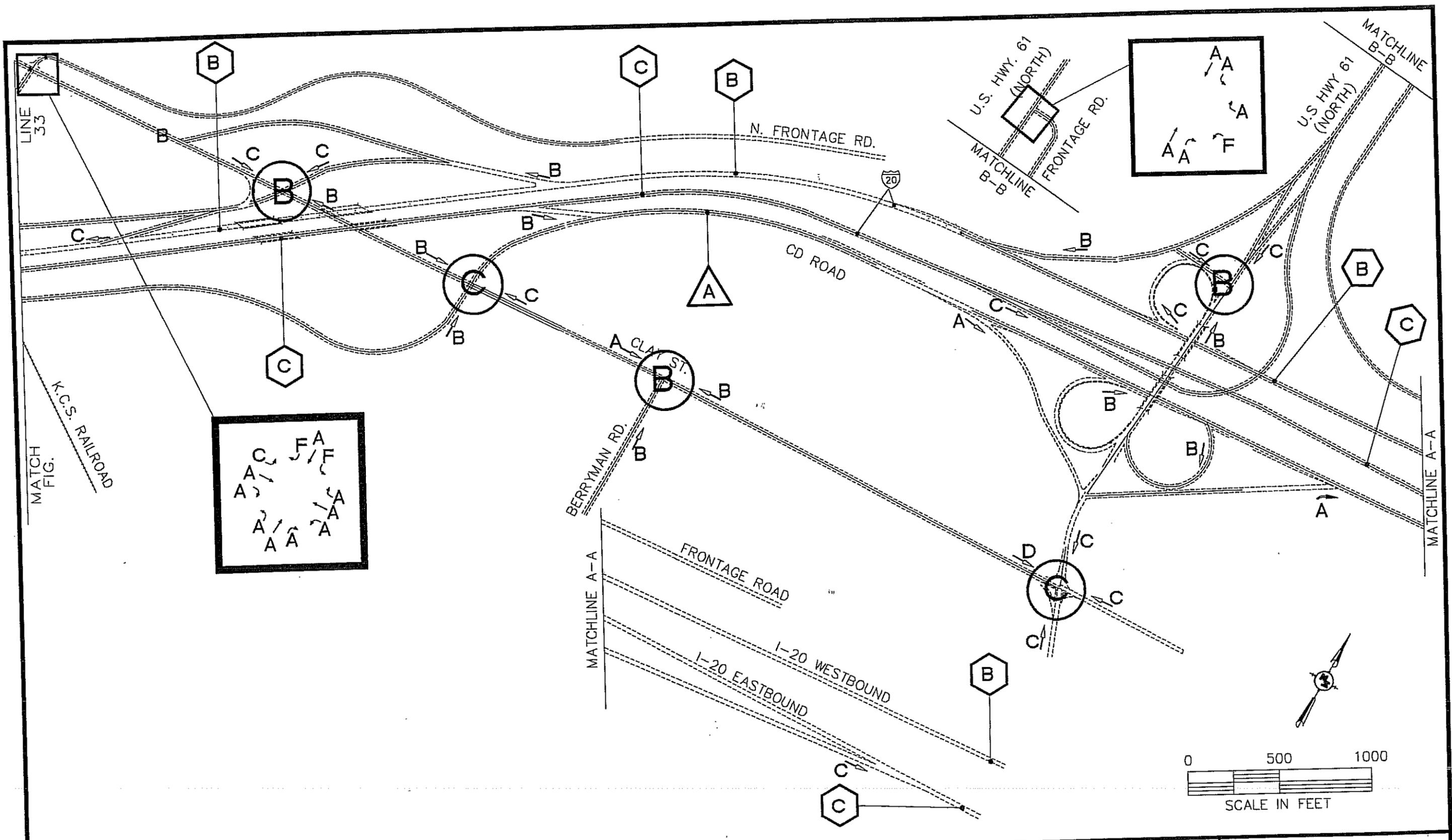
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**ALTERNATE 2A  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
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FIGURE 49



76-07\3276-07\1-6-00\LOS

**LEGEND:**

	FREWAY SEGMENT LEVEL OF SERVICE		SIGNALIZED INTERSECTION LEVEL OF SERVICE
	WEAVING OR RAMP JUNCTION LEVEL OF SERVICE		

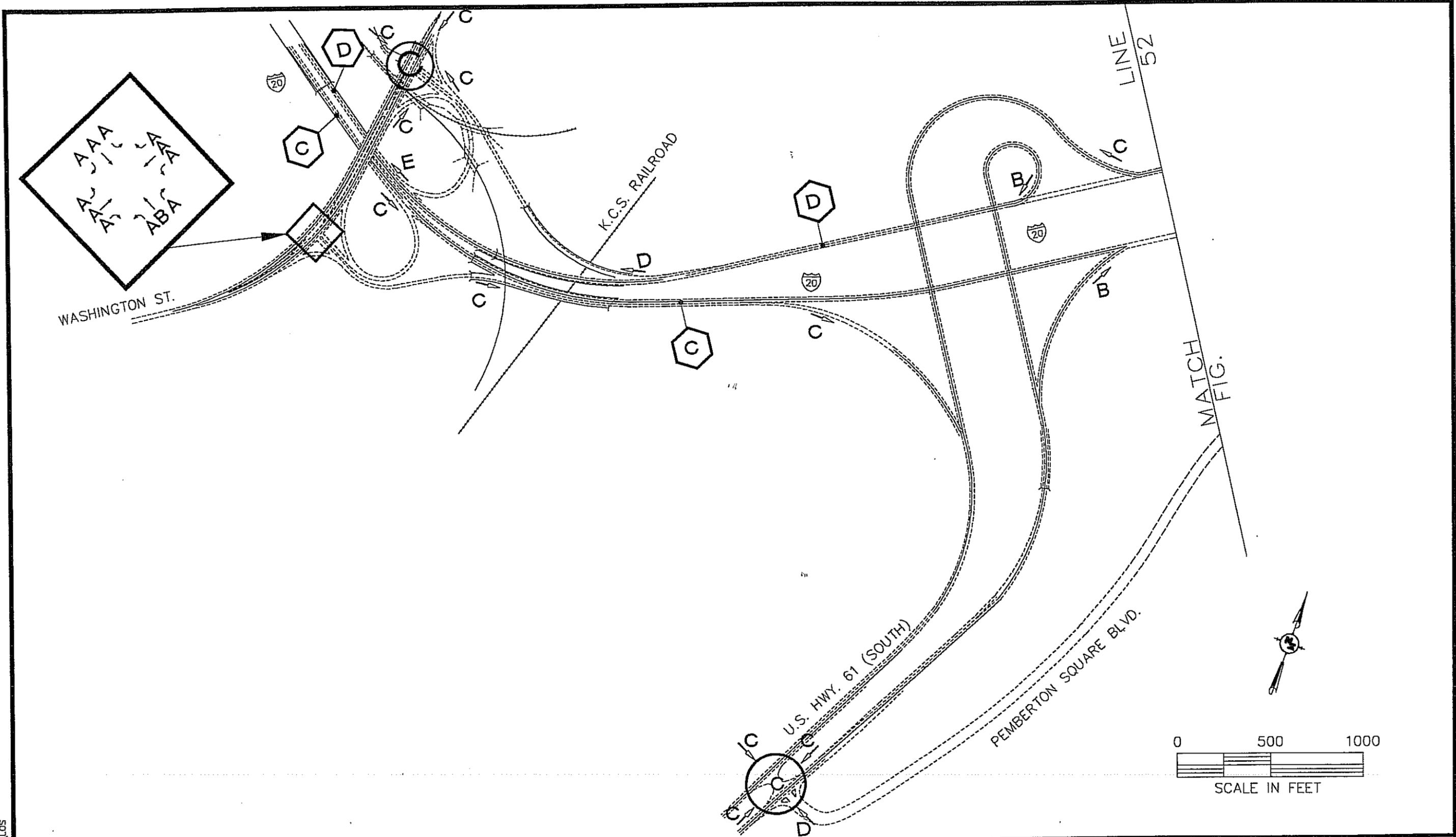
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**ALTERNATE 2A  
 YEAR 2030  
 LEVELS OF  
 SERVICE**



FIGURE 50



1276-07\3276-07\1-6-00\LOS

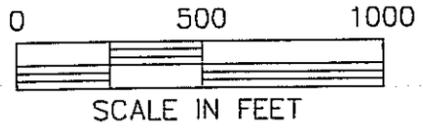
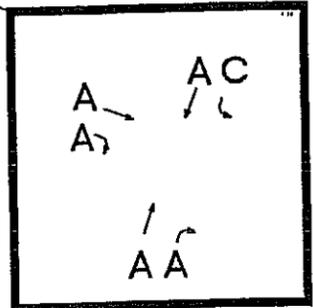
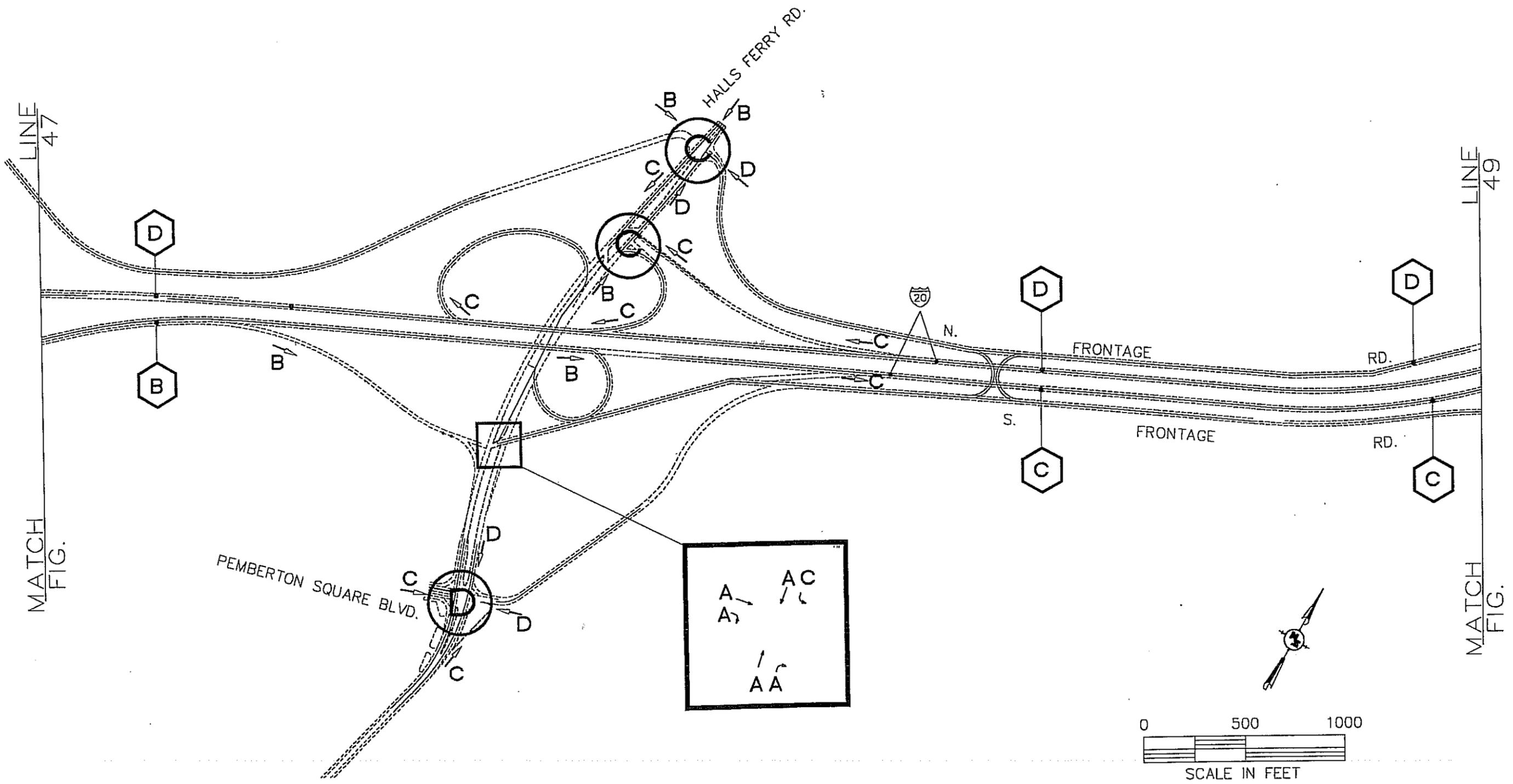
<b>LEGEND:</b>	
	FREWAY SEGMENT LEVEL OF SERVICE
	SIGNALIZED INTERSECTION LEVEL OF SERVICE
	WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

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**ALTERNATE 2B  
 YEAR 2030  
 LEVELS OF  
 SERVICE**





2276-07\3276-07\1-6-00\LOS

**LEGEND:**

- FREEWAY SEGMENT  
LEVEL OF SERVICE
- SIGNALIZED INTERSECTION  
LEVEL OF SERVICE
- WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

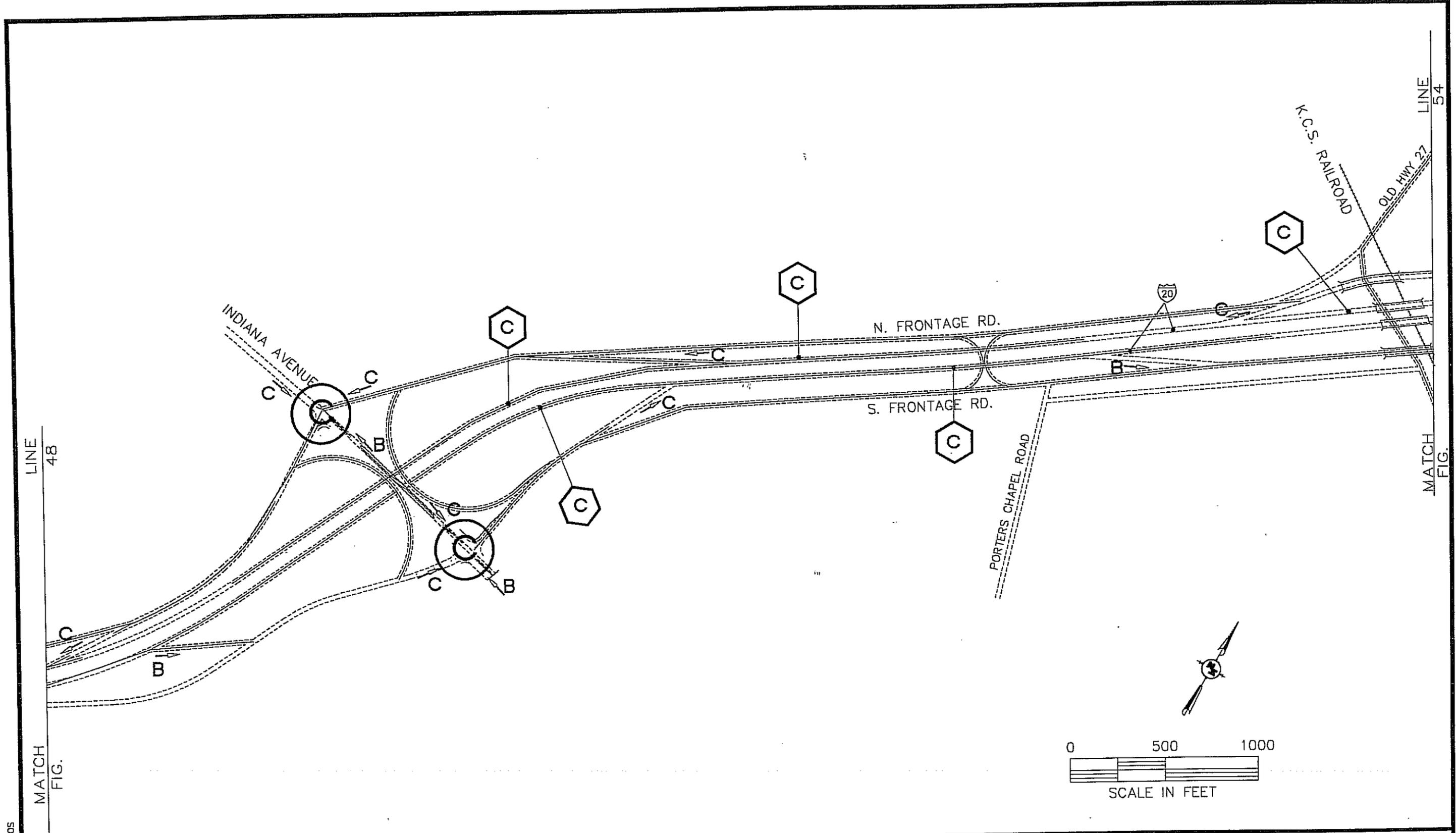
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**ALTERNATE 2B  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

**NEEL-SCHAFFER, INC.**  
 ENGINEERS • PLANNERS  
 Jackson, Mississippi

FIGURE 52



76-07\3276-07\1-6-00\LOS

**LEGEND:**

**(B)** FREEWAY SEGMENT  
LEVEL OF SERVICE

**(A)** SIGNALIZED INTERSECTION  
LEVEL OF SERVICE

**(B)** WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

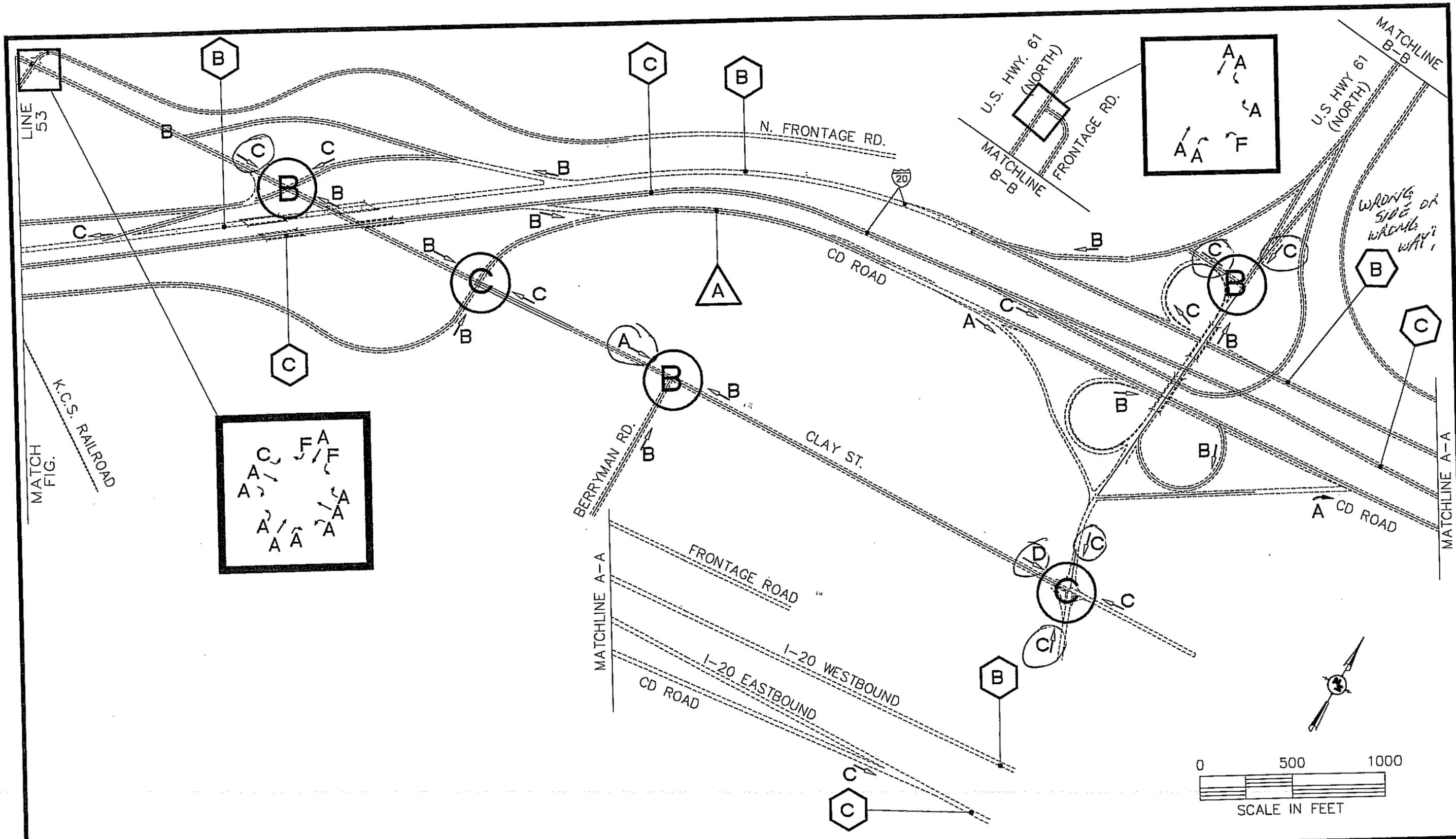
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**ALTERNATE 2B  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
ENGINEERS • PLANNERS  
Jackson, Mississippi

FIGURE 53



176-07\1276-07\1-6-00\LOS

**LEGEND:**



FREEWAY SEGMENT  
LEVEL OF SERVICE



SIGNALIZED INTERSECTION  
LEVEL OF SERVICE



WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

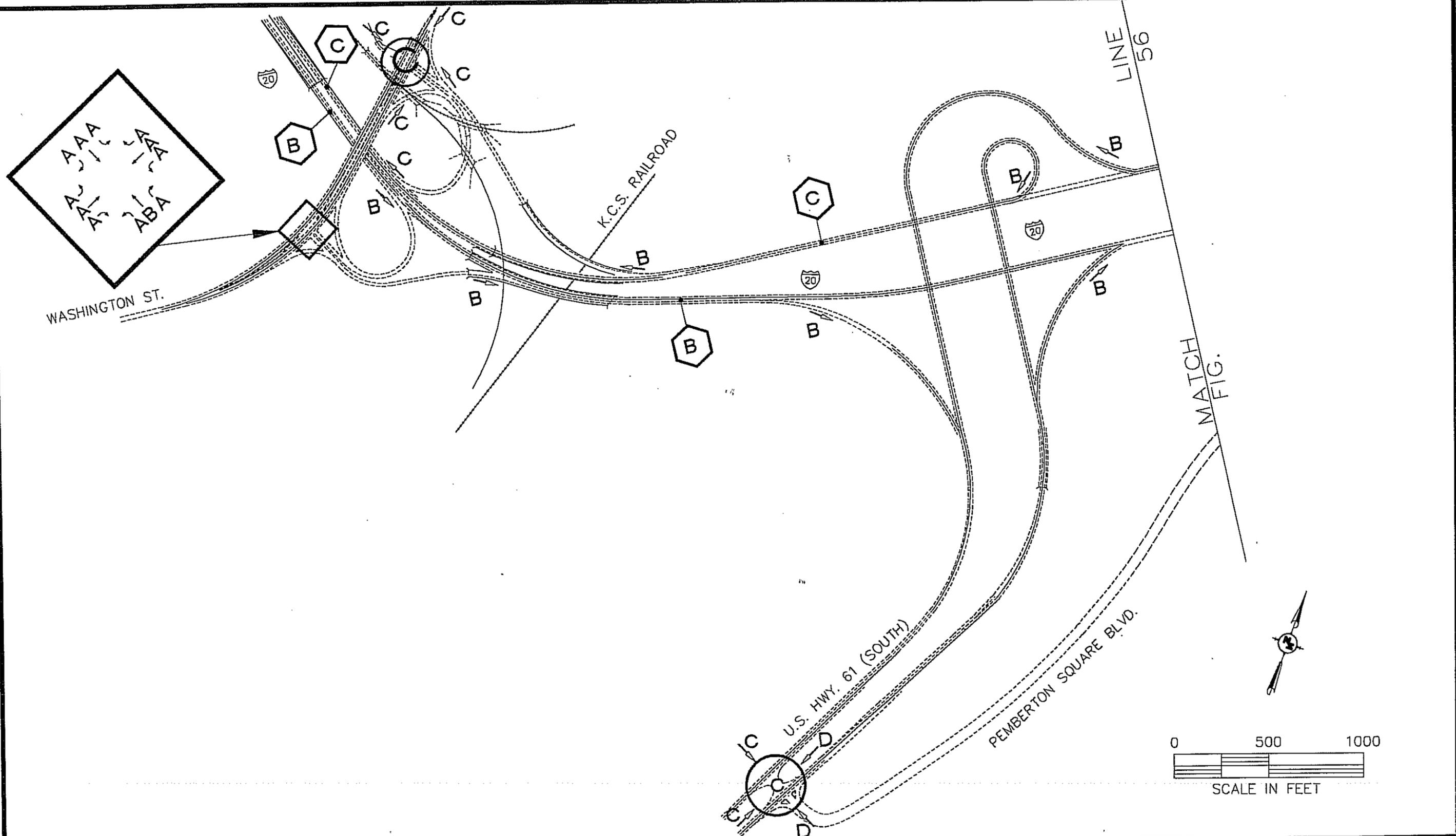
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**ALTERNATE 2B  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
ENGINEERS • PLANNERS  
Jackson, Mississippi

FIGURE 54



3276-07\3276-07\1-6-00\LOS

**LEGEND:**

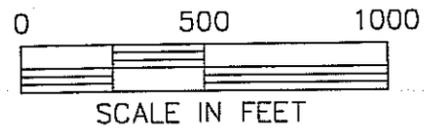
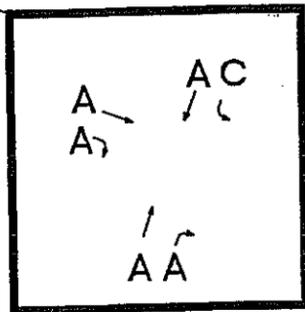
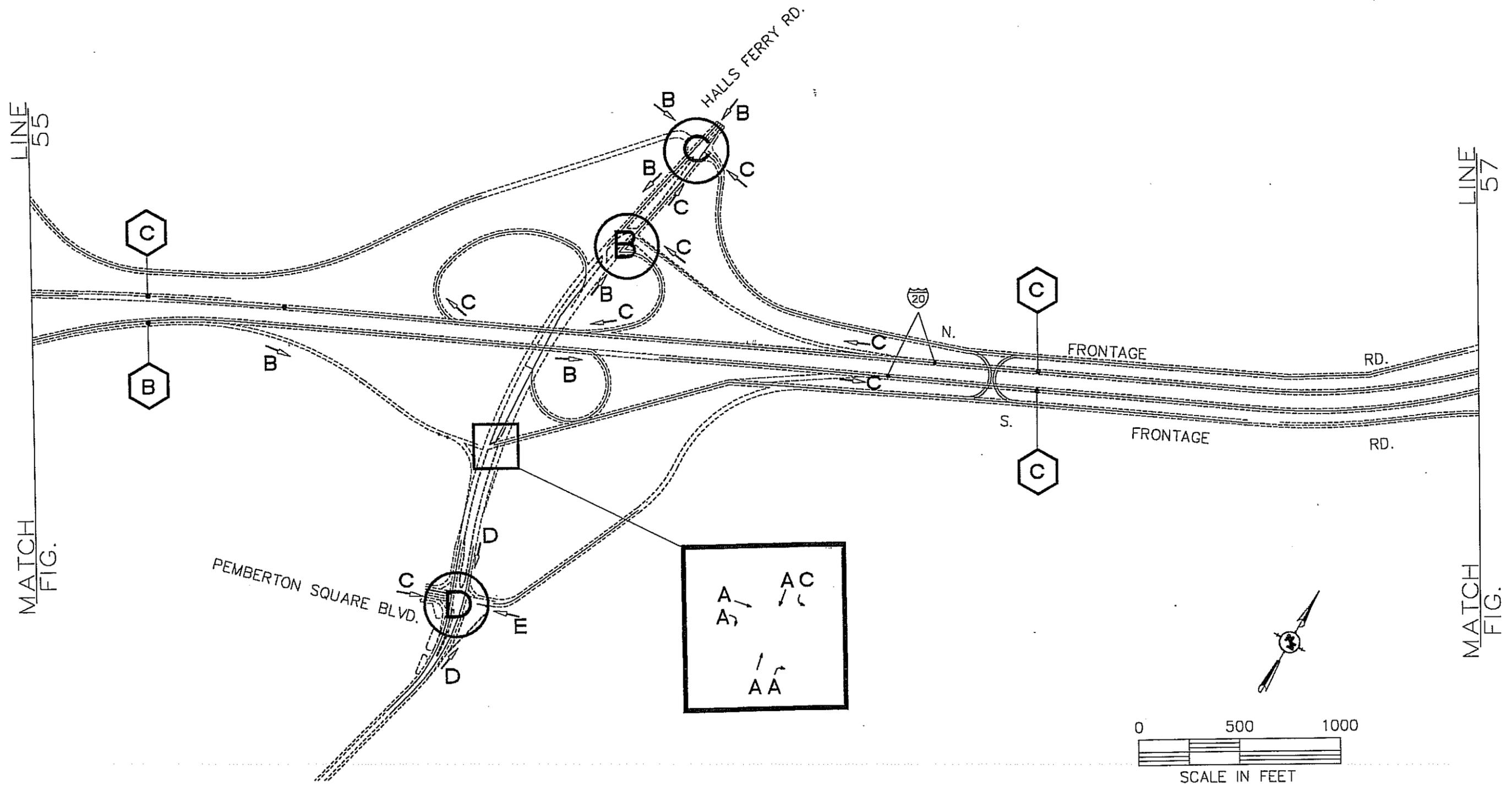
	FREEWAY SEGMENT LEVEL OF SERVICE		SIGNALIZED INTERSECTION LEVEL OF SERVICE
	WEAVING OR RAMP JUNCTION LEVEL OF SERVICE		

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**ALTERNATE 3  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

	<b>NEEL-SCHAFFER, INC.</b> ENGINEERS • PLANNERS Jackson, Mississippi
FIGURE 55	



3276-07\3276-07\1-6-00\LOS

**LEGEND:**



FREWAY SEGMENT  
LEVEL OF SERVICE



SIGNALIZED INTERSECTION  
LEVEL OF SERVICE



WEAVING OR RAMP JUNCTION  
LEVEL OF SERVICE

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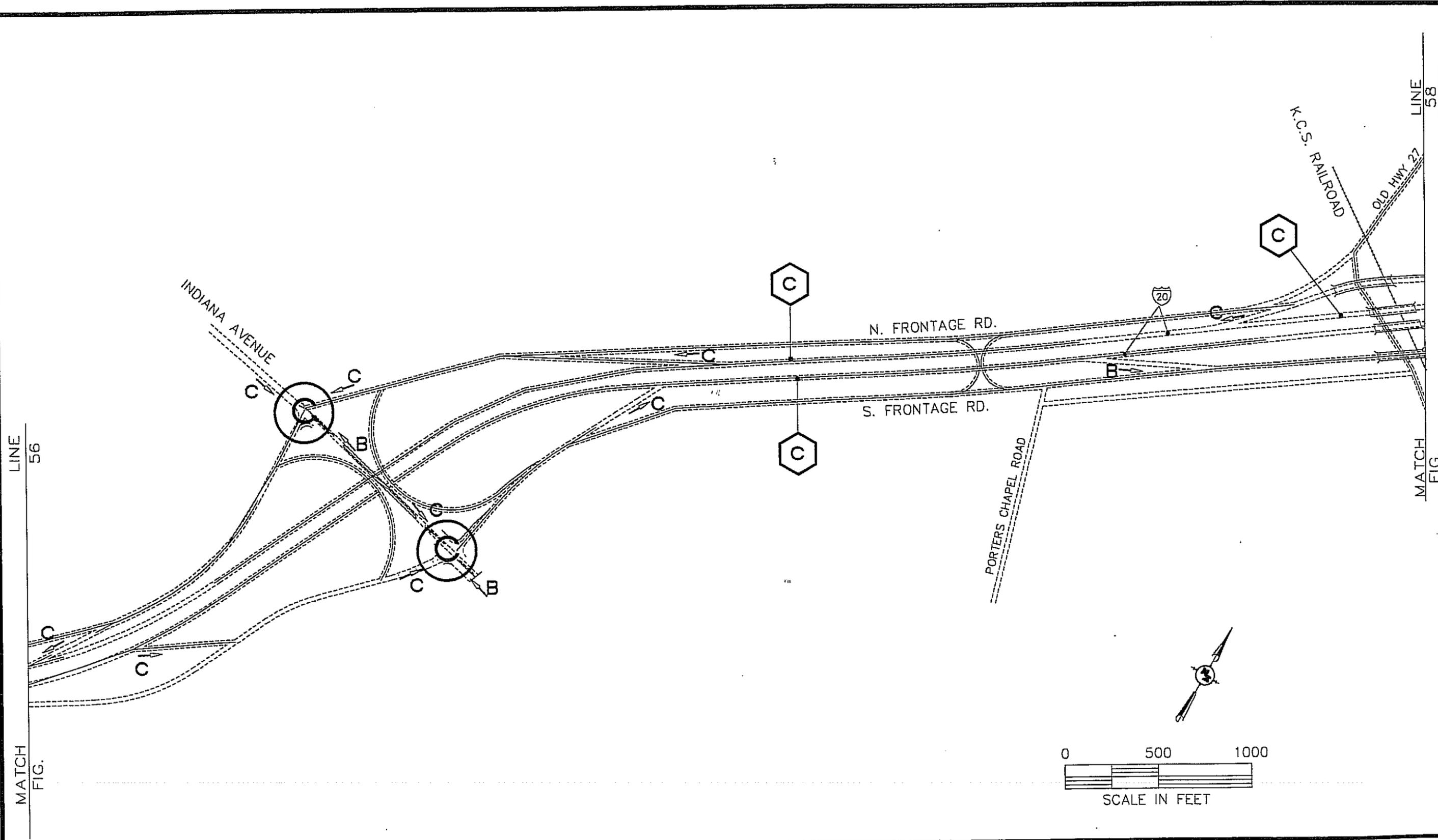
Reconstruction of I-20  
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Project No. 54-0020-01-106-10 P.E.

**ALTERNATE 3  
YEAR 2030  
LEVELS OF  
SERVICE**

**NEEL-SCHAFFER, INC.**  
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Jackson, Mississippi

FIGURE 56

3276-07\3276-07\1-6-00\1.05



**LEGEND:**

-  FREEWAY SEGMENT LEVEL OF SERVICE
-  SIGNALIZED INTERSECTION LEVEL OF SERVICE
-  WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

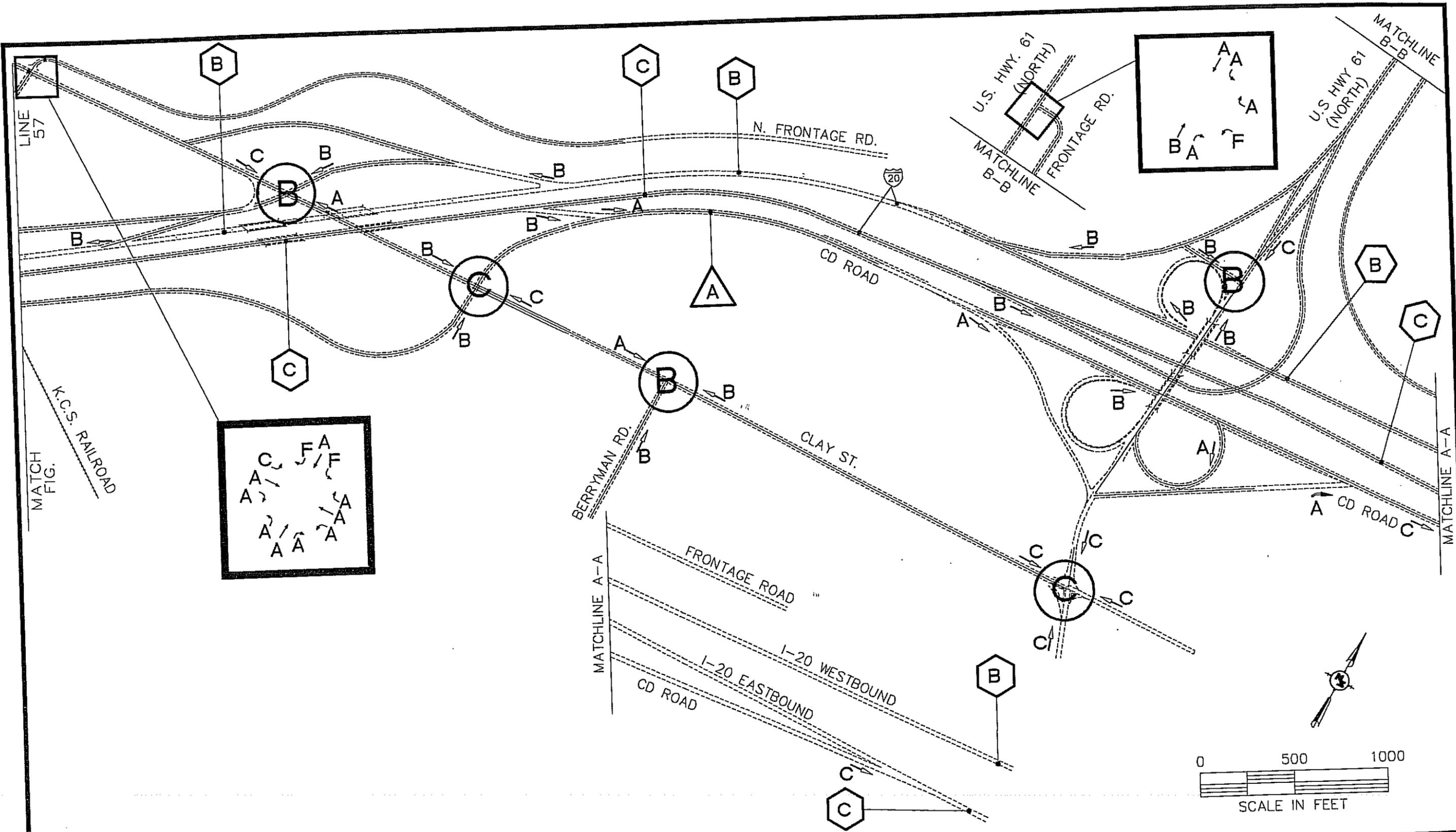
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**ALTERNATE 3  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

 **NEEL-SCHAFFER, INC.**  
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**FIGURE 57**



76-07\3276-07\1-6-00\1.05

**LEGEND:**

**B** FREEWAY SEGMENT LEVEL OF SERVICE

**A** SIGNALIZED INTERSECTION LEVEL OF SERVICE

**B** WEAVING OR RAMP JUNCTION LEVEL OF SERVICE

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**ALTERNATE 3  
 YEAR 2030  
 LEVELS OF  
 SERVICE**

**NEEL-SCHAFFER, INC.**  
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FIGURE 58