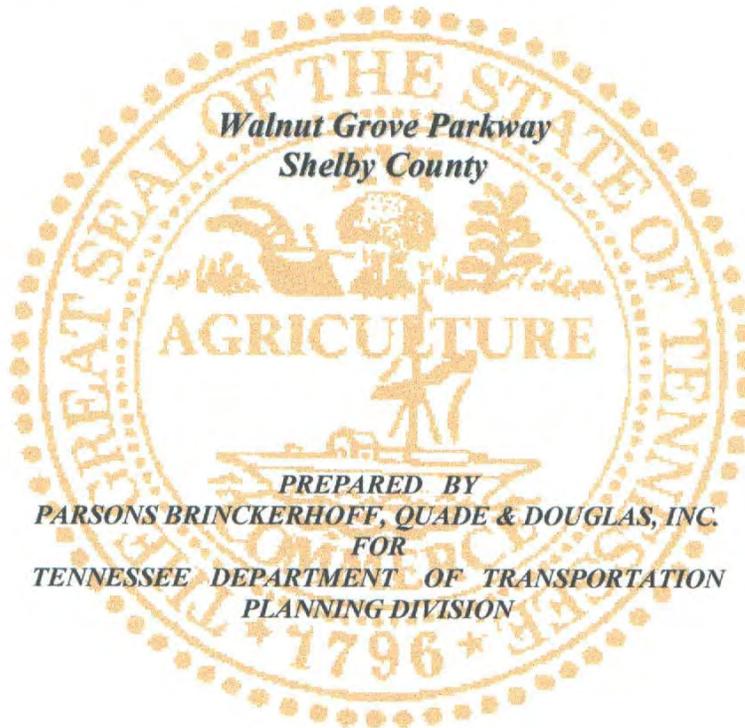


ADVANCE PLANNING REPORT



Approved by: 
Chief Engineer

9/24/02
Date

REVISION

Recommended by:	INITIALS	DATE	Recommended by:	INITIALS	DATE
TRANS. DIRECTOR PLANNING DIVISION	R.E.C.	09/11/02	TRANS. DIRECTOR PLANNING DIVISION		
TRANS. DIRECTOR ENV. PLN. AND PERMITS	JAB	9/11/02	TRANS. DIRECTOR ENV. PLN. AND PERMITS		
ENG. DIRECTOR DESIGN DIVISION	QA	9/16/02	ENG. DIRECTOR DESIGN DIVISION		
ENG. DIRECTOR STRUCTURES DIVISION	EA	9/19/02	ENG. DIRECTOR STRUCTURES DIVISION		
TRANS. DIRECTOR PROG. DEV. DIVISION	JAT	9/23/02	ENG. DIRECTOR PROG. DEV. DIVISION		
ASSISTANT CHIEF ENGINEER	PC	9/24/02	ASSISTANT CHIEF ENGINEER		
ASSISTANT CHIEF ENGINEER	GAZ	9/24/02	ASSISTANT CHIEF ENGINEER		

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Appendix

- A – TDOT Traffic Data and Traffic Analysis
- B – Project Photographs
- C – Meeting Minutes
- D – Comments from Shelby County & City of Memphis
- E – Functional Plans

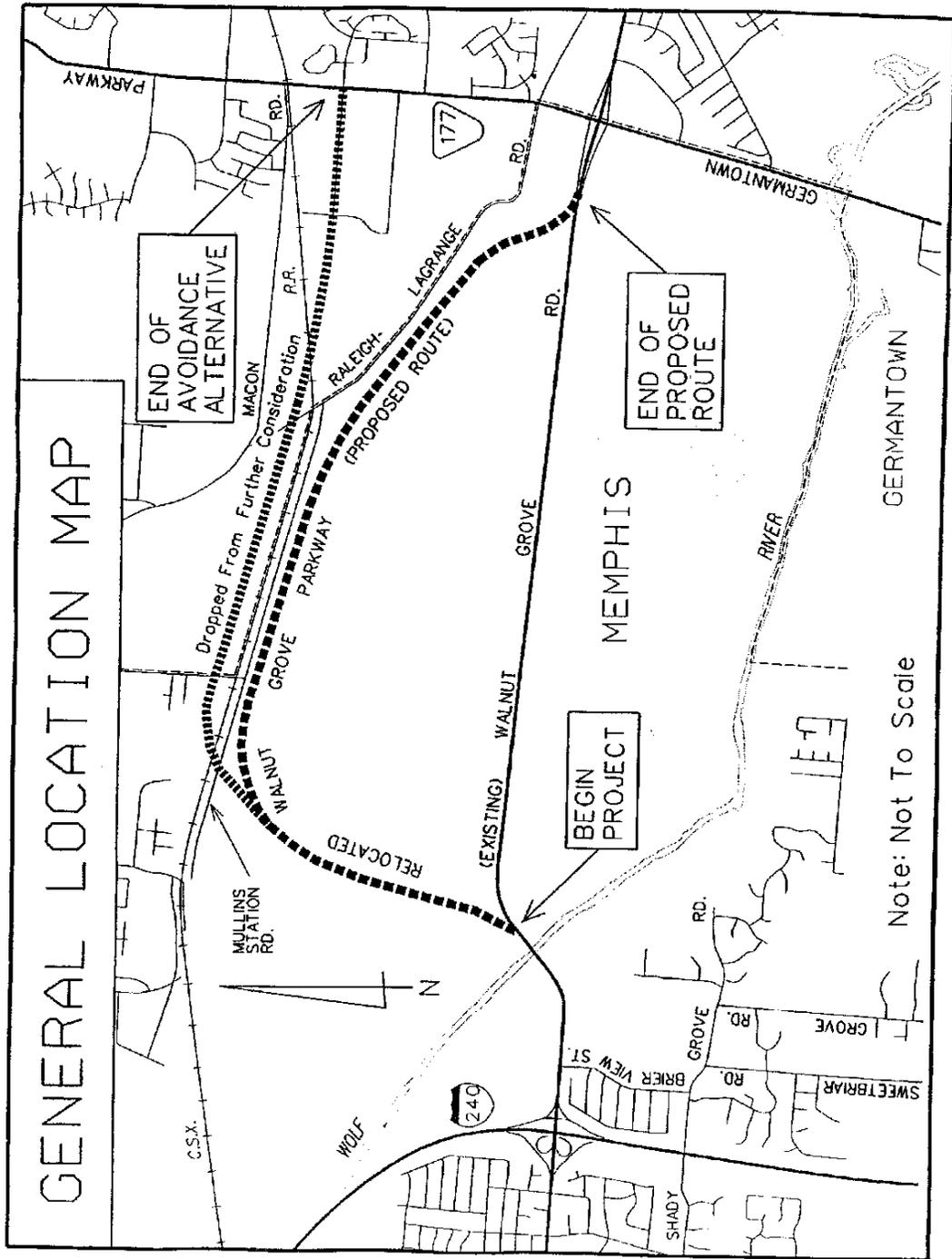
1. PURPOSE & SCOPE OF APR

This APR was initiated in response to a joint letter submitted by the Mayor of Shelby County and the Mayor of Memphis respectively. A copy of this letter is provided in Appendix D “Comments from Shelby County & City of Memphis”.

The purpose of this study is to evaluate existing conditions and determine the need and feasibility of improving the Walnut Grove corridor and relocating to new alignment, located in the City of Memphis (Shelby County). The objectives of the study are to investigate reasonable improvement options, develop recommendations, estimate costs for project implementation, and prepare functional plans.

A project location map was provided in the TDOT public meeting packet and reprinted on the following page. It is also provided in Appendix C “Meeting Minutes”. Alternative “F” below is a conceptual design for which this APR is based and was provided by the City of Memphis and Shelby County as indicated in the joint letter.





2. NEED & PURPOSE OF PROJECT

The following is the Need & Purpose statement for the project written under the direction of Shelby County and the City of Memphis.

The purpose of this project is twofold. The intent is to enhance the transportation network in eastern Shelby County and to consolidate the bulk of the recreational open spaces within Shelby Farms by the relocation of Walnut Grove Road from the mid section of the Farms to its periphery. This proposal is envisioned as a “Parkway” type facility, which is consistent with the master plan for Shelby Farms.

The project will accommodate the proposed continuous north/south vehicular routing of traffic between Humphrey’s Boulevard and Whitten Road (proposed Kirby Parkway north of the Farms). It will also improve the capacity of the Walnut Grove Road segment through Shelby Farms, which is part of a continuous east/west route that stretches from the downtown Memphis area to State Route 385 eastern Shelby County as shown in the Memphis Metropolitan Long Range Transportation Plan. By providing improved access, the new roadway is expected to improve mobility and reduce congestion along existing routes in east Memphis. It will also result in a safer and more efficient roadway system.

The current proposal for the relocation of Walnut Grove Road is the culmination of extensive discussions in Memphis and Shelby County, among local officials and citizens, regarding the future of the Shelby Farms area. This project will result in the physical removal of existing Walnut Grove Road and Farm Road and the construction of an efficient transportation corridor on the eastern and northern boundary of the Farms. The northern and southern halves of the traditional Farms property will then be reunited, and larger areas of open space will be available for recreational use. The removal of the major roadway from the mid section of the Farms will help to enhance the recreational visitor experience.

3. DEFICIENCIES OF EXISTING CONDITIONS

Geometrics _____ Structures _____ Operational X RR Crossing X
Accident Rate: N/A

Statewide Average Rate: N/A (New Alignment)

Other

The existing Walnut Grove Road does not provide enough capacity for current traffic conditions. Significant peak period delays occur predominantly around the signalized intersection with Farm Road. PM peak hour queues have been observed to stretch back to the Humphrey’s Blvd location. Farm Road has significant congestion and delays during both peak periods.

The Walnut Grove at Humphrey’s Blvd intersection is to be reconstructed as a single-point urban interchange. This will require the reconstruction of the bridge over the Wolf River and the addition of ramps for traffic movements to Humphrey’s Blvd. This project will encroach upon the existing road and at a minimum; some reconstruction will be required to tie-in that project.

4. PROPOSED IMPROVEMENTS

SECTION 1-Wolf River Bridge to Sycamore View Road

Section 1 begins just east of the Wolf River Bridge (STA. 100+00) tying to the planned design improvements for the Humphrey's Blvd @ Walnut Grove Road constructed by others. This section runs northeast of the existing Walnut Grove Road along new alignment 4400 ft to Sycamore View Road (STA. 144+00) where a single-point (Urban) Interchange will be constructed along with the Sycamore View Road extension.

SECTION 2-Sycamore View Road to Kirby-Whitten

Section 2 begins at the Sycamore View Road Single Point Interchange (STA. 144+00) and runs approximately 4000 ft to the Kirby-Whitten Interchange (STA. 184+00). Kirby-Whitten is proposed to be a 7-lane section and would be constructed by others.

SECTION 3-Kirby-Whitten to Appling Road

Section 3 begins at the Kirby-Whitten Interchange (STA. 184+00) and runs east along the existing route of Mullins Station Road to the proposed Appling Interchange approximately 5200 ft (STA. 236+00).

SECTION 4-Appling Road to Germantown Parkway

Section 4 runs 9900 ft from Appling Road (236+00) to the existing interchange at Germantown Parkway (STA. 335+00). The alignment tracts Mullins Station Road and turns southeast running parallel to an improved Raleigh-Lagrange Road before turning east to tie in at Germantown Parkway. This section will impact Section 4(F) resources and will require the filling in of one lake.

Sycamore View Road

Sycamore View Road will be 1.6 miles on new Alignment and Extension from 325' south of Longline Road to Farm Road (STA. 130+00 measured along Walnut Grove Parkway centerline). The interchange data is included with the Walnut Grove Parkway section 1 & 2. Construction of this section will clean up the intersection with Mullins Station Road and provide a link to the Parkway and trailhead to the Farms. This extension will eliminate Farm Road. The typical section was set in a 114' minimum ROW. This allows for 88' of pavement with curb & gutters and 5' sidewalks on both sides. Shelby County provided the ROW and pavement dimensions for Sycamore View Road.

Raleigh-LaGrange Road & Appling Connection

The typical section for Raleigh-LaGrange Road is based on 108' of ROW. This includes 84' of pavement, curb & gutter and sidewalks on both sides. The Appling tie-in shares the same typical section as Sycamore View Road: 114' minimum ROW. This allows for 88' of pavement with curb & gutters and 5' sidewalks. Shelby County provided the ROW and pavement dimensions for Raleigh-LaGrange and Appling were provided by Shelby County. The Appling tie-in will integrate with the new single-point urban interchange and run north linking to the Appling extension project by others. Raleigh LaGrange Road will be reconstructed from the Mullins Station/CSX railroad intersection

northbound to tie in to Appling. The tie-in to Appling is shown on functional plan sheet 8 and the tie-in to at Mullins Station Road is shown on sheets 8A and 9. This project assumes that additional reconstruction of Raleigh LaGrange Road from Mullins Station Road south then southeast (running parallel to much of Walnut Grove Parkway) to Germantown Parkway will be by others.

Table 1. DATA TABLE
Walnut Grove Parkway

<u>Item</u>	<u>Existing</u> Walnut Grove Road From Wolf River to Germantown Pkwy	<u>Proposed Section 1</u> Walnut Grove Parkway from the Wolf River Bridge (STA. 100+00) to the intersection with Sycamore View Road (STA. 144+00)
Functional Class	N/A	Urban Major Arterial
System Class	N/A	STP
Approximate Length (Miles)	N/A	0.83
Cross Section (Feet)	N/A	72'-96'/144'/250'
Base Year ADT (2006)	N/A	53,390
Projected Design ADT (2026)	N/A	96,110
DHV (2026)	N/A	9,611
Percent Trucks	N/A	3(ADT),2(DHV)
Estimated Right-Of-Way Acquisition (Acres)	-	30.77
Estimated Right-Of-Way Tracts Affected	1	1
Estimated Family Displacements	-	0
Estimated Business Displacements	-	0
Estimated Non-Profit Displacements	-	0
Estimated Right-Of-Way Cost	(\$338,000) ¹	\$153,850 ¹
Estimated Utility Cost Reimbursable	-	\$60,000
Estimated Utility Cost Non- Reimbursable	-	\$240,000
Estimated Construction Cost	-	\$7,347,000
Estimated Engineering Cost	-	\$640,000
Total Estimated Section Cost	(\$338,000)	\$8,440,850

Notes:

1. ROW costs are estimated at \$5,000 per acre. This is for planning only. A certified appraiser must determine actual costs.

Table 1. DATA TABLE
Walnut Grove Parkway-Continued

<u>Item</u>	<u>Proposed Section 2</u> Walnut Grove Parkway from Sycamore View Road Intersection (STA. 144+00) to Kirby-Whitten Parkway Intersection (STA. 184+00)	<u>Proposed Section 3</u> Walnut Grove Parkway from Kirby- Whitten Parkway Intersection (STA. 184+00) to Appling Road (STA. 236+00)
Functional Class	Urban Major Arterial	Urban Major Arterial
System Class	STP	STP
Approximate Length (Miles)	0.91	0.83
Cross Section (Feet)	72'-96'/144'/250'	72'-96'/144'/250'
Base Year ADT (2006)	51,660	36,510
Projected Design ADT (2026)	92,990	65,720
DHV (2026)	9,299	6,572
Percent Trucks	3(ADT),2(DHV)	4(ADT), 2(DHV)
Estimated Right-Of-Way Acquisition (Acres)	36.58	30.96
Estimated Right-Of-Way Tracts Affected	1 ¹	1 ¹
Estimated Family Displacements	0	0
Estimated Business Displacements	0	0
Estimated Non-Profit Displacements	0	0
Estimated Right-Of-Way Cost	\$182,900 ²	\$154,800 ²
Estimated Utility Cost Reimbursable	\$39,000	\$201,000
Estimated Utility Cost Non- Reimbursable	\$240,000	\$201,000
Estimated Construction Cost	\$5,588,000	\$6,641,000
Estimated Engineering Cost	\$486,000	\$578,000
Total Estimated Section Cost	\$6,535,900	\$7,775,800

Note:

1. Same tract as in Section 1.
2. ROW costs are estimated at \$5,000 per acre. This is for planning only. A certified appraiser must determine actual costs.

Table 1. DATA TABLE
Walnut Grove Parkway-Continued

<u>Item</u>	<u>Proposed Section 4</u> Walnut Grove Parkway from Appling Road (STA. 236+00) to Germantown Parkway (STA. 335+00)	<u>Proposed Total</u> Walnut Grove Parkway from Wolf River Bridge (STA. 100+00 to Germantown Parkway (STA.335+00)
Functional Class	Urban Major Arterial	Urban Major Arterial
System Class	STP	STP
Approximate Length (Miles)	1.88	4.31
Cross Section (Feet)	72'-96'/144'/250'	72'-96'/144'/250'
Base Year ADT (2006)	28,870	39,875 (Wt. Avg.)
Projected Design ADT (2026)	51,960	71,775 (Wt. Avg.)
DHV (2026)	5,196	7,177
Percent Trucks	4(ADT), 2(DHV)	4(ADT), 2(DHV)
Estimated Right-Of-Way Acquisition (Acres)	52.35	150.66 ⁴
Estimated Right-Of-Way Tracts Affected	1 ¹	1 ¹
Estimated Family Displacements	0	0
Estimated Business Displacements	0	0
Estimated Non-Profit Displacements	0	0
Estimated Right-Of-Way Cost	\$261,750	\$415,300
Estimated Utility Cost Reimbursable	\$80,000	\$380,000
Estimated Utility Cost Non- Reimbursable	\$497,000	\$1,178,000
Estimated Construction Cost	\$6,014,000	\$25,590,000
Estimated Engineering Cost	\$523,000	\$2,227,000 ⁵
Total Estimated Section Cost	\$7,375,750	\$29,790,300 ⁶

Notes:

1. Same tract as in Section 1.
2. ROW costs are estimated at \$5,000 per acre. This is for planning only. A certified appraiser must determine actual costs.
4. 67.6 Acres returned to Shelby Farms.
5. 10% is based on ROW costs for 150.66 Acres without reductions for 67.6 Ac returned to Shelby Farms.
6. The costs to remove existing roadbed of Walnut Grove Road has not been estimated

Table 2. DATA TABLE
Sycamore View Road

<u>Item</u>	<u>Existing Section</u> None Existing	<u>Proposed Section</u> 1.6 mile new Alignment and Extension from 325' south of Longline Road to Walnut Grove Pkwy Interchange (STA. 130+00). Interchange Estimates included in Walnut Grove Parkway Section
Functional Class	N/A	Collector
System Class	N/A	
Approximate Length (Miles)	N/A	1.69
Cross Section (Feet)	N/A	88'/114' ¹
Base Year ADT (2006)	N/A	5,650
Projected Design ADT (2026)	N/A	10,170
DHV (2026)	N/A	1,017
Percent Trucks	N/A	4(ADT), 2(DHV)
Estimated Right-Of-Way Acquisition (Acres)	-	19.10
Estimated Right-Of-Way Tracts Affected	-	2
Estimated Family Displacements	-	0
Estimated Business Displacements	-	0
Estimated Non-Profit Displacements	-	0
Estimated Right-Of-Way Cost	-	\$286,500 ²
Estimated Utility Cost Reimbursable	-	\$53,000
Estimated Utility Cost Non- Reimbursable	-	\$210,000
Estimated Construction Cost	-	\$6,275,000
Estimated Engineering Cost (10% Const +ROW)	-	\$546,000
Total Estimated Section Cost	-	\$7,370,500 ³

Notes:

1. Three 12' lanes in each direction with 8' paved shoulder curb & gutter and sidewalks on both sides inside 114' ROW.
2. ROW costs are estimated at \$15,000 per acre. This is for planning only. A certified appraiser must determine actual costs.

Table 3. DATA TABLE
Raleigh-Lagrange Realignment

<u>Item</u>	<u>Existing Section</u> None Existing	<u>Proposed Section</u> From Appling Extension by Others to CSX Railroad Crossing and Mullins Station Road (STA. 315+00)
Functional Class	N/A	Collector
System Class	N/A	
Approximate Length (Miles)	N/A	0.84
Cross Section (Feet)	N/A	84'/108' ¹
Base Year ADT (2006)	N/A	10,470
Projected Design ADT (2026)	N/A	18,850
DHV (2026)	N/A	1,885
Percent Trucks	N/A	5(ADT), 2(DHV)
Estimated Right-Of-Way Acquisition (Acres)	-	3.63
Estimated Right-Of-Way Tracts Affected	-	18
Estimated Family Displacements	-	0
Estimated Business Displacements	-	0
Estimated Non-Profit Displacements	-	0
Estimated Right-Of-Way Cost	-	\$108,900 ²
Estimated Utility Cost Reimbursable	-	\$20,000
Estimated Utility Cost Non- Reimbursable	-	\$100,000
Estimated Construction Cost	-	\$3,157,000
Estimated Engineering Cost (10% Const +ROW)	-	\$274,000
Total Estimated Section Cost	-	\$3,659,900

Notes:

1. Six 12' lanes with 6' paved shoulder, curb & gutter and sidewalks inside 108' ROW.
2. ROW costs are estimated at \$30,000 per acre. This is for planning only. A certified appraiser must determine actual costs.

5. CAPACITY ANALYSIS

A capacity analysis was conducted to determine the level of service that can be anticipated from the proposed construction. TDOT provided all traffic data presented in Appendix A. The build year is 2006 with the design year set for 2026. Three major elements were analyzed for this project and they include:

- Basic Freeway Sections (Table 4)
- Ramp Merge & Diverge (Table 5)
- Weaving (Tables 6-7)

Table 4. 2026 Basic Freeway Section LOS

Segment	S(in)	1	2	3	4	S(out)
ADT	111480	96110	92990	62720	51960	48980
DHV	11148	9611	9299	6272	5196	4898
DD	6689	5767	5579	3763	3118	2939
HCS File	Sin.hcf	S1b.hcf	S2b.hcf	S3b.hcf	S4.hcf	Sout.hcf
# of Lanes	4	4	4	4	3	2
LOS	D	D	D	C	C	D
Density (pc/mi/ln)	32.6	27.8	26.9	18.1	20.6	27.6
Speed	58.5	58.5	58.5	58.5	57.0	60.0
Flow Rates (pc/h/ln)	1886	1626	1573	1061	1172	1657

S(in) = West terminus to Humphrey's Blvd.

1 = Humphrey's Blvd to Sycamore View Road

3 = Kirby-Whitten Blvd to Appling

5 = Germantown Pkwy to East terminus

2 = Sycamore View Road to Kirby-Whitten Blvd

4 = Appling to Germantown Pkwy

HCS File = Included with supporting documents

of Lanes = Includes auxiliary lanes in section 1,2 and 3

Table 5. 2026 Weave Analysis

Location	LOS	D	S _w	cb	HCS File
Sycamore On-Whitten/Kirby Off	E	37.91	41.48	7244	syc_whitten_pm
Whitten On-Appling Off	C	26.17	46.10	7348	Whitten_app_pm

D = Density, pc/mi/ln

S_w = Weaving Segment Speed

cb = Capacity for base condition, pc/h

HCS Files are included with supporting documents. Extension is *.hcf

Table 6. 2026 Ramp Diverge Analysis

Location	LOS	D	S _R	S _O	S	HCS File
Sycamore View EB	C	24.7	52.0	59.7	54.5	sycamore_div_e
Sycamore View WB	D	Ex. 25-4	52.0	60.1	54.8	sycamore_div_w
Kirby-Whitten EB	B	17.4	48.0	61.3	52.2	whitten_div_e
Kirby-Whitten WB	C	20.9	51.0	64.0	55.0	whitten_div_w
Appling EB	C	23.2	50.0	65.0	53.0	Appling_div_e
Appling WB	B	16.8	51.0	65.8	54.7	Appling_div_w
Germantown EB	C	25.5	51.0	65.8	54.2	Germantown_div_e

D = Density, pc/mi/ln

S_R = Speed on ramp at diverge location

S_O = Speed of mainline at diverge location

HCS Files are included with supporting documents. Extension is *.hcr

Table 7. 2026 Ramp Merge Analysis

Location	LOS	D	S _R	S _O	S	HCS File
Sycamore View EB	F	37.2	43.6	58.2	45.4	sycamore_merge_e
Sycamore View WB	C	26.3	54.0	51.7	53.0	sycamore_merge_w
Kirby-Whitten EB	C	22.5	55.3	58.1	55.9	whitten_merge_e
Kirby-Whitten WB	F	32.5	48.9	56.4	50.5	whitten_merge_w
Appling EB	B	14.6	56.7	57.8	57.0	Appling_merge_e
Appling WB	C	21.3	55.5	57.9	56.1	Appling_merge_w
Germantown EB	B	14.2	56.7	58.3	57.2	Germantown_merge_w

D = Density, pc/mi/ln

S_R = Speed on ramp at diverge location

S_O = Speed of mainline at diverge location

HCS Files are included with supporting documents. Extension is *.hcr

6. ENVIRONMENTAL CONSIDERATIONS

While detailed environmental technical studies were not prepared for this project, visual observations were conducted to identify environmentally sensitive areas for historic, archaeological, ecological, and hazardous materials considerations. Section 4(f) resources were identified during previous environmental assessment work and noted on the current functional plans. These resources include the Arboretum and Plough Park (functional plan sheets 7-9). These areas are discussed further in **Section 8.**

7. DISPOSITION OF EXISTING ROUTE

The existing route for Walnut Grove Road will be removed between the STA. 100+00 (See functional plan sheets 3,12-17) to 328+00 (measured along Walnut Grove Parkway centerline) at the eastern end of the project. A separate roadway network pending development will handle access to internal park facilities. Access to Ducks Unlimited will be directed to Germantown Parkway south of the Walnut Grove interchange (Sheet 17A). The removal of the existing Walnut Grove roadbed will result in the return of 67.6 acres of former ROW to Shelby Farms.

Existing Mullins Station Road will be removed from approximately STA. 181+00 (measured along Walnut Grove Parkway centerline) to 245+00. The western terminus would be stopped after the last driveway (Sheet 6). The eastern terminus can be expanded and developed as a parking facility and access to the Shelby Farms area (Sheet 9). The existing intersection of Mullins Station Road at Whitten Road would be replaced by the proposed interchange between Walnut Grove Road and the proposed Kirby-Whitten Parkway.

The existing sweeping curve movement of **Sycamore View Road** to Mullins Station Road will be removed and replaced with an intersection more closely representing a 90 degree intersection. Sycamore View Road is programmed for 114 ft ROW and 94 ft of pavement. ROW in addition to Shelby Farms will be required north of Mullins Station Road

The existing Raleigh-Lagrange Road section running north 1500 ft from Mullins Station Road and will be removed and replaced with the new alignment for the road which ties to the proposed Appling extension (Sheet 8, 8A).

The existing CSX railroad tracks will remain in place and any proposed crossing will happen at-grade.

8. AVOIDANCE ALTERNATEIVE

Section 4(f) resources will be impacted as a result of the proposed alignment for the Walnut Grove Parkway. The identified resources include: Plough Park and the Arboretum. The resources run along the northern perimeter just south of Mullins Station Road. In order to avoid this area the proposed alignment would shift to the north of the CSX railroad tracks. This crossing would be grade separated. Due to physical constraints the alignment could not cross back and tie into the existing Germantown Parkway interchange with Walnut Grove Road. The alignment would continue east and tie in the Germantown Parkway at a new location. Traffic wanting to continue on

to Walnut Grove Road west of Germantown Parkway must travel south on Germantown Parkway and make a left onto the exigent Walnut Grove Road.

An avoidance alternative is not a viable alternative if it does not meet all of the objectives of the need and purpose. Since the avoidance alternative shown **does not meet the need and purpose** in that it did not provide for effective east-west traffic movement it was removed from further consideration.

The avoidance alternative alignment is shown on the General Location Map presented at the Public Meeting held March 26, 2002. Since the alignment option was dropped no cost data was calculated. However, it was estimated that this alignment would result in impacts to 69 tracts with approximately 21 residential and 16 business displacements.

9. FIELD INVESTIGATIONS AND MEETINGS

Several field reviews were specifically conducted for this project. The dates and attendees are listed below. There was also a meeting held at TDOT in Nashville, TN. Its roster is also included.

November 25, 2001

Brad Winkler, Parsons Brinckerhoff

November 29, 2001

Bob Baker, Parsons Brinckerhoff

Becky Headrick, Parsons Brinckerhoff

December 19, 2001, Field Review with TDOT

Tom Ibrahim, TDOT, Planning Division

Charlie Graves, TDOT, Functional Design

Jim Hatmaker, TDOT, Environmental Planning

Burt Hutchins, TDOT, Region 4

James Sumler, TDOT, Region 4

Gary Fottrell, FHWA

Wain Gaskins, City of Memphis

Ted Fox, Shelby County

Brad Winkler, Parsons Brinckerhoff

Bob Baker, Parsons Brinckerhoff

Nancy Skinner, Parsons Brinckerhoff

January 4, 2002, TDOT Follow-Up Meeting

Dennis Cook, TDOT

Jerry Morehead, TDOT

Bill Hart, TDOT

Tom Ibrahim, TDOT, Planning Division

Charlie Graves, TDOT, Functional Design

Jim Bryson, TDOT

Jim Hatmaker, TDOT, Environmental Planning

Gary Fottrell, FHWA

Mark Doctor, FHWA

Wain Gaskins, City of Memphis

Ted Fox, Shelby County

Michael Oakes, Shelby County

Brad Winkler, Parsons Brinckerhoff

Bob Baker, Parsons Brinckerhoff

Nancy Skinner, Parsons Brinckerhoff

March 8, 2002, TDOT Pre-Public Meeting

Jerry Morehead, TDOT

Bill Hart, TDOT

Tom Ibrahim, TDOT, Planning Division

Charlie Graves, TDOT, Functional Design

Jim Bryson, TDOT

Dudley E. Daniel, Functional Design

Wain Gaskins, City of Memphis

John Conroy, City of Memphis

Ted Fox, Shelby County

Michael Oakes, Shelby County

Brad Winkler, Parsons Brinckerhoff
Bob Baker, Parsons Brinckerhoff

Susan Thrasher, Parsons Brinckerhoff

March 26, 2002, Public Information Meeting

Bill Hart, TDOT
Tom Ibrahim, TDOT, Planning Division
Charlie Graves, TDOT, Functional Design
Dudley Daniel, TDOT, Functional Design
Wain Gaskins, City of Memphis
Ted Fox, Shelby County

Dudley Daniel, TDOT
Brad Winkler, Parsons Brinckerhoff
Bob Baker, Parsons Brinckerhoff
Nancy Skinner, Parsons Brinckerhoff
Susan Thrasher, Parsons Brinckerhoff

TABLE 8. CHECKLIST OF DETERMINANTS FOR LOCATION STUDY
Walnut Grove Parkway

If preliminary field reviews indicate the presence of any of the following facilities or ESE categories, place an "X" in the blank opposite the item. Where more than one alternative is to be considered, place its letter designation in the blank.

1.	Agricultural land usage				<u>X</u>
2.	Airport (existing or proposed)				<u> </u>
3.	Commercial area, shopping center				<u> </u>
4.	Floodplains				<u>X</u>
5.	Forested land				<u>X</u>
6.	Historical, archaeological, cultural, or natural landmark, or cemeteries				<u>X</u>
7.	Industrial park, factory				<u>X</u>
8.	Institutionnel usage				
a.	School or other educational institution				<u>X</u>
b.	Church or other religious institution				<u>X</u>
c.	Hospital or other medical facility				<u>X</u>
d.	Public building, e.g., fire station				<u>X</u>
e.	Defense installation				<u> </u>
9.	Recreational usage's				
a.	Park or recreational area, State Natural Area				<u>X</u>
b.	Wildlife refuge or wildlife management area				<u>X</u>
10.	Residential establishment				<u>X</u>
11.	Urban area, town, city, or community				<u>X</u>
12.	Waterway, lake, pond, river, stream, spring, wetland				<u>X</u>
	Coast Guard	<u>X</u>	Section 404	<u>X</u>	Section 10
	TVA Section 26a review			<u>X</u>	NPDES
	Aquatic Resource Alteration Permit				<u>X</u>
	Class V Injection Wells				<u> </u>
13.	Location coordinated with local officials				<u>X</u>
14.	Railroad Crossings				<u>X</u>
15.	Hazardous Material Site				<u>X</u>

TABLE 9. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE	WALNUT GROVE	ALTERNATE	N/A	SECTION	1
REGION	4	COUNTY	SHELBY	PROJECT NO.	
LOCATION:	FROM: WOLF RIVER BRIDGE (STA. 100+00)				
TO:	SYCAMORE VIEW ROAD INTERCHANGE (144+00)				
2006	ADT				53,390
2026	ADT				96,110
PERCENT TRUCKS					3(ADT), 2(DHV)
DHV (2026)					9,611
FUNCTIONAL CLASSIFICATION					URBAN MAJOR ARTERIAL
MINIMUM DESIGN SPEED					60 MPH
ACCESS CONTROL					FULL ACCESS CONTROL
MAXIMUM DEGREE OF CURVATURE					3 ^o 45' @ MAX 0.08 SE (R _{min} =1528')
MAXIMUM GRADE					6%
MINIMUM STOPPING SIGHT DISTANCE					525-650
SURFACE WIDTH					2@36'/48'
NUMBER OF LANES					8 (6 BASIC LANES & 2 AUX)
USEABLE SHOULDER WIDTH					2@12' WITH 10' STABILIZED
MEDIAN WIDTH					72' DEPRESSED
MINIMUM RIGHT-OF-WAY					250' *
SIGNALIZATION					SIGNAL CONTROLLED GRADE SEPARATED INTERSECTION WALNUT GROVE PARKWAY IS MAINLINE SYCAMORE VIEW RD SIGNAL CONTROLLED
REMARKS:	* EASEMENTS MAY BE REQUIRED OUTSIDE RIGHT-OF-WAY.				

TABLE 10. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE	WALNUT GROVE	ALTERNATE	N/A	SECTION	2
REGION	4	COUNTY	SHELBY	PROJECT NO.	
LOCATION:	FROM: SYCAMORE VIEW RD GRADE SEPARATION (STA. 144+00)				
TO:	KIRBY-WHITTEN PARKWAY GRADE SEPARATION (STA. 192+00)				
2006	ADT				51,660
2026	ADT				92,990
PERCENT TRUCKS					3(ADT), 2(DHV)
DHV (2026)					9,299
FUNCTIONAL CLASSIFICATION					URBAN MAJOR ARTERIAL
MINIMUM DESIGN SPEED					60 MPH
ACCESS CONTROL					FULL ACCESS CONTROL
MAXIMUM DEGREE OF CURVATURE					3 ⁰ 45' @ MAX 0.08 SE (R _{min} =1528')
MAXIMUM GRADE					6%
MINIMUM STOPPING SIGHT DISTANCE					525-650
SURFACE WIDTH					2@36'/48'
NUMBER OF LANES					8 (6 BASIC LANES & 2 AUX)
USEABLE SHOULDER WIDTH					2@12' WITH 10' STABILIZED
MEDIAN WIDTH					72' DEPRESSED
MINIMUM RIGHT-OF-WAY					250' *
SIGNALIZATION					SIGNAL CONTROLLED GRADE SEPARATED INTERSECTION WALNUT GROVE PARKWAY IS MAINLINE KIRBY-WHITTEN RD SIGNAL CONTROLLED
REMARKS:	* EASEMENTS MAY BE REQUIRED OUTSIDE RIGHT-OF-WAY.				

TABLE 11. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE WALNUT GROVE ALTERNATE N/A SECTION 3
REGION 4 COUNTY SHELBY PROJECT NO. _____

LOCATION: FROM: KIRBY-WHITTEN RD GRADE SEPARATION (STA. 192+00)
TO: APPLING ROAD GRADE SEPARATION (STA. 236+00)

2006	ADT	36,510
2026	ADT	65,720
PERCENT TRUCKS		4(ADT), 2(DHV)
DHV (2026)		6,572
FUNCTIONAL CLASSIFICATION		URBAN MAJOR ARTERIAL
MINIMUM DESIGN SPEED		60 MPH
ACCESS CONTROL		FULL ACCESS CONTROL
MAXIMUM DEGREE OF CURVATURE		3 ⁰ 45' @ MAX 0.08 SE (R _{min} =1528')
MAXIMUM GRADE		6%
MINIMUM STOPPING SIGHT DISTANCE		525-650
SURFACE WIDTH		2@36'/48'
NUMBER OF LANES		8 (6 BASIC LANES & 2 AUX)
USEABLE SHOULDER WIDTH		2@12' WITH 10' STABILIZED
MEDIAN WIDTH		72' DEPRESSED
MINIMUM RIGHT-OF-WAY		250' *
SIGNALIZATION		SIGNAL CONTROLLED GRADE SEPARATED INTERSECTION WALNUT GROVE PARKWAY IS MAINLINE APPLING RD SIGNAL CONTROLLED

REMARKS: * EASEMENTS MAY BE REQUIRED OUTSIDE RIGHT-OF-WAY.

TABLE 12. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE WALNUT GROVE ALTERNATE N/A SECTION 4
REGION 4 COUNTY SHELBY PROJECT NO. _____

LOCATION: FROM: APPLING ROAD GRADE SEPARATION (STA. 236+00)
TO: GERMANTOWN PARKWAY GRADE SEPARATION TIE-IN (STA. 328+00)

2006	ADT	28,870
2026	ADT	51,960
PERCENT TRUCKS		4(ADT), 2(DHV)
DHV (2026)		6,572
FUNCTIONAL CLASSIFICATION		URBAN MAJOR ARTERIAL
MINIMUM DESIGN SPEED		60 MPH
ACCESS CONTROL		FULL
MAXIMUM DEGREE OF CURVATURE		3 ⁰ 45' @ MAX 0.08 SE (R _{min} =1528')
MAXIMUM GRADE		6%
MINIMUM STOPPING SIGHT DISTANCE		525-650
SURFACE WIDTH		2@36'
NUMBER OF LANES		6
USEABLE SHOULDER WIDTH		2@12' WITH 10' STABILIZED
MEDIAN WIDTH		72' DEPRESSED
MINIMUM RIGHT-OF-WAY		250' *
SIGNALIZATION		EXISTING SIGNAL CONTROLLED GRADE SEPARATED INTERSECTION WALNUT GROVE GERMANTOWN PKWY SIGNAL CONTROLLED

REMARKS: * EASEMENTS WILL BE REQUIRED OUTSIDE RIGHT-OF-WAY.

TABLE 13. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE	SYCAMORE VIEW ROAD	ALTERNATE	N/A	SECTION	ALL
REGION	4	COUNTY	SHELBY	PROJECT NO.	
LOCATION:	FROM: 325' south of Longline Road				
TO:	Interchange @ STA. 130+00 Walnut Grove Road				
2006	ADT			5,650	
2026	ADT			10,170	
PERCENT TRUCKS				4(ADT), 2(DHV)	
DHV (2026)				1,017	
FUNCTIONAL CLASSIFICATION				Urban Collector	
MINIMUM DESIGN SPEED				40 MPH	
ACCESS CONTROL				NONE	
MAXIMUM DEGREE OF CURVATURE				10° /(0.4 SE)	
MAXIMUM GRADE				8%	
MINIMUM STOPPING SIGHT DISTANCE				275'-325'	
SURFACE WIDTH				2@36'	
NUMBER OF LANES				6	
USEABLE SHOULDER WIDTH				2@10' Paved (incl. Curb & gutter)	
MEDIAN WIDTH				NA	
MINIMUM RIGHT-OF-WAY				114'	
SIGNALIZATION				Signal at Single Point Interchange with Walnut Grove	
REMARKS:	* EASEMENTS WILL BE REQUIRED OUTSIDE RIGHT-OF-WAY.				

TABLE 14. TENNESSEE DEPARTMENT OF TRANSPORTATION
DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE RALEIGH-LaGRANGE ALTERNATE N/A SECTION ALL
REGION 4 COUNTY SHELBY PROJECT NO. _____

LOCATION: FROM: Appling Road Tie-In to Walnut Grove Parkway
TO: CSX Railroad Tracks @ Mullins Station Road

2006 ADT _____ 10,470 _____

2026 ADT _____ 18,850 _____

PERCENT TRUCKS _____ 4(ADT), 2(DHV) _____

DHV (2026) _____ 1,885 _____

FUNCTIONAL CLASSIFICATION _____ Urban Collector _____

MINIMUM DESIGN SPEED _____ 40 MPH _____

ACCESS CONTROL _____ None _____

MAXIMUM DEGREE OF CURVATURE _____ 10° /(0.4 SE) _____

MAXIMUM GRADE _____ 8% _____

MINIMUM STOPPING SIGHT DISTANCE _____ 275'-325' _____

SURFACE WIDTH _____ 2@36' _____

NUMBER OF LANES _____ 6 _____

USEABLE SHOULDER WIDTH _____ 8' Paved (Incl. Curb & gutter) _____

MEDIAN WIDTH _____ NA _____

MINIMUM RIGHT-OF-WAY _____ 108' _____

SIGNALIZATION _____ Appling @ Walnut Grove Interchange _____

REMARKS: * EASEMENTS WILL BE REQUIRED OUTSIDE RIGHT-OF-WAY.

TABLE 15. COST DATA SHEET
WALNUT GROVE PARKWAY SECTION 1
Walnut Grove Parkway from the Wolf River Bridge (STA. 100+00) to the intersection with Sycamore
View Road (STA. 144+00)

PROJECT: Walnut Grove Parkway

LENGTH: 0.83 Miles

Right-of-Way		
Land Improvements, and Damages	\$	153,850
Incidentals	\$	0
Relocation Payments	\$	0
		<hr/>
		(0 Residences)
		(0 Businesses)
		(0 Non-Profits)
Total Right-of-Way Cost	\$	153,850
<u>Utility Relocation</u>		
Reimbursable	\$	60,000
Non-Reimbursable	\$	240,000
Total Adjustment Cost	\$	300,000
<u>Construction</u>		
Clear and Grubbing	\$	25,000
Earthwork	\$	765,000
Pavement Removal	\$	10,000
Drainage (Includes Erosion Control)	\$	180,000
Structures	\$	2,925,000
Railroad Crossing or Separation	\$	0
Paving	\$	1,800,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	37,000
Topsoil	\$	30,000
Seeding	\$	20,000
Sodding	\$	15,000
Signing	\$	75,000
Lighting	\$	0
Signalization	\$	100,000
Fence	\$	0
Guardrail	\$	80,000
Rip Rap or Slope Protection	\$	20,000
Other Construction Items (10%)	\$	314,000
Mobilization	\$	311,000
10% Eng. and Const.	\$	640,000
		<hr/>
Total Construction Cost	\$	7,347,000
<u>Preliminary Engineering</u> (10%)	\$	640,000
TOTAL COST	\$	8,440,850

TABLE 16. COST DATA SHEET
WALNUT GROVE PARKWAY SECTION 2

Walnut Grove Parkway from Sycamore View Road Intersection (STA. 144+00) to Kirby-Whitten Parkway
Intersection (STA. 192+00)

PROJECT: Walnut Grove Parkway

LENGTH: 0.91 Miles

<u>Right-of-Way</u>		
Land Improvements, and Damages	\$	182,900
Incidentals	\$	0
Relocation Payments	\$	0
(0 Residences)		
(0 Businesses)		
(0 Non-Profits)		
Total Right-of-Way Cost	\$	182,900
<u>Utility Relocation</u>		
Reimbursable	\$	39,000
Non-Reimbursable	\$	240,000
Total Adjustment Cost	\$	279,000
<u>Construction</u>		
Clear and Grubbing	\$	28,000
Earthwork	\$	835,000
Pavement Removal	\$	15,000
Drainage (Includes Erosion Control)	\$	195,000
Structures	\$	1,746,000
Railroad Crossing or Separation	\$	10,000
Paving	\$	1,298,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	40,000
Topsoil	\$	50,000
Seeding	\$	35,000
Sodding	\$	50,000
Signing	\$	75,000
Lighting	\$	0
Signalization	\$	100,000
Fence	\$	0
Guardrail	\$	80,000
Rip Rap or Slope Protection	\$	20,000
Other Construction Items (10%)	\$	281,000
Mobilization	\$	244,000
10% Eng. and Const.	\$	486,000
<u>Total Construction Cost</u>	\$	5,588,000
<u>Preliminary Engineering</u> (10%)	\$	486,000
TOTAL COST	\$	6,535,900

TABLE 17. COST DATA SHEET
WALNUT GROVE PARKWAY SECTION 3

Walnut Grove Pkwy from Kirby-Whitten Interchange (STA. 192+00) to the Appling Inter. (STA. 236+00)

PROJECT: Walnut Grove Parkway

LENGTH: 0.83 Miles

<u>Right-of-Way</u>		
Land Improvements, and Damages	\$	154,800
Incidentals	\$	0
Relocation Payments	\$	0
(0 Residences)		
(0 Businesses)		
(0 Non-Profits)		
Total Right-of-Way Cost	\$	154,800
<u>Utility Relocation</u>		
Reimbursable	\$	201,000
Non-Reimbursable	\$	201,000
Total Adjustment Cost	\$	402,000
<u>Construction</u>		
Clear and Grubbing	\$	25,000
Earthwork	\$	765,000
Pavement Removal	\$	10,000
Drainage (Includes Erosion Control)	\$	180,000
Structures	\$	2,880,000
Railroad Crossing or Separation	\$	10,000
Paving	\$	1,200,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	37,000
Topsoil	\$	50,000
Seeding	\$	35,000
Sodding	\$	50,000
Signing	\$	75,000
Lighting	\$	0
Signalization	\$	100,000
Fence	\$	0
Guardrail	\$	80,000
Rip Rap or Slope Protection	\$	20,000
Other Construction Items (10%)	\$	262,000
Mobilization	\$	284,000
10% Eng. and Const.	\$	578,000
<u>Total Construction Cost</u>	\$	6,641,000
<u>Preliminary Engineering</u> (10%)	\$	578,000
TOTAL COST	\$	7,775,800

TABLE 18. COST DATA SHEET
WALNUT GROVE PARKWAY SECTION 4
Walnut Grove Parkway from the Appling Interchange (STA. 236+00) to Germantown Parkway Grade
Separation Tie-In (STA. 328+00)

PROJECT: Walnut Grove Parkway

LENGTH: 1.74 Miles

Right-of-Way		
Land Improvements, and Damages	\$	261,750
Incidentals	\$	0
Relocation Payments	\$	<u>0</u>
		(0 Residences)
		(0 Businesses)
		(0 Non-Profits)
Total Right-of-Way Cost	\$	261,750
<u>Utility Relocation</u>		
Reimbursable	\$	80,000
Non-Reimbursable	\$	<u>497,000</u>
Total Adjustment Cost	\$	577,000
<u>Construction</u>		
Clear and Grubbing	\$	54,000
Earthwork	\$	1,150,000
Pavement Removal	\$	20,000
Drainage (Includes Erosion Control)	\$	405,000
Structures	\$	0
Railroad Crossing or Separation	\$	0
Paving	\$	2,600,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	85,000
Topsoil	\$	50,000
Seeding	\$	35,000
Sodding	\$	50,000
Signing	\$	150,000
Lighting	\$	0
Signalization	\$	0
Fence	\$	0
Guardrail	\$	120,000
Rip Rap or Slope Protection	\$	40,000
Other Construction Items (10%)	\$	472,000
Mobilization	\$	260,000
10% Eng. and Const.	\$	<u>523,000</u>
Total Construction Cost	\$	6,014,000
<u>Preliminary Engineering</u> (10%)	\$	523,000
TOTAL COST	\$	7,375,750

TABLE 19. COST DATA SHEET
SYCAMORE VIEW ROAD

PROJECT: 1.6 mile new Alignment and Extension from 325' south of Longline Road to Walnut Grove Pkwy Interchange (STA. 130+00).
Interchange Estimates included in Walnut Grove Parkway Section

LENGTH: 1.6 Miles

Right-of-Way		
Land Improvements, and Damages	\$	286,500
Incidentals	\$	0
Relocation Payments	\$	0
		<hr/>
	(0 Residences)	
	(0 Businesses)	
	(0 Non-Profits)	
Total Right-of-Way Cost	\$	286,500
<u>Utility Relocation</u>		
Reimbursable	\$	53,000
Non-Reimbursable	\$	210,000
Total Adjustment Cost	\$	263,000
<u>Construction</u>		
Clear and Grubbing	\$	13,000
Earthwork	\$	1,118,000
Pavement Removal	\$	17,000
Drainage (Includes Erosion Control)	\$	620,000
Structures	\$	0
Railroad Crossing or Separation	\$	10,000
Paving	\$	2,925,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	100,000
Topsoil	\$	15,000
Seeding	\$	10,000
Sodding	\$	110,000
Signing	\$	25,000
Lighting	\$	0
Signalization	\$	0
Fence	\$	0
Guardrail	\$	0
Rip Rap or Slope Protection	\$	0
Other Construction Items (10%)	\$	496,000
Mobilization	\$	270,000
10% Eng. and Const.	\$	546,000
		<hr/>
Total Construction Cost	\$	6,275,000
Preliminary Engineering (10%)	\$	546,000
TOTAL COST	\$	7,370,500

TABLE 20. COST DATA SHEET
RALEIGH LaGRANGE ROAD

PROJECT: From Applying Extension by Others to CSX Railroad Crossing and
Mullins Station Road (STA. 315+00)

LENGTH: 0.84 Miles

Right-of-Way		
Land Improvements, and Damages	\$	108,900
Incidentals	\$	0
Relocation Payments	\$	0
		0
		(0 Residences)
		(0 Businesses)
		(0 Non-Profits)
Total Right-of-Way Cost	\$	108,900
<u>Utility Relocation</u>		
Reimbursable	\$	20,000
Non-Reimbursable	\$	100,000
Total Adjustment Cost	\$	120,000
<u>Construction</u>		
Clear and Grubbing	\$	7,000
Earthwork	\$	548,000
Pavement Removal	\$	10,000
Drainage (Includes Erosion Control)	\$	310,000
Structures	\$	0
Railroad Crossing or Separation	\$	10,000
Paving	\$	1,448,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	50,000
Topsoil	\$	20,000
Seeding	\$	20,000
Sodding	\$	50,000
Signing	\$	20,000
Lighting	\$	0
Signalization	\$	0
Fence	\$	0
Guardrail	\$	0
Rip Rap or Slope Protection	\$	0
Other Construction Items (10%)	\$	249,000
Mobilization	\$	141,000
10% Eng. and Const.	\$	274,000
Total Construction Cost	\$	3,157,000
<u>Preliminary Engineering</u> (10%)	\$	274,000
TOTAL COST	\$	3,659,900

TABLE 21. COST DATA SHEET
TOTAL PROJECT (PROPOSED ROUTE)

PROJECT: WOLF RIVER BRIDGE TO GERMANTOWN PKWY TIE-IN
APPLING RD AND SYCAMORE VIEW ROAD RECONSTRUCTIONS

LENGTH: 6.81

Right-of-Way		
Land Improvements, and Damages	\$	810,700
Incidentals	\$	0
Relocation Payments	\$	<u>0</u>
		(0 Residences)
		(0 Businesses)
		(0 Non-Profits)
Total Right-of-Way Cost	\$	810,700¹
<u>Utility Relocation</u>		
Reimbursable	\$	610,000
Non-Reimbursable	\$	<u>1,331,000</u>
Total Adjustment Cost	\$	1,941,000
<u>Construction</u>		
Clear and Grubbing	\$	152,000
Earthwork	\$	5,181,000
Pavement Removal	\$	82,000
Drainage (Includes Erosion Control)	\$	1,890,000
Structures	\$	7,551,000
Railroad Crossing or Separation	\$	40,000
Paving	\$	11,271,000
Retaining Walls	\$	0
Maintenance of Traffic	\$	349,000
Topsoil	\$	215,000
Seeding	\$	155,000
Sodding	\$	325,000
Signing	\$	420,000
Lighting	\$	0
Signalization	\$	300,000
Fence	\$	0
Guardrail	\$	360,000
Rip Rap or Slope Protection	\$	100,000
Other Construction Items (10%)	\$	2,074,000
Mobilization	\$	1,510,000
10% Eng. and Const.	\$	<u>3,047,000</u>
Total Construction Cost	\$	35,022,000
<u>Preliminary Engineering</u> (10%)	\$	3,047,000
TOTAL COST	\$	40,820,700¹

Note:

1. Includes reduction of \$338,000 for return of existing ROW to County.

APPENDIX A

TDOT Traffic Data
Basic Freeway Sections
Ramps Merge & Diverge
Weaving

TENNESSEE DEPARTMENT OF TRANSPORTATION
 MAPPING AND STATISTICS OFFICE
 TRAFFIC AND SAFETY PLANNING SECTION

COPY (REV. 7/26/98)

PROJECT NO.: _____ ROUTE: RELOCATED WALNUT GROVE RD.
 COUNTY: SHELBY CITY: MEMPHIS
 PROJECT DESCRIPTION: FROM HUMPHREYS BLVD. TO S.R. 177 [GERMANTOWN RD.]

DIVISION REQUESTING:

MAINTENANCE SPECIAL DESIGN
 PLANNING STRUCTURES
 PROG. DEVELOPMENT & ADM. SURVEY & DESIGN
 PUBLIC TRANS. & AERO. OTHER
 YEAR PROJECT PROGRAMMED FOR CONSTRUCTION: _____
 PROJECTED LETTING DATE: _____

TRAFFIC ASSIGNMENT:

BASE YEAR		DESIGN YEAR					DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
ADT	YEAR	ADT	DHV	%	YEAR	DIR.DIST.	DHV	ADT	FLEX	RIGID
46,470	2006	83,650	8,365	10	2026	60-40	2	3		

REQUESTED BY: NAME JANE CRAIG DATE 10/26/01
 DIVISION FACILITIES PLANNING
 ADDRESS 900 J. K. POLK BUILDING
NASHVILLE TN 37243

REVIEWED BY: STEVE ALLEN *Steve Allen* DATE 12-6-01
 TRANSPORTATION MANAGER I
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: BONNIE H. BROTHERS *Bonnie H. Brothers* DATE 12-07-01
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

PLEASE FURNISH TRAFFIC FOR RELOCATED WALNUT GROVE ROAD WITH TURNING MOVEMENTS @ SYCAMORE VIEW RD., KIRBY-WHITTEN PKWY., APPLING RD. & AT S.R. 177 [GERMANTOWN RD].

THIS TRAFFIC UPDATED FROM THE TRAFFIC SCHEMATIC FROM REAVES, SWEENEY, MARCOM, INC. TRAFFIC GROWTH TAKEN FROM THE ADAM COMPUTER PROGRAM.

RECEIVED

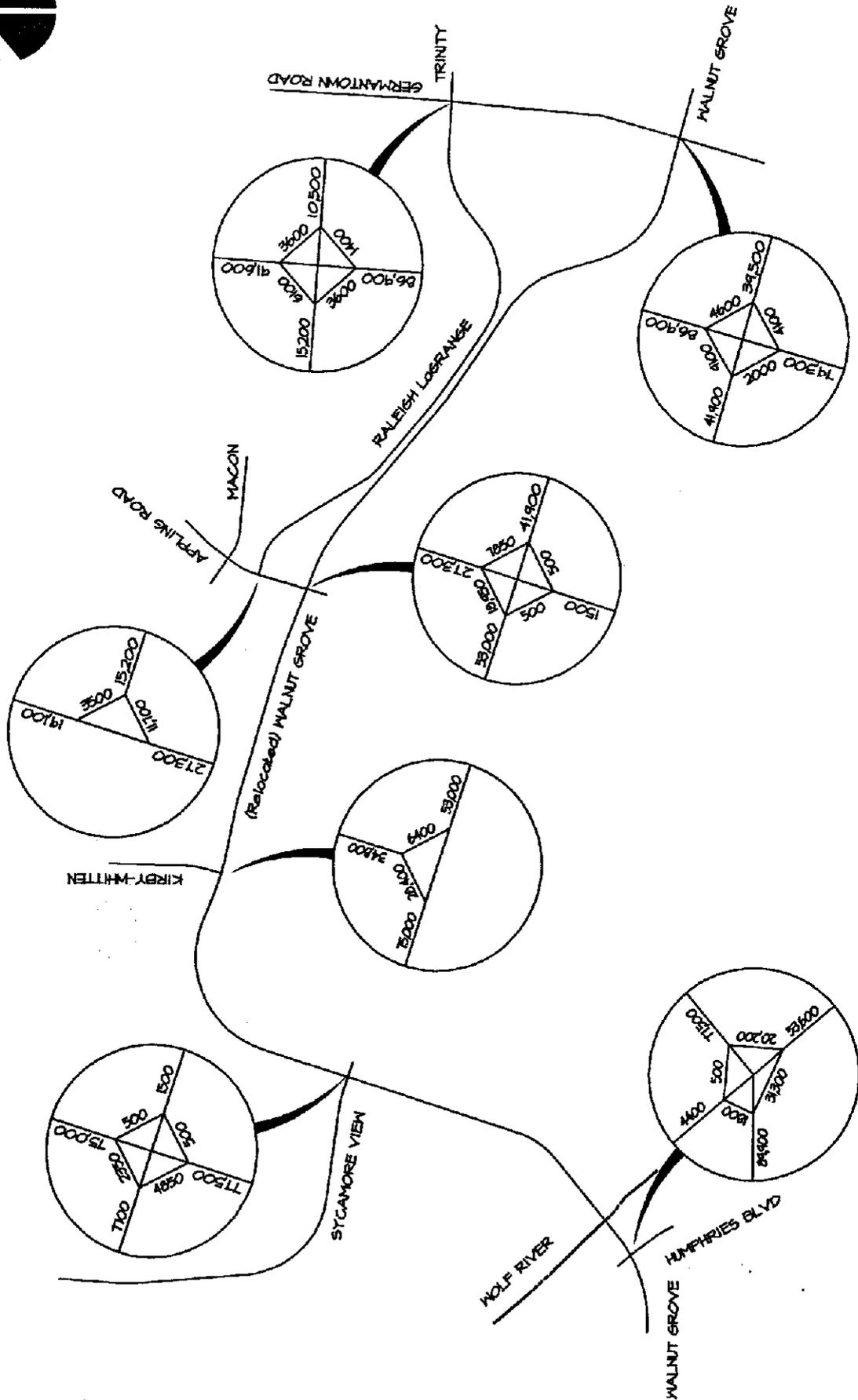
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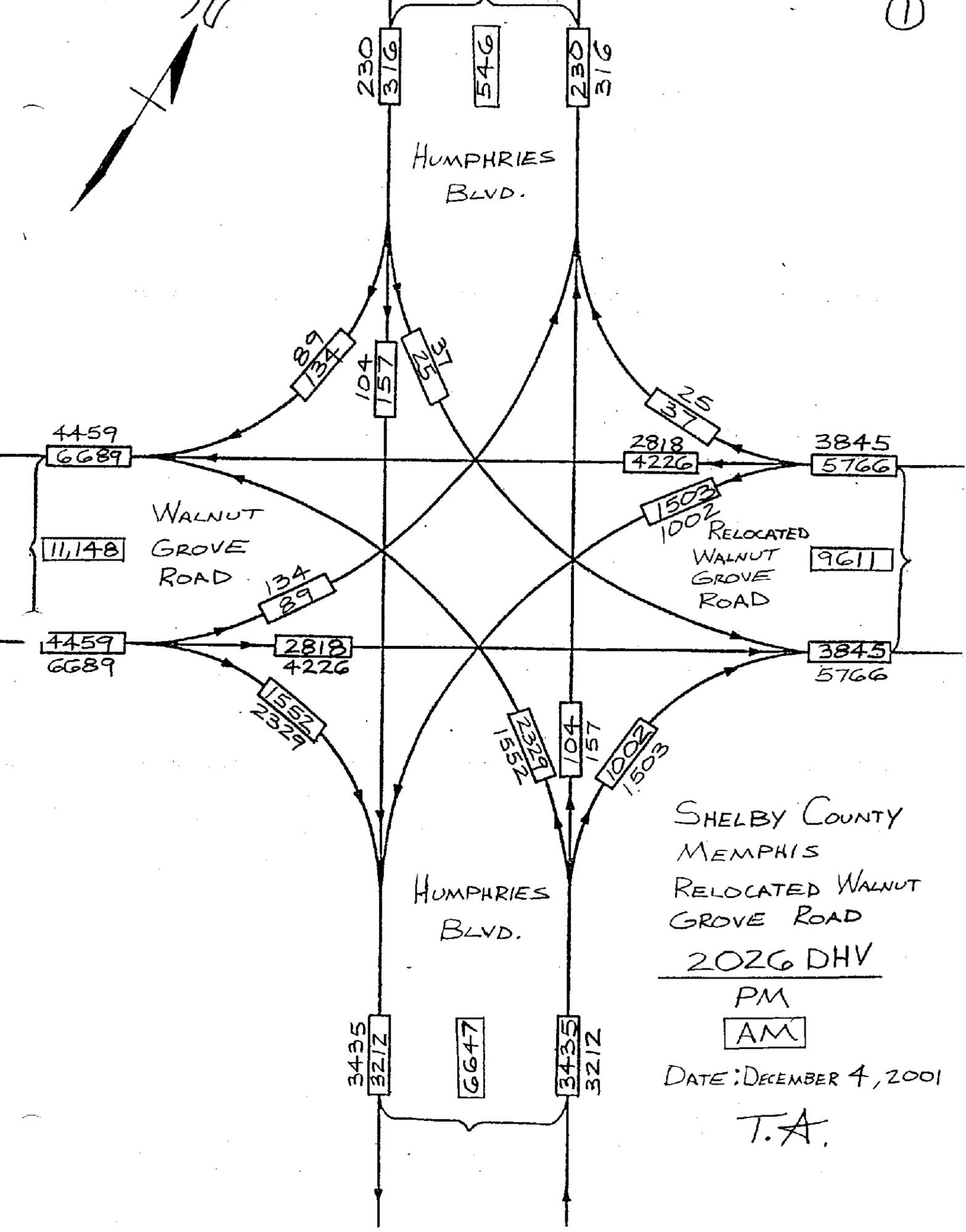
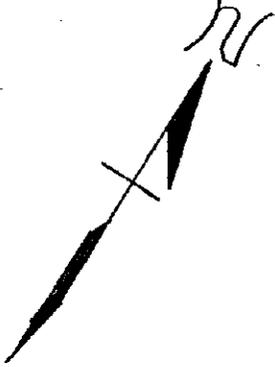
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 PARSONS BRINCKERHOFF

DHV'S ARE NOT REQUIRED FOR SIDE ROADS LESS THAN 1000 ADT.

NOTE: FOR BRIDGE REPLACEMENT PROJECTS, ADLs ARE NOT REQUIRED FOR ADTs OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.
 SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

NORTH



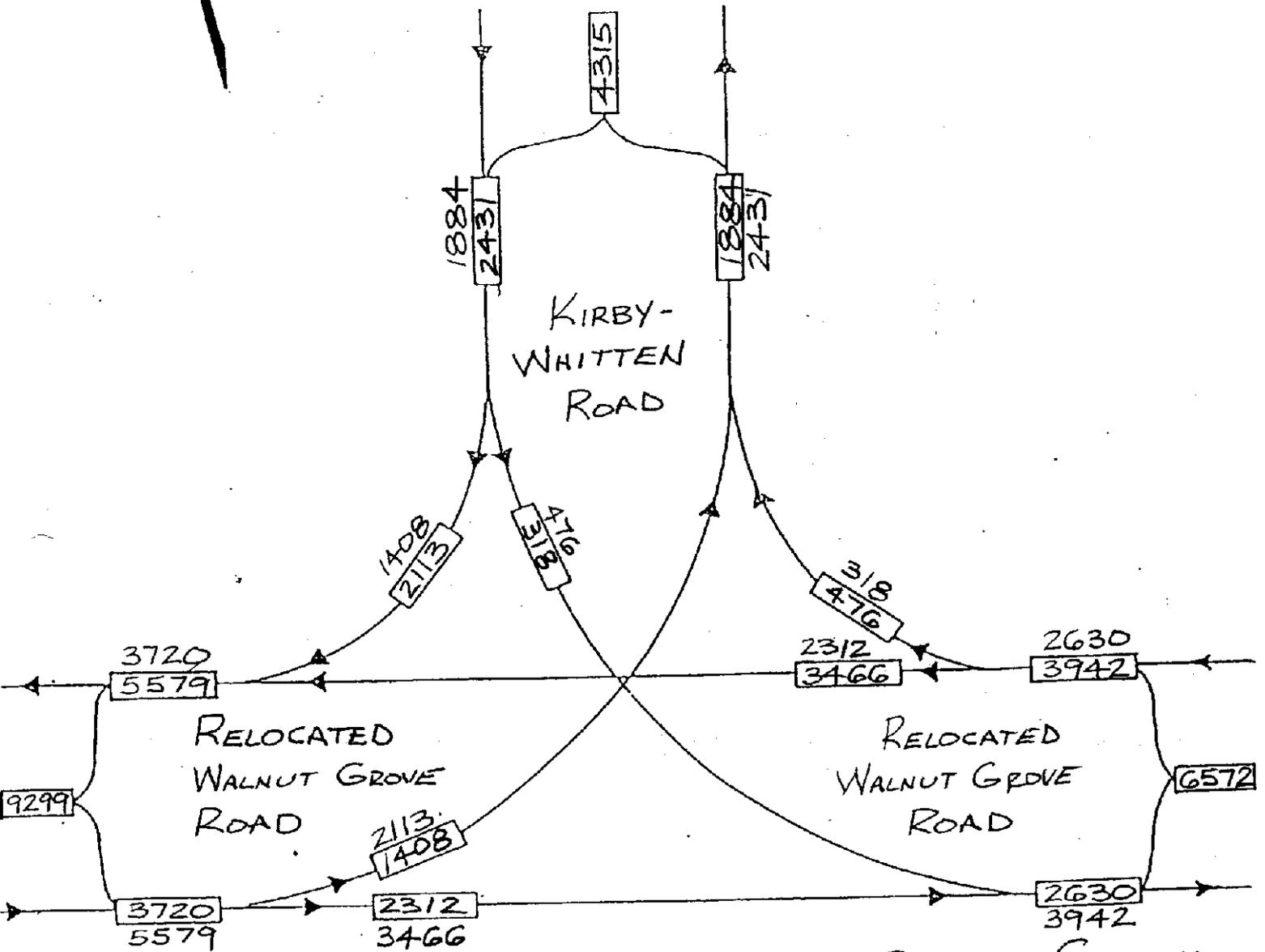


SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD

2026 DHV
 PM
 AM

DATE: DECEMBER 4, 2001

T.A.

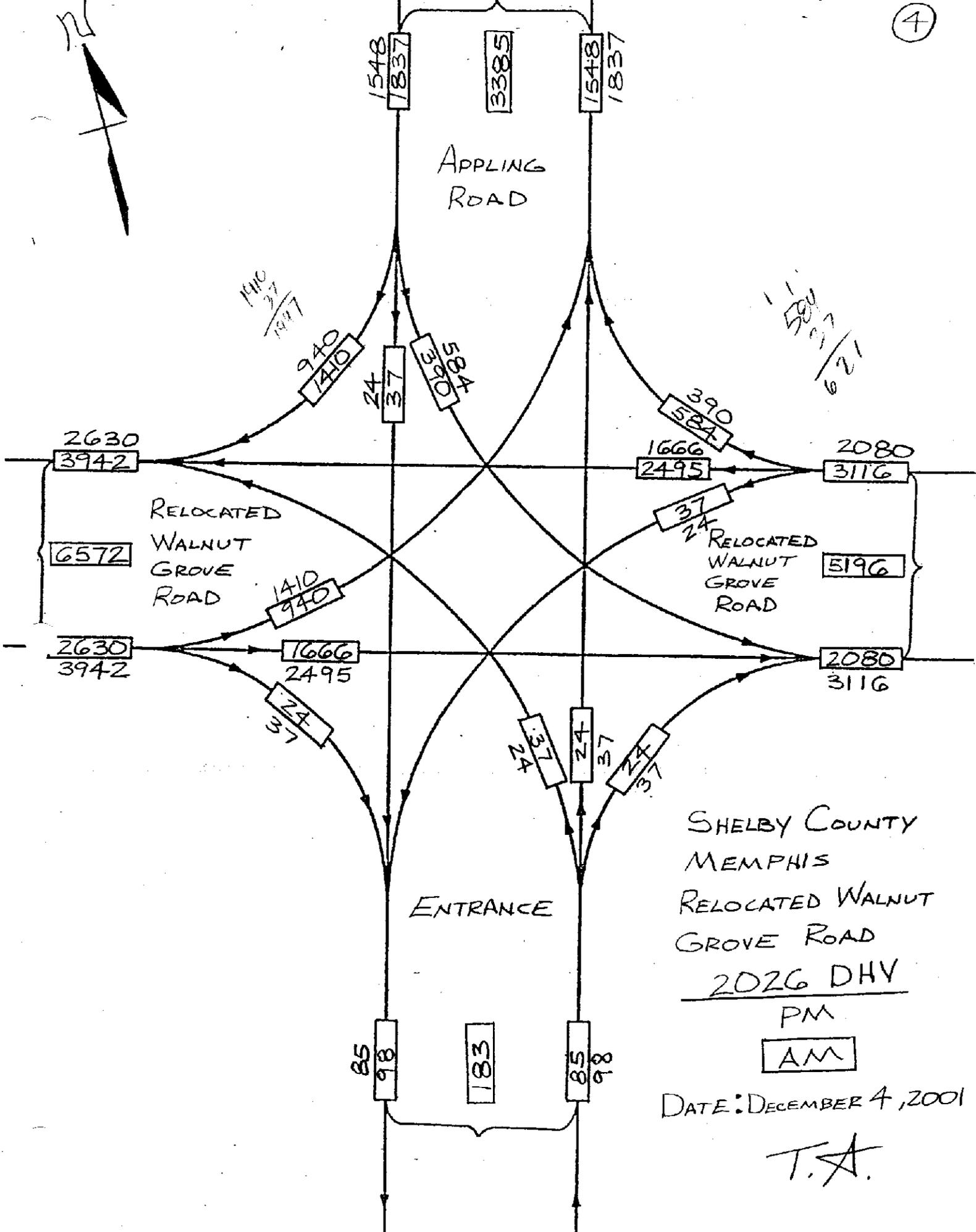


SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD
2026 DHV

PM

AM

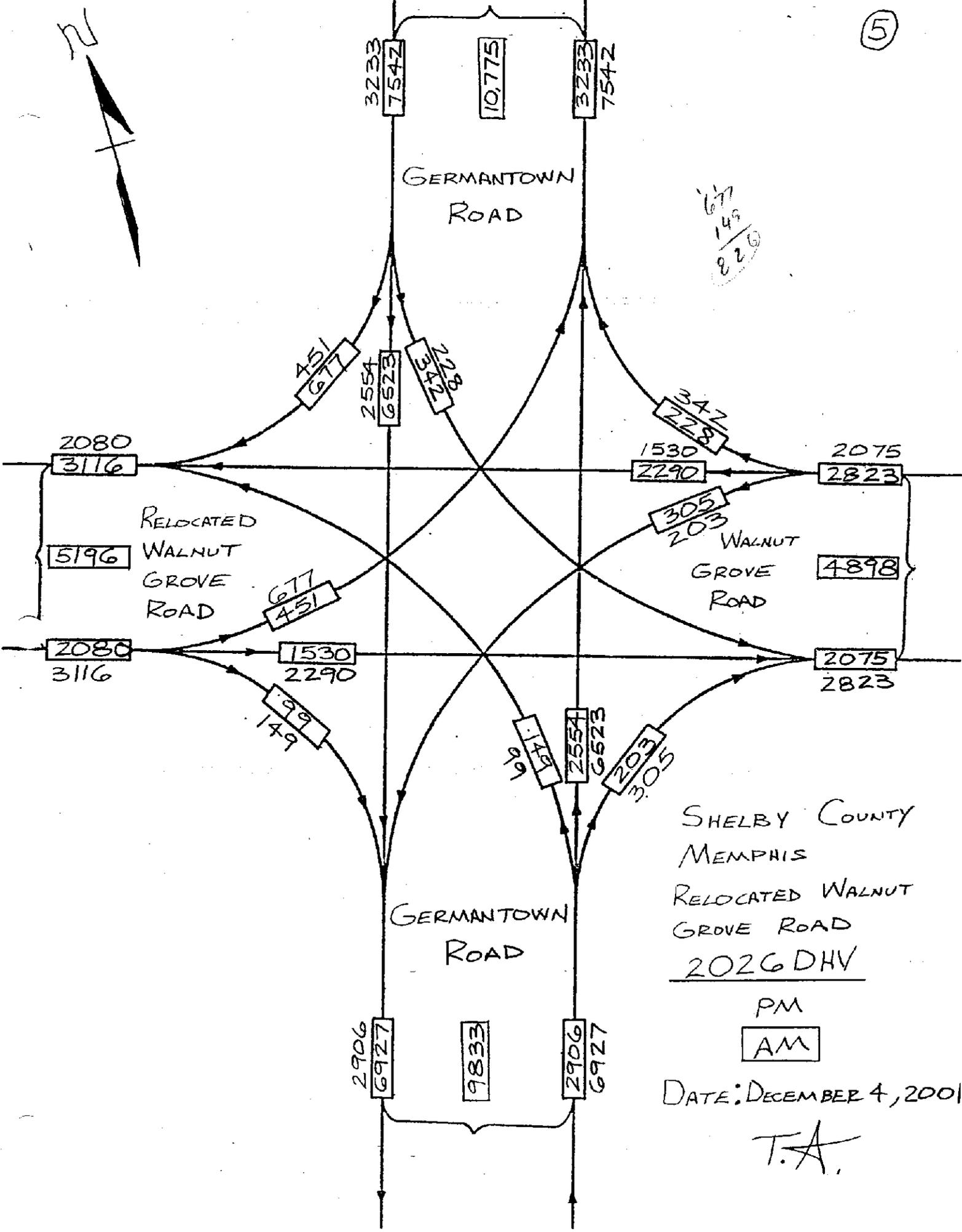
DATE: DECEMBER 4, 2001
 T.A



SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD
2026 DHV
 PM
 AM

DATE: DECEMBER 4, 2001

T.A.

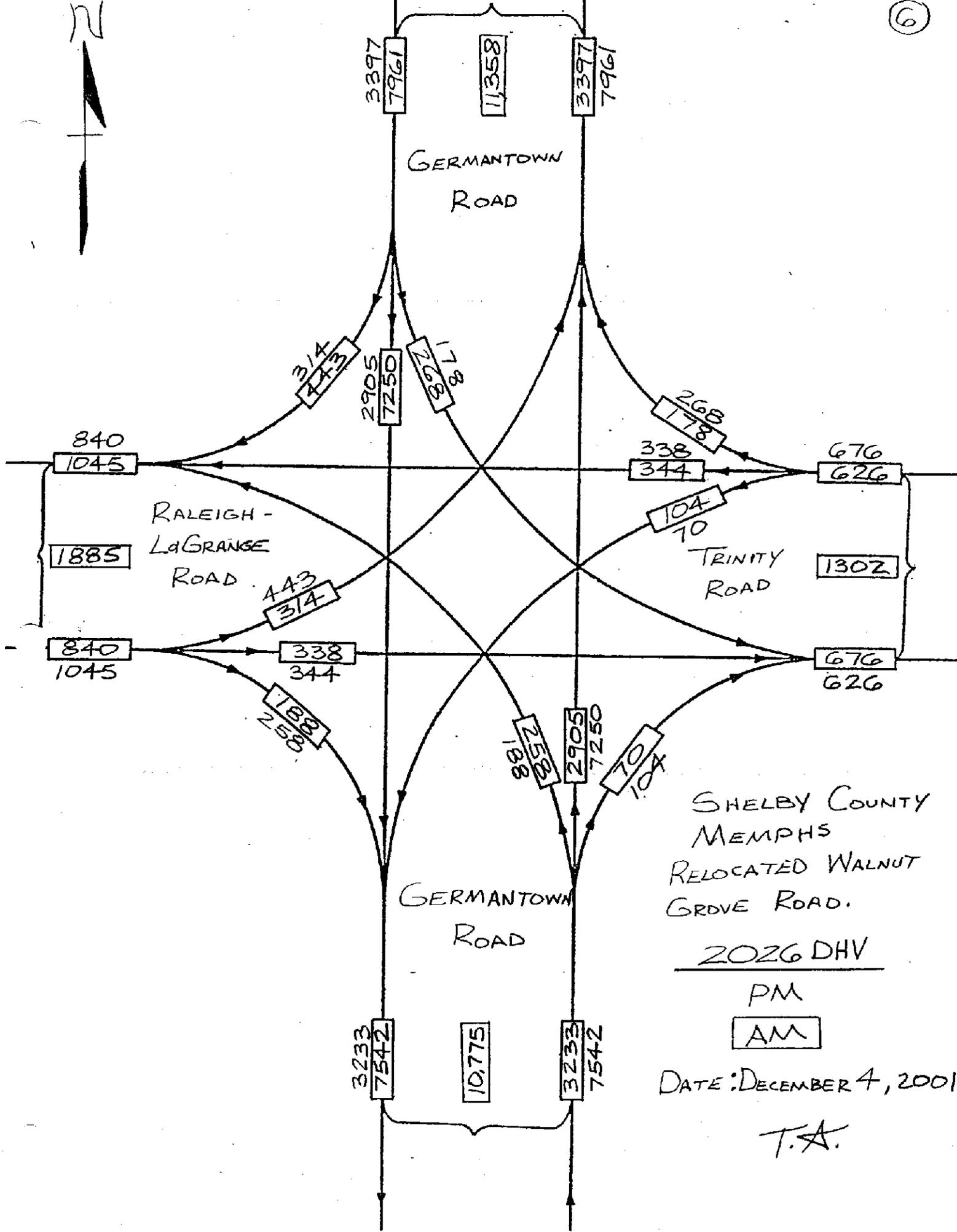


SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD
 2026 DHV

PM
 AM

DATE: DECEMBER 4, 2001

T.A.



SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD.

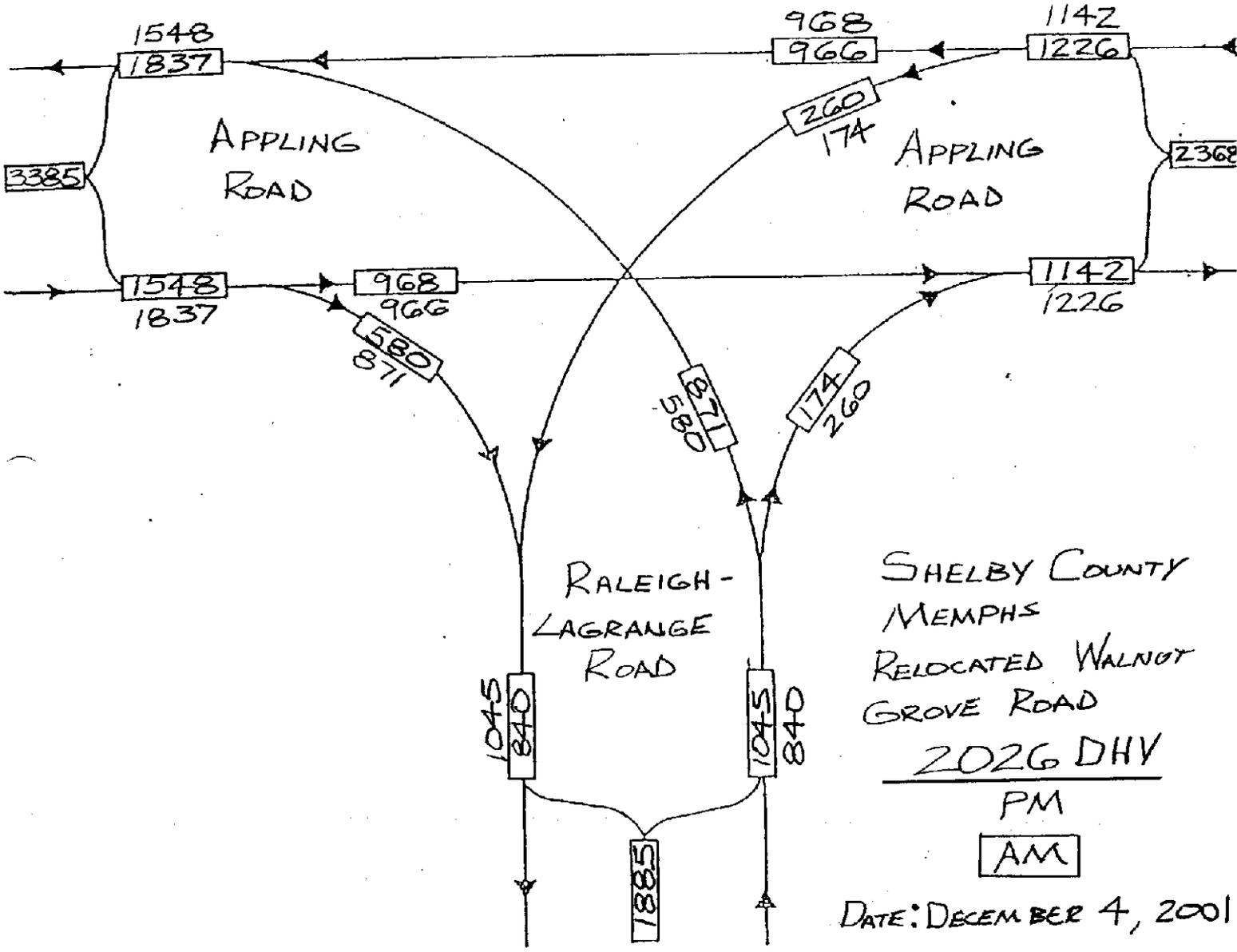
2026 DHV

PM

AM

DATE: DECEMBER 4, 2001

T.A.



SHELBY COUNTY
 MEMPHIS
 RELOCATED WALNUT
 GROVE ROAD
2026 DHV

PM
 AM

DATE: DECEMBER 4, 2001

T.A.

BASIC FREEWAY SECTIONS

Walnut Grove Road APR
Basic Freeway Sections Summary Report

Segment	S(in)	1	2	3	4	S(out)
ADT	111480	96110	92990	62720	51960	48980
DHV	11148	9611	9299	6272	5196	4898
DD	6689	5767	5579	3763	3118	2939
HCS FILE	Sin.hcf	S1.hcf	S2.hcf	S3.hcf	S4.hcf	Sout.hcf
# of Lanes	4	3	3	3	3	2
LOS	D	E	E	C	C	D
Density pc/mi/ln	32.6	40.9	38.6	24.8	20.6	27.6
Speed Avg. for Passenger Car	58.5	57.0	54.4	57.0	57.0	60.0
Flow Rates pc/h/ln	1886.0	2168.0	2097.0	1415.0	1172.0	1657.0
Variation						
HCS FILE		S1b.hcf	S2b.hcf	S3b.hcf		
# of Lanes		4	4	4		
LOS		D	D	C		
Density pc/mi/ln		27.8	26.9	18.1		
Speed Avg. for Passenger Car		58.5	58.5	58.5		
Flow Rates pc/h/ln		1626	1573	1061		
Section 1	Wolf River-Sycamore			Section 3	Kirby/Whitten-Applying	
Section 2	Sycamore-Kirvy/Whitten			Section 4	Applying-Germantown Pkwy	

Walnut Grove Parkway ADT Sensitivity Analysis

Basic Freeway Sections Planning Estimates

Section Name	2026	2024	2022	2020	2018	2016	2014	2012	2010
Wolf River Bridge to Sycamore View Road	96110	90624	85451	80573	75974	71637	67548	63692	60057
Sycamore View Road to Kirby Whitten Pkwy	92990	87682	82677	77958	73508	69312	65355	61625	58107
Kirby-Whitten Pkwy to Appling Road	62720	59140	55764	52581	49580	46750	44081	41565	39192
Appling Road to Germantown Pkwy	51960	48994	46197	43560	41074	38729	36519	34434	32469

Est. Max Daily Vol. for Each Peak-Hour LOS			
	8-Lane	6-Lane	4-Lane
A	76800	57600	38400
B	82600	61900	41300
C	86400	64800	42000
D	92200	69100	46100
E	96000	72000	48000

HCS2000: Basic Freeway Segments Release 4.1a

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Operational
Analysis

Analyst: Brad S. Winkler
Agency or Company: Parsons Brinckerhoff
Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: I-240 to Humphries Blvd
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	6689	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1858	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1886	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	58.5	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1886	pc/h/ln
Free-flow speed, FFS	58.5	mi/h
Average passenger-car speed, S	57.9	mi/h
Number of lanes, N	4	
Density, D	32.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

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Operational
Analysis

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Agency or Company: Parsons Brinckerhoff
Date Performed: 1/28/01
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Humphries Blvd to Sycamore
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	5767	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1602	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	2168	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	3	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	57.0	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	2168	pc/h/ln
Free-flow speed, FFS	57.0	mi/h
Average passenger-car speed, S	53.0	mi/h
Number of lanes, N	3	
Density, D	40.9	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

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Operational
Analysis

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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Humphries Blvd to Sycamore
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	5767	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1602	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1626	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	58.5	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1626	pc/h/ln
Free-flow speed, FFS	58.5	mi/h
Average passenger-car speed, S	58.5	mi/h
Number of lanes, N	4	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational
Analysis

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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Sycamore to Whitten
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	5579	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1550	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	2097	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	3	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	57.0	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	2097	pc/h/ln
Free-flow speed, FFS	57.0	mi/h
Average passenger-car speed, S	54.4	mi/h
Number of lanes, N	3	
Density, D	38.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational
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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Sycamore to Whitten
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	5579	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1550	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1573	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	58.5	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1573	pc/h/ln
Free-flow speed, FFS	58.5	mi/h
Average passenger-car speed, S	58.5	mi/h
Number of lanes, N	4	
Density, D	26.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational
Analysis

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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Whitten to Appling
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	3763	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1045	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1415	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	3	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	57.0	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1415	pc/h/ln
Free-flow speed, FFS	57.0	mi/h
Average passenger-car speed, S	57.0	mi/h
Number of lanes, N	3	
Density, D	24.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Whitten to Appling
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	3763	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	1045	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1061	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	4	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	58.5	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1061	pc/h/ln
Free-flow speed, FFS	58.5	mi/h
Average passenger-car speed, S	58.5	mi/h
Number of lanes, N	4	
Density, D	18.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

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Operational
Analysis

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Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Appling to Germantown
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	3118	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	866	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1172	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	3	
Free-flow speed:	Ideal	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	57.0	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1172	pc/h/ln
Free-flow speed, FFS	57.0	mi/h
Average passenger-car speed, S	57.0	mi/h
Number of lanes, N	3	
Density, D	20.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS2000: Basic Freeway Segments Release 4.1a

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Operational
Analysis

Analyst: Brad S. Winkler
Agency or Company: Parsons Brinckerhoff
Date Performed: 1/28/02
Analysis Time Period: DHV
Freeway/Direction: East and West Peaks
From/To: Germantown to out
Jurisdiction: Shelby County
Analysis Year: 2026
Description: Walnut Grove Road Relocated APR

Flow Inputs and
Adjustments

Volume, V	2939	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	816	v
Trucks and buses	3	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.985	
Driver population factor, vp	1.00	
Flow rate, vp	1657	pc/h/ln

Speed Inputs and
Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density interchange/mi	0.50	
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	0.0*	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	60.0	mi/h

Urban Freeway

LOS and Performance

Measures _____

Flow rate, vp	1657	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	2	
Density, D	27.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

RAMPS
Merge & Diverge

2026 Ramp Diverge Analysis

Location	LOS	D	S _R	S _O	S	HCS File
Sycamore View EB	C	24.7	52.0	59.7	54.5	sycamore_div_e
Sycamore View WB	D	Ex. 25-4	52.0	60.1	54.8	sycamore_div_w
Kirby-Whitten EB	B	17.4	48.0	61.3	52.2	whitten_div_e
Kirby-Whitten WB	C	20.9	51.0	64.0	55.0	whitten_div_w
Appling EB	C	23.2	50.0	65.0	53.0	Appling_div_e
Appling WB	B	16.8	51.0	65.8	54.7	Appling_div_w
Germantown EB	C	25.5	51.0	65.8	54.2	Germantown_div_e

D = Density, pc/mi/ln

S_R = Speed on ramp at diverge location

S_O = Speed of mainline at diverge location

HCS Files are included with supporting documents. Extension is *.hcr

Walnut Grove Parkway

2026 Ramp Merge Analysis

Location	LOS	D	S _R	S _O	S	HCS File
Sycamore View EB	F	37.2	43.6	58.2	45.4	sycamore_merge_e
Sycamore View WB	C	26.3	54.0	51.7	53.0	sycamore_merge_w
Kirby-Whitten EB	C	22.5	55.3	58.1	55.9	whitten_merge_e
Kirby-Whitten WB	F	32.5	48.9	56.4	50.5	whitten_merge_w
Appling EB	B	14.6	56.7	57.8	57.0	Appling_merge_e
Appling WB	C	21.3	55.5	57.9	56.1	Appling_merge_w
Germantown EB	B	14.2	56.7	58.3	57.2	Germantown_merge_w

D = Density, pc/mi/ln

S_R = Speed on ramp at diverge location

S_O = Speed of mainline at diverge location

HCS Files are included with supporting documents. Extension is *.hcr

HCS2000: Ramps and Ramp Junctions Release 4.1a
Sycamore_merge_e

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Merge Analysis

Analyst: Brad Winkler
Agency/Co.: Parsons Brinckerhoff
Date performed: 1/29/02
Analysis time period: PM Peak
Freeway/dir or travel: Walnut Grove North/East
Junction: Sycamore
Jurisdiction: Shelby County
Analysis Year: 2026
Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5349	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	230	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	2113	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5349	230	2113	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1486	64	587	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%

Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6032	259	2383	pcph

Estimation of V12 Merge Areas

L = 8822.66 (Equation 25-2 or 25-3)
EQ
P = 0.833 Using Equation 3
FM
 $v_{12} = v_F (P_{FM}) = 5027 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	6291	6900	No
v _{R12}	5286	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 37.2 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M = 0.911	
Space mean speed in ramp influence area,	S _R = 43.6	mph
Space mean speed in outer lanes,	S ₀ = 58.2	mph
Space mean speed for all vehicles,	S = 45.4	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Sycamore_merge_w

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 1/29/02
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove West
 Junction: Sycamore
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5349	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	417	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	230	vph	
Position of adjacent Ramp	Upstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2000	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5349	417	230	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1486	116	64	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade Length		%	%	%
		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6032	470	259	pcph

Estimation of V12 Merge Areas

L = 2793.63 (Equation 25-2 or 25-3)
EQ
P = 0.569 Using Equation 2
FM
 $v_{12} = v_F (P_{FM}) = 3434 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v	6502	6900	No
FO			
v	3904	4600	No
R12			

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.3 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M = 0.334	
	S	
Space mean speed in ramp influence area,	S = 54.0	mph
	R	
Space mean speed in outer lanes,	S = 51.7	mph
	0	
Space mean speed for all vehicles,	S = 53.0	mph

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Whitten_merge_e

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 1/29/02
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Whitten-Kriby
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	3466	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	476	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	1400	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3466	476	1400	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	963	132	389	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade Length	% mi	% mi	% mi
Trucks and buses PCE, ET	1.5	1.5	1.5
Recreational vehicle PCE, ER	1.2	1.2	1.2
Heavy vehicle adjustment, fHV	0.985	0.985	0.985
Driver population factor, fP	1.00	1.00	1.00
Flow rate, vp	3909	537	1579 pcph

Estimation of V12 Merge Areas

$$L = 5845.98 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.737 \text{ Using Equation 3}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2882 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	4446	6900	No
v _{R12}	3419	4600	No

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.5 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M = 0.260	
Space mean speed in ramp influence area,	S _R = 55.3	mph
Space mean speed in outer lanes,	S ₀ = 58.1	mph
Space mean speed for all vehicles,	S = 55.9	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

whitten_merge_w

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 2/15/02
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove West
 Junction: Whitten-Kriby
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	3466	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	2113	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	230	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3466	2113	230	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	963	587	64	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade Length	% mi	% mi	% mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3909	2383	259	pcph

Estimation of V12 Merge Areas

$$L = 958.90 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 2422 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	6292	6900	No
v _{R12}	4805	4600	Yes

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 32.5 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M = 0.617	
Space mean speed in ramp influence area,	S _R = 48.9	mph
Space mean speed in outer lanes,	S ₀ = 56.4	mph
Space mean speed for all vehicles,	S = 50.5	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Appling_merge_e

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 1/29/02
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Appling
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	2495	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	621	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	1447	vph	
Position of adjacent Ramp	Upstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2000	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2495	621	1447	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	693	173	402	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade Length	%	%	%	
	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2814	700	1632	pcph

Estimation of V12 Merge Areas

$$L = 2154.20 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.610 \text{ Using Equation 2}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1716 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	3514	6900	No
v _{R12}	2416	4600	No

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 14.6 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.185	
Space mean speed in ramp influence area,	S _R = 56.7	mph
Space mean speed in outer lanes,	S ₀ = 57.8	mph
Space mean speed for all vehicles,	S = 57.0	mph

Appling_merge_w

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 2/15/02
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove West
 Junction: Appling
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	2495	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	1410	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent Ramp	476	vph	
Position of adjacent Ramp	Downstream		
Type of adjacent Ramp	Off		
Distance to adjacent Ramp	2000	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2495	1410	476	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	693	392	132	v
Trucks and buses	3	3	3	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade Length	%	%	%	
	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2814	1590	537	pcph

Estimation of V12 Merge Areas

$$L = 1988.15 \text{ (Equation 25-2 or 25-3)}$$

$$EQ$$

$$P = 0.619 \text{ Using Equation 1}$$

$$FM$$

$$v_{12} = v_F (P_{FM}) = 1743 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	4404	6900	No
v _{R12}	3333	4600	No

Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.3 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M = 0.250	
	S	
Space mean speed in ramp influence area,	S = 55.5	mph
	R	
Space mean speed in outer lanes,	S = 57.9	mph
	0	
Space mean speed for all vehicles,	S = 56.1	mph

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Germantown_merge_w

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Merge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 2/15/02
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove West
 Junction: Germantown Pkwy
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Merge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	2290	vph	

On Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	60.0	mph	
Volume on ramp	677	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No		
Volume on adjacent Ramp		vph	
Position of adjacent Ramp			
Type of adjacent Ramp			
Distance to adjacent Ramp		ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2290	677	vph
Peak-hour factor, PHF	0.90	0.90	
Peak 15-min volume, v15	636	188	v
Trucks and buses	3	3	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	Level

Grade Length		%	%	%
		mi	mi	mi
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985	
Driver population factor, fP	1.00		1.00	
Flow rate, vp	2583		764	pcph

Estimation of V12 Merge Areas

L = 1988.15 (Equation 25-2 or 25-3)
EQ
P = 0.619 Using Equation 1
FM
 $v_{12} = v_F (P_{FM}) = 1600 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v	3347	6900	No
FO			
v	2364	4600	No
R12			

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 14.2 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.182	
	S	
Space mean speed in ramp influence area,	S = 56.7	mph
	R	
Space mean speed in outer lanes,	S = 58.3	mph
	0	
Space mean speed for all vehicles,	S = 57.2	mph

Sycamore_div_e

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Sycamore
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5766	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	417	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	230	vph	
Position of adjacent ramp	Downstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5766	417	230	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1602	116	64	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	6503		470		256	pcph

Estimation of V12 Diverge Areas

L = 0.00 (Equation 25-8 or 25-9)
EQ
P = 0.576 Using Equation 5
FD
 $v_{12} = v_R + (v_F - v_R) P = 3944$ pc/h
FD

Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_F$	6503	6900	No
v_{12}	3944	4400	No
$v_{FO} = v_F - v_R$	6033	6900	No
v_R	470	2000	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 24.7$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D = 0.470	
Space mean speed in ramp influence area,	S = 52	mph
Space mean speed in outer lanes,	S = 59.7	mph
Space mean speed for all vehicles,	S = 54.5	mph

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Sycamore_div_w

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove South/West
 Junction: Sycamore
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5579	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	230	vph	
Length of first accel/decel lane	1000	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	2113	vph	
Position of adjacent ramp	Upstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5579	230	2113	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1550	64	587	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	6292		259		2348	pcph

Estimation of V12 Diverge Areas

L = 9974.51 (Equation 25-8 or 25-9)
EQ
P = Using Equation 6
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD}$ = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6292	6900	No
v_{12}		4400	No
$v_{FO} = v_F - v_R$	6033	6900	No
v_R	259	2000	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = pc/mi/ln
Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D = 0.451	
Space mean speed in ramp influence area,	S = 52	mph
Space mean speed in outer lanes,	S = 60.1	mph
Space mean speed for all vehicles,	S = 54.8	mph

Whitten_div_e

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5579	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	2		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	2113	vph	
Length of first accel/decel lane	1000	ft	
Length of second accel/decel lane	500	ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	230	vph	
Position of adjacent ramp	Upstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5579	2113	230	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1550	587	64	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	6292		2383		256	pcph

Estimation of V12 Diverge Areas

L = 0.00 (Equation 25-8 or 25-9)
EQ
P = 0.450 Using Equation 0
FD
 $v_{12R} = v_{FR} + (v_{FR} - v_{FD}) P = 4142$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FiF}	6292	6900	No
v_{12}	4142	4400	No
v_{FOFR}	3909	6900	No
v_R	2383	3800	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 17.4$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D = 0.642	
Space mean speed in ramp influence area,	S = 48	mph
Space mean speed in outer lanes,	S = 61.3	mph
Space mean speed for all vehicles,	S = 52.2	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a

Whitten_div_w

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: AM Peak
 Freeway/dir or travel: Walnut Grove South/West
 Junction: Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	3942	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	476	vph	
Length of first accel/decel lane	1000	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	1400	vph	
Position of adjacent ramp	Downstream		
Type of adjacent ramp	Off		
Distance to adjacent ramp	2000	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3942	476	1400	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1095	132	389	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	4446		537		1556	pcph

Estimation of V12 Diverge Areas

$$L = 1923.16 \text{ (Equation 25-8 or 25-9)}$$

$$EQ$$

$$P = 0.624 \text{ Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2977 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	4446	6900	No
v_{12}	2977	4400	No
$v_{FO} = v_F - v_R$	3909	6900	No
v_R	537	2000	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 20.9 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$D = 0.476$	
Space mean speed in ramp influence area,	$S = 51$	mph
Space mean speed in outer lanes,	$S = 64.0$	mph
Space mean speed for all vehicles,	$S = 55.0$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1a
 Appling_**div_e**

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Appling
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	3942	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	1447	vph	
Length of first accel/decel lane	1000	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	476	vph	
Position of adjacent ramp	Upstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2400	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3942	1447	476	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1095	402	132	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	4446		1632		529	pcph

Estimation of V12 Diverge Areas

$$L = 1779.41 \text{ (Equation 25-8 or 25-9)}$$

$$EQ$$

$$P = 0.574 \text{ Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 3247 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4446	6900	No
v_{12}	3247	4400	No
$v_{FO} = v_F - v_R$	2814	6900	No
v_R	1632	2000	No

Level of Service Determination (if not F)

$$D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 23.2 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$D = 0.575$	
Space mean speed in ramp influence area,	$S_R = 50$	mph
Space mean speed in outer lanes,	$S_0 = 65.0$	mph
Space mean speed for all vehicles,	$S = 53.0$	mph

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 Applying **div_e**

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Appling
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	3116	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	621	vph	
Length of first accel/decel lane	1000	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	1400	vph	
Position of adjacent ramp	Downstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2000	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3116	621	1400	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	866	173	389	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	3514		700		1556	pcph

Estimation of V12 Diverge Areas

$$L = 0.00 \quad (\text{Equation 25-8 or 25-9})$$

$$EQ$$

$$P = 0.640 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12R} = v_F + (v_R - v_F) P = 2501 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3514	6900	No
v_{12}	2501	4400	No
$v_{FO} = v_F - v_R$	2814	6900	No
v_R	700	2000	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 16.8 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	$D = 0.491$	
Space mean speed in ramp influence area,	$S = 51$	mph
Space mean speed in outer lanes,	$S = 65.8$	mph
Space mean speed for all vehicles,	$S = 54.7$	mph

Germantown_div_e

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Diverge Analysis

Analyst: Brad Winkler
 Agency/Co.: Parsons Brinckerhoff
 Date performed: 12/17/01
 Analysis time period: PM Peak
 Freeway/dir or travel: Walnut Grove North/East
 Junction: Sycamore
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description:

Freeway Data

Type of analysis	Diverge		
Number of lanes in freeway	3		
Free-flow speed on freeway	60.0	mph	
Volume on freeway	5766	vph	

Off Ramp Data

Side of freeway	Right		
Number of lanes in ramp	1		
Free-Flow speed on ramp	35.0	mph	
Volume on ramp	417	vph	
Length of first accel/decel lane	1500	ft	
Length of second accel/decel lane		ft	

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes		
Volume on adjacent ramp	230	vph	
Position of adjacent ramp	Downstream		
Type of adjacent ramp	On		
Distance to adjacent ramp	2200	ft	

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5766	417	230	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	1602	116	64	v
Trucks and buses	3	3	0	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	

Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	
Heavy vehicle adjustment, fHV	0.985		0.985		1.000	
Driver population factor, fP	1.00		1.00		1.00	
Flow rate, vp	6503		470		256	pcph

Estimation of V12 Diverge Areas

$$L = 0.00 \quad (\text{Equation 25-8 or 25-9})$$

$$EQ$$

$$P = 0.576 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 3944 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_F$	6503	6900	No
v_{12}	3944	4400	No
$v_{FO} = v_F - v_R$	6033	6900	No
v_R	470	2000	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 24.7 \quad \text{pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	$D = 0.470$	
Space mean speed in ramp influence area,	$S_R = 52$	mph
Space mean speed in outer lanes,	$S_0 = 59.7$	mph
Space mean speed for all vehicles,	$S = 54.5$	mph

Weaving Sections

2026 Weave Analysis

Location	LOS	D	Sw	cb	HCS File
Sycamore On-Whitten/Kirby Off	E	37.91	41.48	7244	syc_whitten_pm
Whitten On-Applying Off	C	26.17	46.10	7348	Whitten_app_pm

D = Density, pc/mi/ln

Sw = Weaving Segment Speed

cb = Capacity for base condition, pc/h

HCS2000: Freeway Weaving Release 4.1a

Syc_whitten_am

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Operational Analysis

Analyst: Brad Winkler
 Agency/Co.: PBQD
 Date Performed: 2/15/02
 Analysis Time Period: AM Peak
 Freeway/dir or Travel: westbound
 Weaving Location: Sycamore-Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description: Walnut Grove Parjway 2026 Peak Hour Traffic Analysis

Inputs

Freeway free-flow speed, SFF	60	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2200	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.40	
Weaving ratio, R	0.06	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	3236	92	2113	138	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	899	26	587	38	v
Trucks and buses	3	3	3	3	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3649	103	2382	155	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.97	0.35
Weaving and non-weaving speeds, Si	31.83	52.16
Number of lanes required for unconstrained operation, Nw (Exhibit 24-7)		2.07

Maximum number of lanes, N_w (max) (Exhibit 24-7) 1.40
 Type of operation is Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S 41.48 mph
 Weaving segment density, D 37.91 pc/mi/ln
 Level of service, LOS E
 Capacity for base condition, c_b 7244 pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, V_w	2537	2800	a
Average flow rate (pcphpl)	1572	2300	b
Volume ratio, VR	0.40	0.35	c
Weaving ratio, R	0.06	N/A	d
Weaving length (ft)	2200	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR 's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1a
Syc_whitten_am_4 lane

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Operational Analysis

Analyst: Brad Winkler
 Agency/Co.: PBQD
 Date Performed: 2/15/02
 Analysis Time Period: AM Peak
 Freeway/dir or Travel: westbound
 Weaving Location: Sycamore-Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description: Walnut Grove Parjway 2026 Peak Hour Traffic Analysis

Inputs

Freeway free-flow speed, SFF	60	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2200	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.40	
Weaving ratio, R	0.06	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	3236	92	2113	138	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	899	26	587	38	v
Trucks and buses	3	3	3	3	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3649	103	2382	155	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.59	0.26
Weaving and non-weaving speeds, Si	34.33	54.73
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 2.52
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 1.40
 Type of operation is Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S 44.15 mph
 Weaving segment density, D 28.49 pc/mi/ln
 Level of service, LOS D
 Capacity for base condition, cb 10344 pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded See Note	Maximum	Note
Weaving flow rate, Vw	2537	2800		a
Average flow rate (pcphpl)	1257	2300		b
Volume ratio, VR	0.40	0.20		c
Weaving ratio, R	0.06	N/A		d
Weaving length (ft)	2200	2500		e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1a
Syc_whitten_pm

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Operational Analysis

Analyst: Brad Winkler
 Agency/Co.: PBQD
 Date Performed: 2/15/02
 Analysis Time Period: PM Peak
 Freeway/dir or Travel: eastbound
 Weaving Location: Sycamore-Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description: Walnut Grove Parjway 2026 Peak Hour Traffic Analysis

Inputs

Freeway free-flow speed, SFF	60	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2200	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.40	
Weaving ratio, R	0.06	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	3236	92	2113	138	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	899	26	587	38	v
Trucks and buses	3	3	3	3	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3649	103	2382	155	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.97	0.35
Weaving and non-weaving speeds, Si	31.83	52.16
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 2.07
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 1.40
 Type of operation is Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S 41.48 mph
 Weaving segment density, D 37.91 pc/mi/ln
 Level of service, LOS E
 Capacity for base condition, cb 7244 pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	2537	2800	a
Average flow rate (pcphpl)	1572	2300	b
Volume ratio, VR	0.40	0.35	c
Weaving ratio, R	0.06	N/A	d
Weaving length (ft)	2200	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1a
Syc_whitten_pm 4 lane

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Operational Analysis

Analyst: 7rad Winkler
 Agency/Co.: PBQD
 Date Performed: 2/15/02
 Analysis Time Period: PM Peak
 Freeway/dir or Travel: eastbound
 Weaving Location: Sycamore-Whitten
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description: Walnut Grove Parjway 2026 Peak Hour Traffic Analysis

Inputs

Freeway free-flow speed, SFF	60	mph
Weaving number of lanes, N	5	
Weaving segment length, L	2200	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.40	
Weaving ratio, R	0.06	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	3236	92	2113	138	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	899	26	587	38	v
Trucks and buses	3	3	3	3	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3649	103	2382	155	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.59	0.26
Weaving and non-weaving speeds, Si	34.33	54.73
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 2.52
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 1.40
 Type of operation is Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S 44.15 mph
 Weaving segment density, D 28.49 pc/mi/ln
 Level of service, LOS D
 Capacity for base condition, cb 10344 pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	2537	2800	a
Average flow rate (pcphpl)	1257	2300	b
Volume ratio, VR	0.40	0.20	c
Weaving ratio, R	0.06	N/A	d
Weaving length (ft)	2200	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

HCS2000: Freeway Weaving Release 4.1a
whitten_app_pm

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Operational Analysis

Analyst: Brad Winkler
 Agency/Co.: PBQD
 Date Performed: 2/14/02
 Analysis Time Period: PM Peak
 Freeway/dir or Travel: eastbound
 Weaving Location: Whitten-Applying
 Jurisdiction: Shelby County
 Analysis Year: 2026
 Description: Walnut Grove Parkway

Inputs

Freeway free-flow speed, SFF	60	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2400	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	Multilane or C-D
Volume ratio, VR	0.39	
Weaving ratio, R	0.12	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2495	118	1447	200	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	693	33	402	56	v
Trucks and buses	4	4	4	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.980	0.980	0.980	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2827	133	1639	226	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
Weaving intensity factor, Wi	1.38	0.22
Weaving and non-weaving speeds, Si	35.97	56.03
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 1.98
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 1.40
 Type of operation is Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S 46.10 mph
 Weaving segment density, D 26.17 pc/mi/ln
 Level of service, LOS C
 Capacity for base condition, cb 7348 pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded Maximum	See Note
Weaving flow rate, Vw	1865	2800	a
Average flow rate (pcphpl)	1206	2300	b
Volume ratio, VR	0.39	0.35	c
Weaving ratio, R	0.12	N/A	d
Weaving length (ft)	2400	2500	e

Notes:

- a. Capacity constrained by maximum allowable weaving flow rate.
- b. Capacity constrained by basic freeway capacity.
- c. Segments do not operate well at VR's exceeding max. Poor operations and some local queuing are expected in such cases.
- d. Breakdown may occur in some cases for Type C segments.
- e. When length exceeds these limits, merge and diverge are treated as isolated junctions and analyzed accordingly (HCM Chapter 25, HCS Ramps.)

APPENDIX B

Project Photographs















APPENDIX C

Meeting Minutes

December 20, 2001

Mr. Tom Ibrahim
Facilities Planning
Tennessee Department of Transportation
Suite 900, James K. Polk Bldg.
505 Deaderick Street
Nashville, TN 37243

Dear Mr. Ibrahim:

**Subject: APR Field Plan Review 12/19/01
Work Order No. 12, Agreement No. E0514, Project No.
99104-1069-04 Advance Planning Report, Walnut Grove
Road Relocated, Shelby County**

This letter documents the meeting that took place on December 19, 2001 at 1:30 PM for the above referenced project. The meeting took place in a conference room at the Shelby Farms Welcome Center.

The following were in attendance:

NAME	AGENCY	NAME	AGENCY
Tom Ibrahim	TDOT	Wain Gaskins	City of Memphis
Charlie Graves	TDOT	Ted Fox	Shelby County
Jim Hatmaker	TDOT	Nancy Skinner	PBQ&D
Burt Hutchins	TDOT	Brad Winkler	PBQ&D
James Sumler	TDOT	Bob Baker	PBQ&D
Gary Fottrell	FHWA		

General Comments:

It is the desire of the City and County to provide a 'park' like roadway with large grassed and /or landscaped medians. It is also desirable for the speeds to be held to a minimum through the corridor. However, for safety concerns design speed should be based on higher freeway speeds.

The following items were determined from the meeting:

- Design Speed is 60 MPH
- A 72 ft depressed median will be used on basic freeway sections (this will allow for the addition of a 4th lane in each direction to the inside)
- Roadway is classified as a major arterial
- 6-lane section will be the basic freeway section
- Auxiliary lanes will be provided as needed based on traffic analysis
- 12 ft shoulder (10' stabilized) will be provided on inside and outside lanes
- The railroad tracks on Whitten Road will be crossed at-grade
- Trinity Road Tie-in to Appling and Germantown Parkway will not be included in this APR
- The basic R/W width will be 250 ft with additions made as necessary
- All APR design will be based on the railroad corridor remaining intact
- Follow-up meeting will be scheduled for Friday, December 28, 2001
- Delivery of the draft APR is scheduled for January 22, 2001

If you have any questions, please do not hesitate to contact me at (615) 340-9184.

Sincerely,

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Brad S. Winkler, P.E.
Lead Engineer

cc: File
Meeting Attendees
Mr. Bill Hart, TDOT Facilities Planning
Mr. Houston Walker, TDOT Region 3 & 4 Structures Office

January 11, 2002

Mr. Tom Ibrahim
Facilities Planning
Tennessee Department of Transportation
Suite 900, James K. Polk Bldg.
505 Deaderick Street
Nashville, TN 37243

Dear Mr. Ibrahim:

Subject: "Walnut Grove Parkway"
APR Meeting 1/4/02, Walnut Grove Road Relocated
Work Order No. 12, Agreement No. E0514
Project No. 99104-1069-04

This letter documents the meeting that took place on January 4, 2002 at 10:00 AM for the above referenced project. The meeting took place in the 4th floor conference room at TDOT Headquarters in Nashville, TN.

Attendance:

NAME	AGENCY	NAME	AGENCY
Tom Ibrahim	TDOT	Gary Fottrell	FHWA
Dennis Cook	TDOT	Mark Doctor	FHWA
Charlie Graves	TDOT	Wain Gaskins	City of Memphis
Jim Hatmaker	TDOT	Ted Fox	Shelby County
Jerry Moorhead	TDOT	Michael Oakes	Shelby County
Bill Hart	TDOT	Nancy Skinner	PBQ&D
Jim Bryson	TDOT	Brad Winkler	PBQ&D
		Bob Baker	PBQ&D

Meeting Minutes:

It is the desire of the City and County to provide a "park-like" roadway with large grassed and /or landscaped medians. It is also desirable for the speeds to be held to a minimum through the corridor. However, for safety concerns design speed should be based on larger radii.

Shelby County and the City of Memphis want to determine the posted speed. They also are opposed to the use of the term "freeway". **Parkway** is preferred and will be used from this point forward.

Shelby Farms Board supports conceptually alternative "F" which is now called **Walnut Grove Road Relocated**. The Board wants to become an authority. This may happen by July 2002.

FHWA: Can utilize studies from past. However, this is a separate project. A new NEPA document will be required. Parsons Brinckerhoff (PB) is directed to move forward with detailed functional designs and determine footprint impact.

Possible land swap of Section 4(f) areas with area of existing Walnut Grove Road to be removed. Does land swap of Walnut Grove Road removal balance 4(f) impact?

FHWA discussed purpose of project and summed it up in two key points. (1) Get from point A to B, and (2) rejoin the farm.

Valid avoidance alternatives are those that are reasonable and prudent. Looking to see if there is an avoidance alternative is part of the APR process. An avoidance alternative must totally bypass Section 4(f) resources. The APR must contain sufficient information to define avoidance. The avoidance considers what is feasible and prudent. Demonstrate what impacts would be. During the process it is important to describe minimization efforts.

A Purpose and Need statement is needed.

It is County's responsibility to educate the citizens on the purpose of the Walnut Grove Road Relocated project.

Shelby County and the City of Memphis are sponsoring the project. Project funding will come from the originally designated funds for Kirby Parkway, Walnut Grove Road widening and Mullins Station widening.

Why isn't widening Walnut Grove Road an avoidance alternative? It does not meet purpose #2 for rejoining the farm.

County indicates that this project gives up capacity as outlined in previous improvement plans. This is a compromise that should be highlighted. Will things be as good as before?

Concern centers on 60 mph design speed. Prefer to refer to design criteria in terms of minimum radii and degree of curvature.

City and County have concern for Trinity Road's exclusion from the APR. This connector is vital since it provides access to adjacent land uses. Trinity Road will be included in the APR.

The Kirby-Whitten interchange is part of the APR. PB directed to use previous design plans for Kirby Parkway to establish appropriate tie-ins north of the subject area.

It is desirable to have another public meeting that County, City, TDOT, FHWA and PB will attend. The meeting will be held prior to final APR submittal (Maybe mid-March). Functional plans will be presented for both proposed alignment and prudent avoidance alternatives.

Is 72' median excessive or is it context sensitive? Minimum required median is 48 feet as per TDOT standards. Can this be relaxed? 12 ft shoulders by standard are paved. Why not sod with a stabilized foundation? This provides for aesthetics and the farm character.

Design will start with 12' shoulder (10' stabilized). The outside shoulders can be used as one-directional bike lanes thus providing a continuous north/south and east/west bike lane through the farms and connection to any internal bike system that is developed by the farms master plan.

Assume CSX railroad tracks will remain in operation for this APR.

Section 4(f) resources will be added to functional displays. Some additional research will be necessary to identify all Section 4(f) resources.

In order to bypass all Section 4(f) resources it might be necessary to create a new interchange with Germantown Parkway to the north of the existing single point.

New APR deliver date is tentatively set for late March. A public information meeting will be held prior to that date.

Purpose and Need statement will be prepared and circulated for review and comment week of 1/7/02.

If you have any questions or comments, please do not hesitate to contact me at (615) 340-9184 or via e-mail at winkler@pbworld.com.

Sincerely,

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Brad S. Winkler, P.E.
Lead Engineer

cc: File
Meeting Attendees

March 15, 2002

Mr. Tom Ibrahim
Facilities Planning
Tennessee Department of Transportation
Suite 900, James K. Polk Building
505 Deaderick Street
Nashville, TN 37243

Dear Mr. Ibrahim:

**Subject: Walnut Grove Parkway Public Meeting Pre-meeting
Work Order No. 12, Agreement No. E0514
Project No. 99104-1069-04**

This letter documents the meeting that took place on March 8, 2002, at 10:00 AM for the above referenced project. The meeting took place in the 18th floor conference room at TDOT Headquarters in Nashville, TN.

Attendance:

NAME	AGENCY	NAME	AGENCY
Tom Ibrahim	TDOT	Wain Gaskins	City of Memphis
Jerry Moorhead	TDOT	John Conroy	City of Memphis
Charlie Graves	TDOT	Ted Fox	Shelby County
Jim Bryson	TDOT	Michael Oakes	Shelby County
Bill Hart	TDOT	Susan Thrasher	PBQ&D
Dudley Daniel	TDOT	Brad Winkler	PBQ&D
		Bob Baker	PBQ&D

Material Distributed:

Purpose and Need Statement
Minutes from 1/4/02 Meeting
Notice of Public Meeting including a location map

Material Displayed:

Full Size Functional Plan Set
½ size plans pieced together

Summary Agenda:

1. Reason for Meeting:
 - ◆ Preparations for public meeting on 3/26/02
 - ◆ Who will attend
2. Purpose & Need
3. Two Potential Alternatives:

- a. Functional Design: derived from citizen and local jurisdiction input
 - b. Avoidance Alternative: necessary because of Section 4(f) resources
4. Outstanding Issues
- ◆ Traffic Data
 - ◆ Aerial photography for Germantown Parkway
 - ◆ Designation of additional Section 4(f) Properties
5. Display material:
- ◆ Full size functional sets (100 scale)
 - ◆ Wall Displays (functional plans pieced together (100 scale)
 - ◆ Location Map (TDOT)

Meeting Minutes:

The meeting on the 26th will have the following items:

- ◆ Comment Cards (provided by TDOT)
- ◆ Court Reporter (TDOT)
- ◆ 5 Table copies of full size Functional plan sets (PB)
- ◆ 2 Wall Displays @ 1"=100' (PB)
- ◆ Location Map (part of TDOT handout)

The meeting will follow procedures for a TDOT open house. No formal presentation will be made. TDOT, Shelby Count, the City of Memphis and PB staff will be present to answer questions and explain the project. Only one alternative will be displayed since the avoidance alternative does not meet the purpose and need and is therefore not prudent.

Disregard all previous discussions pertaining to the possibility of using the CSX ROW. The current functional layout does not use railroad ROW.

An avoidance alternative is not a viable alternative if it does not meet all of the objectives of the need and purpose. Since the avoidance alternative shown **does not meet the need and purpose** it will be removed from further consideration and not displayed at the March 26 meeting. This does not discount the effort. The work to date was necessary to reach the conclusion that the avoidance was not prudent.

The advertisement shows two possible routes. One being the above mentioned avoidance alternative. TDOT will see about amending the advertisement if possible. The reason the avoidance alternative falls out will be documented in the Q & A handout.

Avoidance alternative will be addressed in Q & A handouts but it will not be displayed. PB will prepare a sensitivity analysis that is not part of the APR. It will be used for clarification and informational purposes only to project stakeholders.

Schedule of activities will be prepared and be included in the hand out material.

Questions and topics to consider in the Q & A handout:

- ◆ How will Section 4(f) properties be mitigated?
- ◆ What is the timeframe?
- ◆ Why were alternatives eliminated?
- ◆ How many lanes?
- ◆ Walnut Grove is not a state route
- ◆ The process is not far enough along to have cost estimates
- ◆ Shelby Farms Master Plan: review and development is timely due to the development of the master plan

TDOT to have a display at entrance posing issues for citizens to think about and comment on including (This information will also be included in handout material):

- ◆ Median type
- ◆ Pedestrian access
- ◆ Berms
- ◆ Bikeways

The recommended flow of information for potential enhancements resulting from the public comment period should follow the following order:

Public Comments to Shelby Farms Board which makes recommendations to Shelby County Government and the City of Memphis in combination/cooperation with the Tennessee Department of Transportation. This is a joint effort with the governments of Shelby County and the City of Memphis, TDOT and FHWA.

If you have any questions or comments, please do not hesitate to contact me at (615) 340-9184 or via e-mail at winkler@pbworld.com.

Sincerely,

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Brad S. Winkler, P.E.
Lead Engineer

cc: File and Meeting Attendees

Purpose of and Need for this Project

The purpose of this project is twofold. The intent is to enhance the transportation network in eastern Shelby County and to consolidate the bulk of the recreational open spaces within Shelby Farms by the relocation of Walnut Grove Road from the mid section of the Farms to its periphery. This proposal is envisioned as a “Parkway” type facility, which is consistent with the master plan for Shelby Farms.

The project will accommodate the proposed continuous north/south vehicular routing of traffic between Humphrey’s Boulevard and Whitten Road (proposed Kirby Parkway north of the Farms). It will also improve the capacity of the Walnut Grove Road segment through Shelby Farms, which is part of a continuous east/west route that stretches from the downtown Memphis area to State Route 385 eastern Shelby County as shown in the Memphis Metropolitan Long Range Transportation Plan. By providing improved access, the new roadway is expected to improve mobility and reduce congestion along existing routes in east Memphis. It will also result in a safer and more efficient roadway system.

The current proposal for the relocation of Walnut Grove Road is the culmination of extensive discussions in Memphis and Shelby County, among local officials and citizens, regarding the future of the Shelby Farms area. This project will result in the physical removal of existing Walnut Grove Road and Farm Road and the construction of an efficient transportation corridor on the eastern and northern boundary of the Farms. The northern and southern halves of the traditional Farms property will then be reunited, and larger areas of open space will be available for recreational use. The removal of the major roadway from the mid section of the Farms will help to enhance the recreational visitor experience.



**PUBLIC MEETING HANDOUT
WALNUT GROVE PARKWAY RELOCATION
FROM HUMPHREYS BOULEVARD
TO SR-177 (GERMANTOWN PARKWAY)
SHELBY COUNTY**

The Tennessee Department of Transportation welcomes you to tonight's informal "Open House" public meeting. The purpose of this meeting is to give the public an opportunity to review and comment on the Department's proposal to relocate Walnut Grove Parkway within stated termini. Please be aware that this plan is preliminary in nature and may change with the input of public opinion.

As depicted on the General Location Map, this project has two viable routes, "proposed route" and "avoidance alternative". Both routes typically have cross-sections of three (3) 12-foot traffic lanes in each direction, 12-foot shoulders, with ditches, and a 72-foot depressed, grassed median, all within a minimum 250-foot right-of-way. Auxiliary lanes connecting ramp movements are provided throughout most of both corridors. Both routes begin at the Wolf-River Bridge. The 4.5-mile "proposed route" remains to the south of the railroad tracks and terminates at the existing Walnut Grove Road @ Germantown Parkway single-point (urban) interchange. The 4.2-mile "avoidance alternative" crosses the railroad tracks twice with grade-separations at each location and ties in the Germantown Parkway at Fischer Steel Road/Walnut Run Road. The "avoidance alternative" was dropped from further consideration because it did not meet the need and purpose of this study.

Comments and suggestions received at this meeting will help further refine all aspects of project alignment and design. Comment sheets are provided and may be turned in at the meeting. Comment sheets and written statements may be mailed to the address below, but they must be received within ten days to be included in the project file for this meeting:

**Project Comments
Tennessee Department of Transportation
Suite 700, James K. Polk Building
505 Deaderick Street
Nashville, Tennessee 37243-0332**

We appreciate your interest and urge everyone to express his or her views on any aspect of this project.

***Walnut Grove Parkway Relocation
Frequently Asked Questions***

1. What is the intent of tonight's public meeting?

The intent of tonight's meeting is to provide preliminary information to the public about the current proposal and invite ongoing public comment and participation in the development of this project. It should be noted that this project is in the early stages of development and effective public involvement is necessary.

2. What is the purpose of this project?

The purpose of this project is twofold. The intent is to improve the transportation network in eastern Shelby County, and enhance the scenic and recreational value of Shelby Farms by removing the existing Walnut Grove Road from the middle of the Farms and relocating it to the northern periphery.

The project is expected to improve mobility and reduce traffic congestion along existing routes in east Memphis. The project will accommodate continuous north-south traffic between Humphreys Boulevard and Whitten Road (proposed Kirby Parkway north of Shelby Farms). It will also continue to serve the east-west traffic movement which is consistent with Memphis Long-Range Transportation Plan.

3. Why did the purpose and need of the original project change?

The purpose and need of the original project changed as a result of the community working together to reach a consensus on an alignment that more closely supported the park and its sensitive environment as well as meeting future traffic demands.

4. What is the Shelby Farms Board role in the process

The Shelby Farms Governance Authority will play a prominent role in providing appropriate input into the process when required.

5. How does this project affect Shelby Farms?

Preliminary studies indicate that the proposal may have varied effects on Shelby Farms. The advantages to Shelby Farms are consolidation of land, better access between north and south Shelby Farms by removal of the bisecting barrier created by the existing Walnut Grove Road, and improving the scenic vistas from the middle of Shelby Farms. The degree of impact and mitigation measures will be assessed as further project development occurs.

6. Who is endorsing this project?

Shelby County and the City of Memphis endorse this project as a way to improve the transportation network in eastern Shelby County and enhance Shelby Farms with the relocation of Walnut Grove Road to the northern periphery, thereby allowing a consolidation of the open spaces within Shelby Farms by removing the existing Walnut Grove Road. This proposal for the relocation of Walnut Grove Road is the culmination of extensive discussions in Memphis and Shelby County among local officials and citizens regarding the future of Shelby Farms recreational areas. This proposal is envisioned as a "Parkway" type facility, which is consistent with the master plan for Shelby Farms.

7. Was an avoidance alternative for this project evaluated?

An avoidance alternative was carefully evaluated and found not to meet the purpose and need for this project. Based on this finding, it was dropped from further consideration.

8. What are some of the features being considered in this project that enhance Shelby Farms?

It is the desire of the City and County to provide a roadway that "fits-in" with the context of the area and is compatible with the park-like setting. Bicycle lanes, landscaped median, and earth berm are being considered.

9. Is the CSX Railroad line is being abandoned, can the proposed roadway utilize that land?

CSX was denied abandonment of rail line; therefore railroad right-of-way can not be used in this proposal.

10. What is the schedule for this project?

The Tennessee Department of Transportation's commitment to Shelby County is to finalize this Advance Planning Report (APR). Based on the results of the APR any future project funding must be consistent with the Memphis Transportation Improvement Program based on transportation priorities identified through the transportation planning process of the Memphis Area Metropolitan Planning Organization (MPO).

11. Have you already made a decision on this project?

No. This project is in the very early stages of development. Public input is very important to the decision-making process to further develop this project.

12. Will there be additional opportunities for public comment and, if so, how many and when?

Yes, additional public meetings/hearings will be held during the Environmental Impact Statement (EIS) as well as design phase. While the exact number and dates have not been determined at this time, there will be a number scheduled throughout the process over a 2-5 year period.

13. What is the estimated cost of this project?

Cost estimates will be developed after decisions reached on type facility and enhancements to be designed.

14. Where will the money come from to build Walnut Grove Road Relocated?

The majority of the funding will be provided by the Federal Highway Administration. Monies that have been allocated for the widening of current Walnut Grove Road and Mullins Station Road will also be used to support construction costs.

15. How much of the funding will come from local sources?

Approximately 20% of the project will come from local sources.

16. Who will ultimately make the decisions?

Elected officials will make the final decisions.

17. What is the timetable for construction of the road?

See attached page with project milestones.

18. Where can I go for answers to future questions?

Shelby County Public Works (545-4266/4565) will provide the lead role in terms of being a single point of contact for questions concerning the proposed project.

Milestones
(Walnut Grove Parkway Relocated)
March 26, 2002

- January 2002.....Draft Advanced Planning Report for
Comments**
- February 2002.....Draft Advanced Planning Report back to
Consultants**
- June 2002.....Finalize Advanced Planning Report Document**
- September 2003Final EIS Approved (18 Months)**
- June 2005.....Design/Survey (21 Months)**
- June 2006.....Appraisal/R.O.W. Acquisition (12 Months)**
- July 2006-January 2007.....Let Construction Contract**

Note: The above dates reflect the earliest possible completion milestones.

APPENDIX D

**Comments from Shelby County
&
City of Memphis**



WILLIE W. HERENTON
City of Memphis Mayor

CITY OF MEMPHIS
AND
SHELBY COUNTY, TENNESSEE

JBS (Moore) *mm*
1088



JIM ROUNT
Shelby County Mayor

August 1, 2001

Commissioner Bruce Saltsman
Tennessee Department of Transportation
7th Floor, James K. Polk Building
505 Deaderick Street
Nashville, TN 37243-0349

RE: Kirby-Whitten Parkway (Alternative "F")

Dear Commissioner Saltsman:

On behalf of the City of Memphis and Shelby County Governments, we request that the Tennessee Department of Transportation (TDOT) begin, at the Department's earliest convenience, an Environmental Assessment (EA)/4F Statement of "Alternative F." In order to more accurately reflect the purpose of this project, we request designation of this alternative as the "Walnut Grove Road Relocation Project." This proposed alignment is the most logical effort to blend the functional needs of Memphis and Shelby County with the pristine attributes of its most prized open space, Shelby Farms. Accordingly, we request that the Walnut Grove Relocation Project replace all alternatives considered in the evaluation process relating to the road alignment in the Shelby Farms area, including the alignments referred to as "Alternatives A through E."

We have worked diligently this past year with members of the community, assessing views and obtaining a broad-based consensus for the goals of this alignment. The assessment of the Walnut Grove Relocation Project will allow the fulfillment of the goals of efficient transportation and traffic safety while enhancing and protecting the environmental values available in Shelby Farms, a unique and magnificent public amenity.

Sincerely,

Willie W. Herenton

Jim Rount

CC: Bill Moore, Chief Engineer
Tennessee Department of Transportation





Shelby County Tennessee

June 28, 2002

Jim Rout, Mayor

Jerry Moorhead
Transportation Planning Office
Suite 900, James K. Polk Bldg.
Nashville, Tennessee 37243-0334

Dear Mr. Moorhead:

Both city and county officials have reviewed the public comments provided during the Walnut Grove Relocation Public Meeting held March 26, 2002. We request that TDOT proceed with the project as scheduled and that additional consideration be given to the cross-section, drainage and interchange designs which were raised as concerns during the public meeting.

In addition, enclosed for your consideration during the design phase of the project is a report provided by the Friends of Shelby Farms who engaged the services of an independent engineering firm to assess parkway options.

Thank you for your office's continued support and efforts as we move this project forward.

Sincerely,

Ted Fox
Director of Public Works

TF/jls

enclosure

SUMMARY AND CONCLUSION

We have reviewed materials, provided by Friends of Shelby Farms, Inc. (FOSF) relating to the proposed plan for new or widened roadways in Shelby Farms. We have focused on plans for "Alternative F," as currently proposed. Based on our review of these materials, we offer the following conclusions:

1. **Need for Arterial Road in the Farms** -- Transportation planning principles for sustainable growth, the 1975 Eckbo Plan, and the recent advancement of Alternative F all argue for a relocated Walnut Grove Road, on the northern perimeter of the Farm. The major alternative to this relocation -- removing but not relocating Walnut Grove Road -- presents large, possibly insurmountable problems of public acceptance. We recommend that the FOSF continue to pursue a design, for Alternative F, that is on the Farm's terms.
2. **Route of Alternative F** -- The route as currently proposed for Alternative F, while observing the broad concept (perimeter location) of the Eckbo Plan, is nevertheless dictated by high-speed freeway geometry. FOSF should insist on revisiting the route, but as an at-grade parkway, and with a design speed more typical of an urban parkway, and therefore more compatible with the Farms.
3. **Road Design Elements** -- The footprint of the proposed roads within the Shelby Farms will be determined by five design elements, all of which are the proper purview of FOSF:
 - a. **Facility Type** -- An at-grade parkway with intersections is vastly preferable to a freeway design. A parkway provides adequate traffic capacity, reasonable vehicle speeds, is consistent with all connecting roadways in all four directions, is vastly less intrusive to the Farms and improves the value of the Farms to the surrounding neighbors.
 - b. **Number of Lanes** -- We suggest that FOSF advocate a cross section of no greater than six lanes to the west of the Sycamore View intersection, and a cross-section of four lanes to the east.
 - c. **Design Speed** -- A design speed of no greater than 40-45 miles per hour, with a resulting posted speed of 35-40 miles per hour is appropriate for a parkway alternative. Design speeds are the single most critical factor in obtaining a roadway that protects the interests of the Farms. High design speeds, extremely damaging to the Farms, yield less traffic capacity than lower design speeds.
 - d. **Vertical Alignment** -- FOSF should insist on a vertical alignment that takes full advantage of the design speed in the 40-45 miles per hour range. This lower design speed will minimize the amount of grading required. Extended sections of cut and cover (i.e., "buried") roadway with

landscaped decking above, are completely reasonable features and should be pursued.

4. **Park Features Incorporated into the Roadway** -- There are many opportunities for making the new road within Shelby Farms into an important asset to the Farms, rather than a threat to it. The FOSF should insist on (1) the road designers gaining an understanding of successful parkway designs throughout the country and (2) expertise in parkway design being added to the road design effort.
5. **Planning Context Outside Shelby Farms** -- The new roadway within the Farms and its connection to existing roads outside the Farms are important factors in the value of the Farms as frontage for adjacent properties, and extending the value of the Farms outward to nearby communities. The FOSF should insist on an intensive urban design initiative throughout the surrounding context (approximately one-mile radius) of the Farms, as an essential complement to the road design.

NEED FOR ARTERIAL ROAD IN SHELBY FARMS

Sustainable transportation planning, defined as transportation planning that seeks not only to move vehicular traffic adequately, but also balances that need with a wide range of community values, is in accord with arterial streets or roads spaced at the interval that Walnut Grove Road now occupies between parallel arterial facilities (Wolf River Parkway to the south, and Mullins Station and Raleigh LaGrange Road to the north). A well spaced and well-connected arterial network has proven to be the most powerful traffic moving machine which can be devised for an urban area. Conversely, the absence of a well-connected network of arterial streets is the primary contributing factor to most of the traffic "bottlenecks" now seen in urban areas. Rather than being distributed to a large mileage of well-connected streets, traffic is channeled onto a limited mileage of streets for which no alternate routes are possible, thereby focusing large amounts of traffic at critical "bottleneck" locations. This situation, frequently seen in rapidly growing suburban areas, leads to the anomaly of traffic congestion while the surrounding land is still only partially developed, sometimes with open rural land still the dominant feature.

Walnut Grove Road through Shelby Farms is an example of the well-connected arterial street, at an appropriate spacing. We concur, therefore, with the emphasis, in the Eckbo Plan and the recent Alternative F, in maintaining its capacity on a parallel alternate route, as the original route through the Farms is downsized or abandoned as an arterial street.

It should be noted that the "bending" of Walnut Grove Road into the north-south direction just to the east of the Wolf River provides a north-south arterial connection, joining Humphries Boulevard to the south and Sycamore View to the north. Thus, a segment of the relocated Walnut Grove Road (as recommended in the Eckbo Plan and Alternative F) does double duty: (1) both as a north-south arterial link connecting

existing but currently discontinuous north-south roads, and (2) as a relocation of the existing Walnut Grove Road. Thus dual function of the relocated Walnut Grove Road is an interesting solution to a perplexing mobility problem.

We are impressed with the depth of understanding of traffic and the need to balance traffic flow with other urban qualities that were demonstrated in the 1975 Eckbo Plan. Though now almost thirty years old, the concept offered in this Plan would still be considered an example of forward thinking on how to balance traffic needs and other needs of the community. The relocation of Walnut Grove Road was a major conclusion of the 1975 Eckbo Plan, and one that no doubt rests on a great deal of deliberation, input from the community, and creative thinking. We find no reason to "second guess" the conclusions of that Plan. To the contrary, we see many reasons for the FOSF to pursue actions that realize the intent of this Plan.

The acceptance, by some elected officials and possibly a sizeable fraction of the public of Alternative F is an interesting, possibly remarkable piece of flexibility. Of the controversial road issues with which we are directly involved, we can point to none in which a consensus, at least in broad concept, was reached from such originally disparate and conflicting positions.

Finally, it is just simply unthinkable, from a public acceptance viewpoint, to pursue a course of both removing Walnut Grove Road from the Farms and not replacing it with some other equivalent east-west arterial capacity. Although some comparisons are made between Walnut Grove and the celebrated Overton Park interstate highway situation, the fundamental realities are actually quite different. Walnut Grove is an existing arterial street, of a sensible size and spacing, serving a valuable function in a surface arterial street system. Interstate 40 through Overton Park was a new segment of freeway, severing rather than joining segments of the City.

For the above reasons, we conclude firmly that FOSF should continue with their policy of cautious acceptance of Alternative F in principle, with a greatly intensified attention to the specific elements of that Alternative's design. These design elements are summarized in the remainder of this report.

ROUTE OF ALTERNATIVE F

The Route of the proposed Alternative F is, in its broad terms, consistent with the concept as advanced in the Eckbo Plan. This concept called for relocation along the northern perimeter of the Farms, with the connection between the relocated segment just east of the Wolf River to be accomplished in a north-south segment of roadway.

We are concerned that the route as currently proposed for Alternative F, while observing the broad concept (perimeter location) of the Eckbo Plan, is nevertheless now being dictated by the geometric design requirements of a high-speed freeway, rather than by sensitivity to the Farms. The design speed of the proposed road, its cross-section as a limited access freeway rather than a parkway, and other important geometric design

the design features as currently proposed, while possibly saving a few seconds of travel time, create large impacts on the Farms, and degrade the experience of driving through the Farms for the motorists themselves.

FACILITY TYPE

It does not appear that the decision to make the relocated Walnut Grove into a freeway flowed from a design dialogue that considered both traffic needs and the other needs of the community. Rather, it appears that the decision to design the road as a freeway was made simply on the basis of traffic projections and a priori decision to have a freeway link within this segment. While some consideration was paid to Farm features, such as existing forested areas, the primary determinant of the road's route was the need to accommodate freeway alignment features.

The FOSF should insist on revisiting the route decision, in detail, with the road cross section redefined as an at-grade parkway, and with a design speed compatible with the Farms (i.e., 35-40 miles per hour).

The differences between an at-grade parkway and the limited access freeway are summarized in *Table 1*.

Table 1
Comparison of Limited Access and At-Grade Designs

Design Feature	Limited Access Highways	At-Grade Arterial Street/Road
Cross-Street Connections	Interchanges (grade-separated) at no more than 3-4 locations	At-grade intersections, roundabouts, signal at major intersections
Non-Intersecting Cross-Streets	On or under bridges	Non-connecting cross streets unlikely; on/under bridge when occurring
Design Speed	Typically, 60 miles per hour, but can be lower	Typically 35-45 miles per hour, but can be higher
Driveways?	No	Possible, but should be limited or prohibited
Hourly Vehicle Capacity, One Direction	2,000 vehicles per hour per lane, (reflects free-flow condition)	1,200 vehicles per hour per lane, (reflects need to share right-of-way at signals)
Pavement Cross Section	Typically rural (open drainage swales), can be enclosed drainage	Typically enclosed drainage (curb/gutter), but can be rural open-swale
Fronting Development	None	Can be major, vibrant, memorable
Flexibility for New Intersections	Locks in interchange spacing for long time, or even permanently	Much flexibility to add intersections

Sidewalks	Typically none, but can be successfully added as side paths away from the road	Typically along both sides of the road
Pedestrian Crosswalks	None. Pedestrians cross at interchanges, on/under bridges at non-connecting cross streets or on pedestrian bridges or tunnels	At signalized intersections, at crosswalks, or on pedestrian bridges and tunnels
Bicycle Transportation	On trails, or side paths, in or alongside road right-of-way	Can be on road, but preferably on a trail or side path

As outlined in *Table 1*, three of the differences between the limited access and surface arterial cross sections are enormously important to how well the road complements the Farms: (1) the design speed, which is the single most important factor in both the horizontal and vertical alignment of the road, (2) the difference between interchanges (vertical and inflexible) versus at-grade intersections (no vertical elevation, with flexibility for future additions), and (3) the ability for the road to be fronted by useful activity.

NUMBER OF LANES

We recommend that FOSF not accept a road cross section of more than six lanes west of Sycamore View, and four lanes to the east of that point. This number of lanes will carry the year 2020 traffic as currently projected.

However, we feel that even these projections are too high. The traffic projections assume a pattern of travel demand that continues the trends of the last two decades. The most important traffic feature of these trends is that they produce more vehicle miles of travel per capita. This projection of growth in vehicle miles per person comes from assuming an accelerated rate of suburban sprawl, continued disinvestments in Memphis, and relocation of population and business to eastern Shelby County and beyond.

The type of development being forecast in the travel demand models is in conflict with the stated goals of the comprehensive plans of Shelby County, Memphis and the other constituent municipalities in the region. Invariably, these plans call for compact growth, livable communities, reduction in vehicle miles of travel, development of alternative modes of travel, and so forth. Travel demand models that ignore these plan statements, and simply continue the trends of the last two decades, are not only non-responsive to local plans, but conflict with local plans in many ways.

A 4-Lane/6-Lane Parkway Alternative Has Not Yet Been Tested

The travel demand forecasting process for the roadway has not yet tested an at-grade parkway alternative. Thus, there is no understanding of the impact, on traffic and land use patterns, of alternatives other than providing for a freeway through the Farms. Some of the questions left unanswered by not having yet studied the traffic forecast for an at-grade alternative include the reduced volumes that would be expected on the parkway

through Shelby Farms, traffic volumes on parallel, crosswise and adjacent roadways, change in land use patterns as the real estate and employment markets adjust to the realities of mobility, and so forth. If the forthcoming Environmental Impact States (EIS) does not address this alternative, the FOSF should insist on its addition to the environmental documentation.

DESIGN SPEED

Design speed, determined at the outset of the design process, is the most important factor affecting the impact of the proposed road on the environmental of Shelby Farms. The design speed dictates the dimensions of the road design elements that account for most of its appearance and impacts:

- **Horizontal Alignment** -- Design speed dictates the maximum curvature (i.e., minimum radius) of the road, which in turn greatly affects the ability to fit the road to the landscape and built environment.
- **Vertical Alignment** -- Design speed dictates a minimum sight distance, which in turn establishes how "flat" or "hilly" the road can be, greatly affecting the extent of earth moving and therefore the appearance of the road.
- **Merging, Weaving Distances** -- Design speed dictates the length of auxiliary lanes needed for merging and weaving operations, thus establishing roadway width near interchanges.

The "harshness" of design requirements increases exponentially as design speeds increase. Thus, even small changes in design speed have large consequences for road impact. For example, the stopping sight distance (a key element in vertical alignment) doubles as design speed increases by just 20 miles per hour, from 40 miles per hour to 60 miles per hour. This doubling of required sight distance, in turn, requires a disproportionate extent of cutting of hills, "flattening" of slopes, and other unsightly earthmoving.

Proper road design does not dictate that high design speeds be adopted. The "bible" of road design (the AASHTO "Green Book," *A Policy on Geometric Design of Highways and Streets*) allows for design speeds ranging from 15 miles per hour to 80 miles per hour, and arrays the design variables (radius, sight distance, etc.) accordingly. Road designers have wide latitude in choosing a design speed, and are urged by the AASHTO "Green Book" to use judgment in setting a design speed that does not simply move traffic as fast as possible, but also considers a host of other needs of the community.

It is frequently assumed, by road designers and the public, that high design speeds are closely tied to traffic capacity, and that high-speed roads are needed to carry the projected traffic volumes. This assumption is not correct. Roadways carry their maximum traffic volume at traffic speeds of 30-40 miles per hour. Above this range (i.e., 30-40 miles per hour) the capacity of the road DECREASES, as drivers space themselves more widely,

reflecting an intuitive understanding of the exponentially greater stopping distance needed as speed rises.

Thus, there is no advantage, to traffic capacity, in designing the road for an intended operating speed (i.e., design speed) of more than 40 miles per hour or so. To the contrary, traffic capacity and the preservation of the Farms argue for design speeds of no greater than 40 miles per hour.

A high design speed (45-50 miles per hour or greater) for the proposed road through Shelby Farms is inconsistent with the adjoining road system. Walnut Grove to both the east and west of the Farms is an urban arterial street, fronted by valuable properties. Planned connecting streets (for example, Sycamore View of Mullins Station) are minor arterial streets, also fronted by homes and businesses. A segment of freeway, with design speed of 60 miles per hour or greater, would be seriously inconsistent with the connecting fabric of streets. Some of the traffic consequences of this inconsistency are speeding and vehicle overtaking on nearby segments (for example, in front of the Hospital), failure to observe nearby traffic signals, and failure to anticipate normal urban demands (e.g., pedestrian, driveway traffic) on nearby street segments.

The character of the surrounding area is already urban, and is rapidly becoming more so, as demonstrated by the growth of institutions (hospital, schools) and businesses. Inserting an anomalous segment of rural freeway into this urban environment is detrimental to the travel needs of the adjacent area.

VERTICAL ALIGNMENT

The vertical alignment ("profile") of the proposed road is as important as its horizontal alignment (route) in establishing how the road either complements or degrades the Farms through which it passes. The visibility of road structures, visibility of moving traffic, noise incidence pattern and nighttime light pollution are all likely to be determined more by profile than by any other design element.

Major design options which affect the vertical alignment are:

- **Design Speed** -- This design decision determines how lightly or heavily the road profile will lay on the terrain. The extent of hill cutting, valley filling and side slope terracing is largely set by the adopted design speed. Consequently, high design speeds, typical of a freeway alternative, will have a harsh impact on the Farms' landscape. Conversely, lower design speeds, typical of an urban parkway, will permit the road to lay more lightly on the landscape.
- **Depressed Roadway** -- A road profile in a "cut" or more natural looking (but man-made) swale could greatly reduce the impact of the road's vertical alignment.
- **Cut and Cover** -- Decking over parts of the road with a landscaped cover hides parts of the road, screens its impacts from the Farms, and gives continuity to Farm

land that would otherwise be severed by the road. Duluth, Minnesota and Seattle, Washington have extensive sections of cut and cover freeway alignment.

- **Split Profile** -- Putting each direction of a divided highway onto separate, differing profiles allows the road to fit more lightly onto the terrain. Split profiles are seen extensively on rural Interstate and other divided highways.
- **Interchange Design** -- Depressing (rather than raising) one of the intersecting roadways will confine intersection profiles to ground level and below. Innovative interchange designs can eliminate the need for more than two levels of roadway.

PARKWAY DESIGN

The magnificence of Shelby Farms as a rural centerpiece for an urban area, and the one-time chance to complement the Farms with a new parkway argues strongly for bringing the best possible design talent to bear. The FOSF should insist that designers for the new parkway within Shelby Farms be deeply familiar with parkways throughout the U.S. and even internationally. The extraordinary nature of the opportunity warrants an extraordinary level of talent to be applied to the design. The FOSF is fully justified in taking the lead in insisting that designers (individual or firms) with national and international credentials and track record in parkway design be added to the design team for the road.

There are many examples, throughout the U.S., of parkways or other types of major roadways with design features highly applicable to a new parkway within Shelby Farms. A few of these examples are:

- **Rock Creek Parkway, Washington, D.C.** -- A catalog of parkway design features, particularly low-speed geometrics, beautiful overpasses, parallel trails, sensitivity to nature and connection to the surrounding city.
- **Martin Luther King Drive, Rockefeller Park, Cleveland** -- A handsome restoration of a turn-of-the-century parkway, now in use as a major arterial road. Features include low-speed geometrics, interesting and asymmetrical bridges, at-grade intersections, and interesting transitions through non-park areas.
- **Merrit Parkway, Connecticut** -- Famous and still-handsome example of rural parkway, now carrying enormous volumes of urban traffic. Design features include many glades, natural materials, and compact interchanges.
- **Blue Ridge Parkway (several eastern states) and Natchez Trace Parkway (Mississippi and Tennessee)** -- Outstanding examples of rural-appearing parkways, often threaded through settled areas. Design features include an entire catalog of roadside landscape treatments, view-shed creation, use of native materials, and low-speed geometrics.

- **Scajaquada Expressway, Buffalo** -- Restoration planned for converting this freeway-like link of the major road system back to the parkway originally planned and built by Olmstead as a part of Delaware Park.
- **Interstate 70, Glenwood Canyon (west of Denver)** -- Widely publicized and spectacular design of a freeway, in challenging terrain. Adopted design differed radically from original design, which was for an ordinary freeway segment.
- **Fort Washington Way, Cincinnati** -- A just-completed major project, which located two interstates (I-71 and I-75) in a depressed section through Cincinnati's riverfront, and flanked them with a pair of handsome urban arterials, connected with numerous new bridges across the depressed freeway.
- **Interstate 35, Duluth, Minnesota** -- Extensive application of cut and cover construction over an interstate in a downtown area. Features terraced decking, park areas on the deck, hardscape and landscape features, and improved access to the downtown area.
- **Interstate 5, Seattle** -- Highly publicized example of spectacular decking over an interstate highway. Design features include interesting grade changes across the covered section, elaborate landscaping, and dramatic hardscape features (walls, stairways, etc.).

The above listings are but a few of the examples of successful parkway design in the United States. The older of these examples have withstood the challenges of urban growth, and most now carry traffic volumes equivalent to major freeways. The more recent examples demonstrate that the creation of urban parkways is by no means a "lost art" appropriate only for an earlier era of road building.

The examples of good parkway design, with elements highly applicable to the roadway through Shelby Farms, argue strongly that the design team, both as presently constituted and with recommended addition of parkway specialists, make an intensive study tour of as many representative examples as possible.

The FOSF has every right to insist that the design process for the road be conducted as an open design dialogue, with the FOSF and other stakeholders fully involved. A design dialogue would include focus group workshops, community design sessions, an intensive on-site design workshop, and hands-on design input from participants.

DESIGN CONTEXT OF SHELBY FARMS AND ITS PROPOSED NEW ROAD

Shelby Farms as the potential to become a major "centerpiece" of the eastern Memphis urban area. The extensive perimeter of the Farms, analogous to waterfronts in many cities, can become an exquisitely high-valued site for institutions, infill residential developments, commercial villages and so forth. With foresight, the value of the Farms can be "carried outward" on connecting streets, as in, for example, Minneapolis, where

local street design and connectivity “carries” the value of lake frontage many blocks inland.

While the potential value of the Farms to its surroundings is enormous, capturing this value is no simple matter, and will almost certainly not happen without a bold strategic plan.

Planning for the Farms and its roads has not yet addressed the surrounding urban contexts. The Eckbo plan, although visionary and durable, treats the Farms in freestanding isolation. Road planning (including Alternative F), while concerned with road connections beyond the Farms, has no scope or mission to strategically plan the Farms’ surroundings.

The FOSF should take the lead in advocating that a comprehensive urban design strategy plan accompany any road design within the Farms. Numerous highly successful examples of such plans are available to serve as models for Shelby Farms and its surrounding area.

City of



Memphis

Inter-Office Memorandum

TO: John Corroy, City Engineer
FROM: Wain Gaskins, Administrator *WJG*
Transportation Planning and Design
DATE: May 10, 2002
SUBJECT: Walnut Grove Relocation Public Meeting Comments

Attached are the comments received by TDOT on the Walnut Grove Relocation Public Meeting held March 26, 2002. The document includes comments taken verbally, comment cards and letters/emails sent to TDOT within the identified comment period.

In my conversations with TDOT, they are awaiting the local review and input on the meeting comments before proceeding forward with the project. Three (3) copies were sent to Ted Fox. I got this copy of the comments from the TDOT planning office in Nashville on my recent trip. Pam from Mike Oakes' office had called while I was in Nashville to see if I had gotten a copy of the comments.

I have read all the comments in the documents. Based on my count, there were 65 separate comments on the project. Of this number, 15 were generally in favor of the relocation (Alt F) alignment. Some of these suggested that the "size" of the roadway be looked at and some other modifications be considered.

Nine (9) responses didn't really fall into a category. It was hard to get a read if they were generally for or against the alignment and/or project. They spoke to urban sprawl and the street system in general.

Forty-one (41) responses ranged from mild opposition to "no road" comments. About 12 of these were a copy of a form response signed by different people. Several of the comments focused on the format of the meeting stating that not enough information was provided, that it wasn't an open meeting, that it was not advertised properly, etc.

Some of the comments against the project stated that Walnut Grove Road should be left in place and widened to accommodate the traffic. There appeared to be little acknowledgement of the purpose and need for the project and need for a north/south Kirby Parkway connection. Practically all of the comments focused on east/west traffic when traffic was a consideration at all.

In general, the comments fall along the lines of what was expected. To my knowledge, the format and advertisement of the meeting was standard for the typical TDOT public meetings that are held throughout the state. The form letter is evidence of the organized opposition to the project that has been experienced all along. It does not appear that the organized groups have followed through on their "sign-off" of the project which led to the selection of Alt F as the preferred alternative.

John Conroy
March 10, 2002
Page 2

I think that TDOT should proceed with the project as scheduled with consideration given to the cross-section, laneage, interchanges, etc., which were raised as concerns in the comments. Consideration should also be given to accommodating the north/south movement of traffic along Kirby Parkway, which wasn't really addressed in the comments from the public.

c:/tdot/altcomments

APPENDIX E

Functional Plans

Index Of Sheets

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-2B	TYPICAL SECTIONS
3-12	WALNUT GROVE PARKWAY
5A-5D	SYCAMORE VIEW ROAD
8A	TRINITY ROAD
13-17	EXISTING WALNUT GROVE ROAD
17A	S. OF GERMANTOWN/WALNUT GROVE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING AND DEVELOPMENT

SHELBY COUNTY

WALNUT GROVE PARKWAY
FROM WOLF RIVER BRIDGE
TO GERMANTOWN PARKWAY

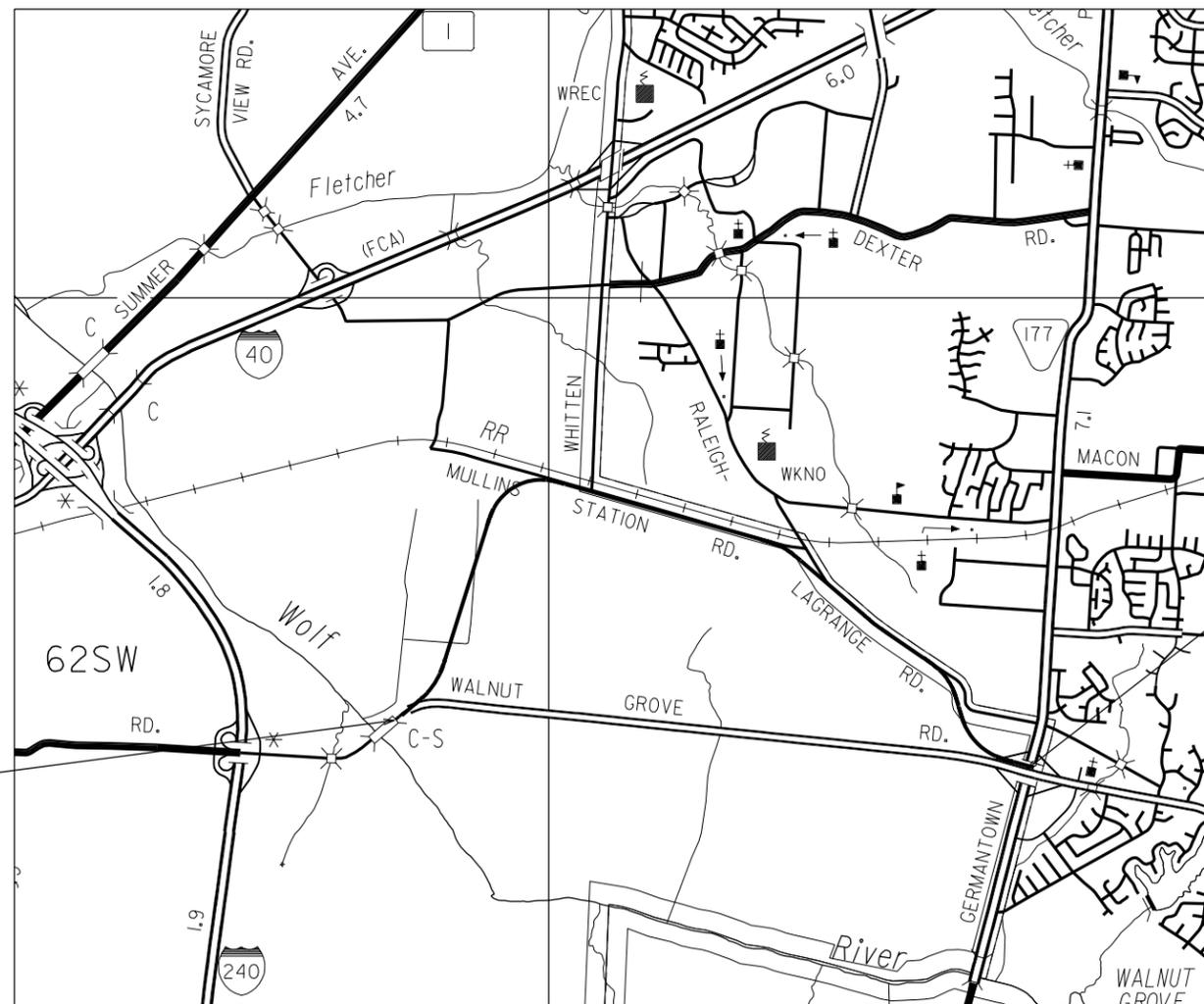
STATE HIGHWAY NO. F.A.H.S. NO.

TENN.	YEAR	SHEET NO.
	2002	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		



PROJECT LOCATION

FUNCTIONAL PLANS
NOT FOR CONSTRUCTION



BEGIN PROJECT

END PROJECT

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 1995 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT

SCALE: 1" = 2000'



TDOT ROAD SP. SV. 2 _____
DESIGNED BY PARSONS BRINCKERHOFF
DESIGNER ROBERT BAKER CHECKED BY BRAD WINKLER
P.E. NO. _____

APPROVED: _____
DIRECTOR, DESIGN DIVISION

DATE: _____

APPROVED: _____
COMMISSIONER

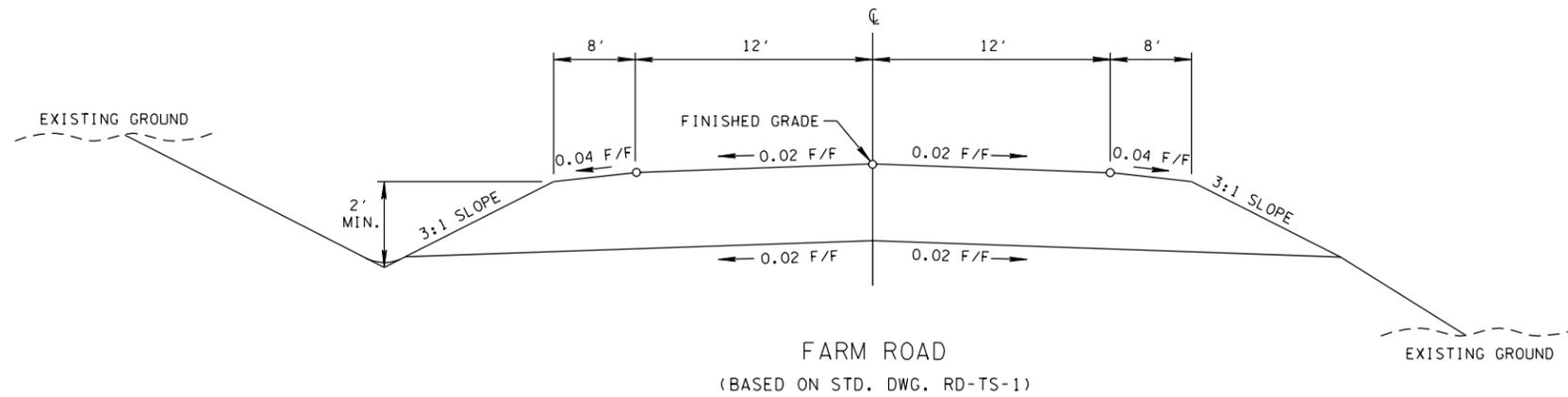
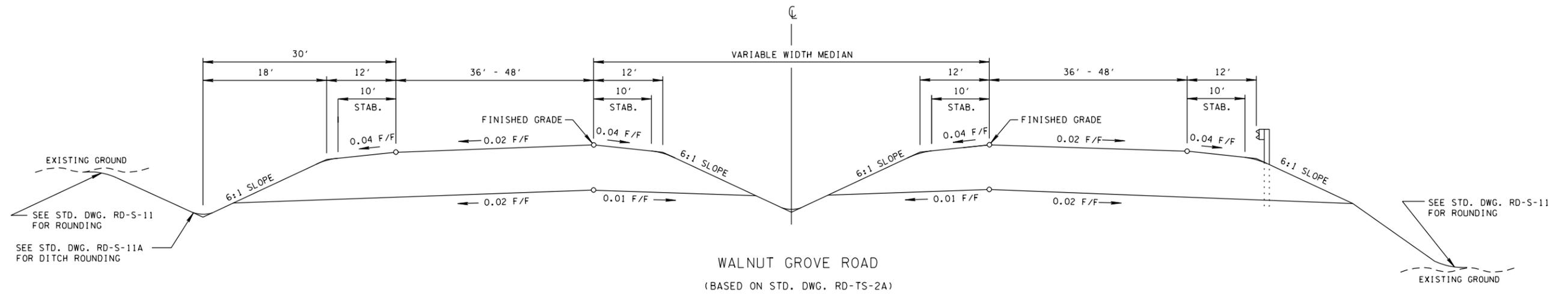
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED: _____
DIVISION ADMINISTRATOR DATE

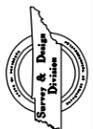
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07/27/02



TYPE	YEAR	PROJECT NO.	SHEET NO.
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07/12/02
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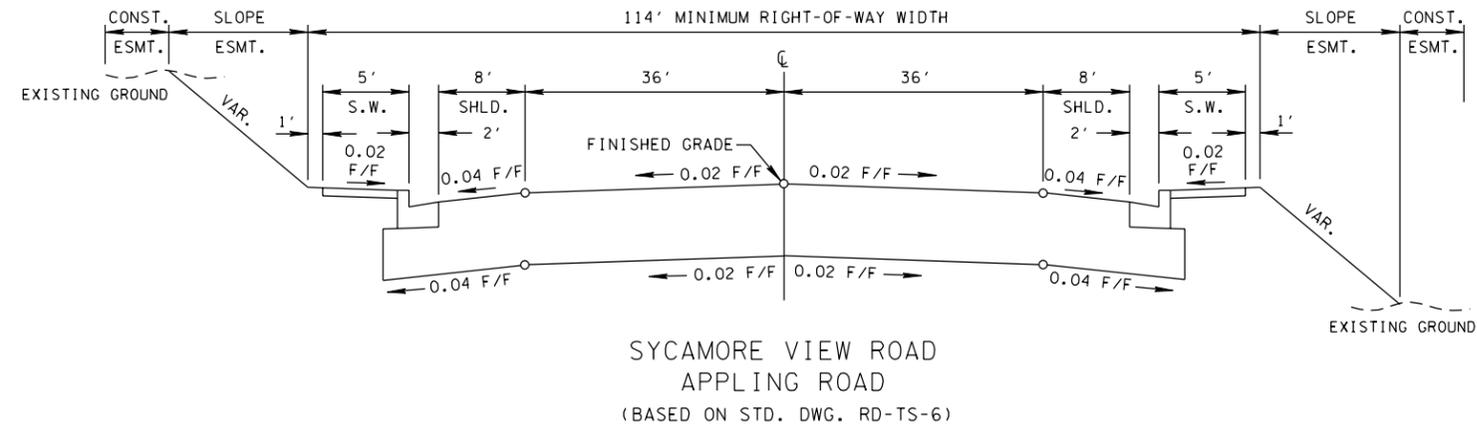
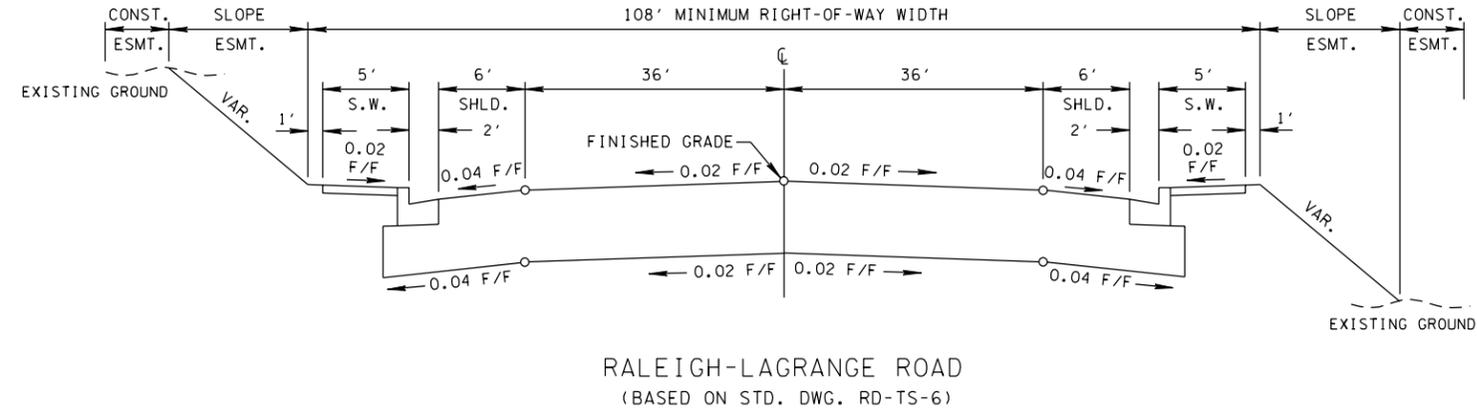


COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TGRN.

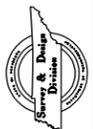
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

TYPICAL
 SECTIONS

TYPE	YEAR	PROJECT NO.	SHEET NO.
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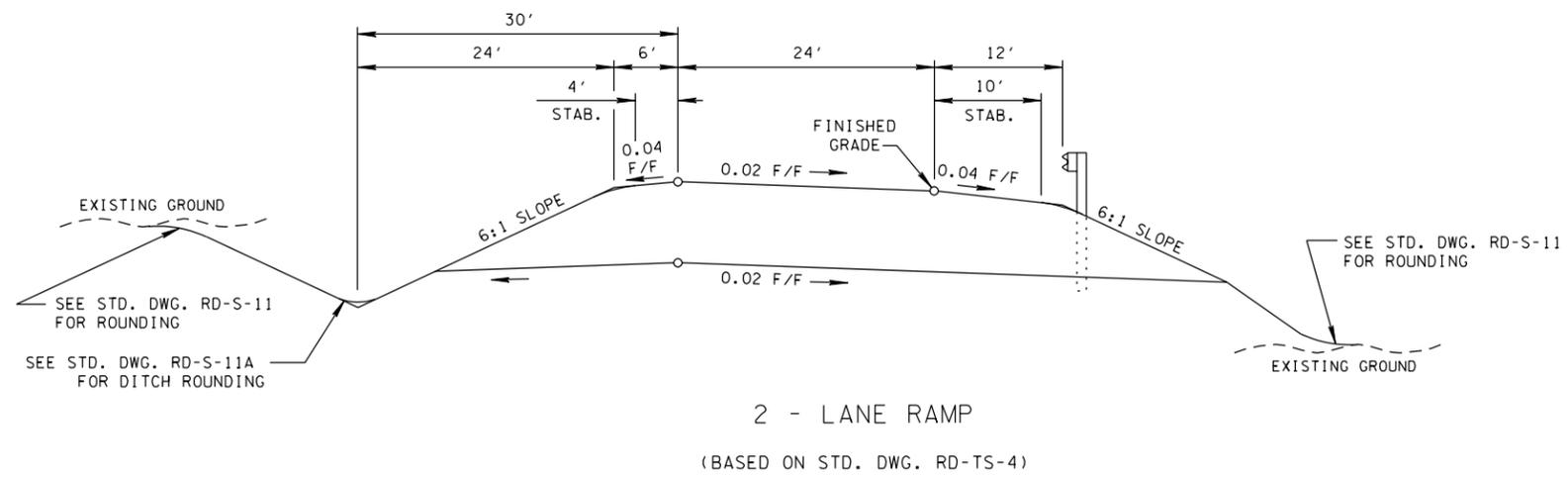
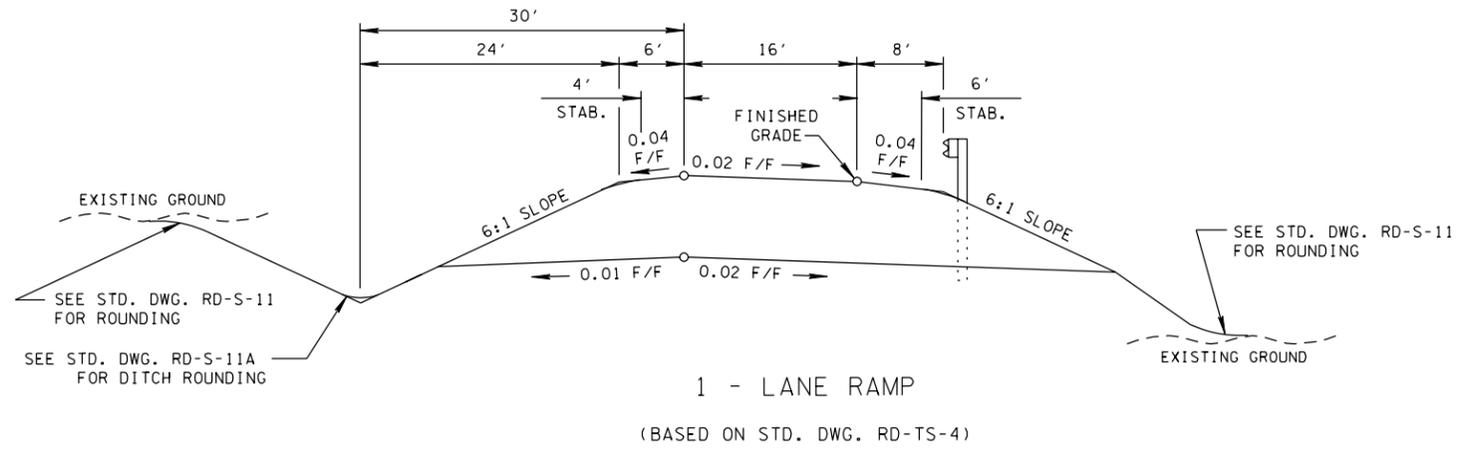


COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TGRN.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

TYPICAL
 SECTIONS

TYPE	YEAR	PROJECT NO.	SHEET NO.
			2B



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COORDINATE VALUES ARE NAD/83(1995)
AND ARE DATUM ADJUSTED BY THE
FACTOR 1.00 & TIED TO THE TGRN.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

TYPICAL
SECTIONS

TYPE	YEAR	PROJECT NO.	SHEET NO.
			3



TYPE	YEAR	PROJECT NO.	SHEET NO.
			4

CURVE ALG-1
 PI 112+31.87
 N 293,525.8100
 E 848,901.3340
 Δs 32° 16' 39" (LT)
 Δs 7° 03' 00"
 Δo 18° 10' 39" (LT)
 D 3° 00' 00"
 R 1,909.86
 Lc 605.91
 Ts 788.93
 Ls 470.00



MATCH LINE STA. 112+00 SEE SHEET NO. 3

CS Sta. 115+18.86

ST Sta. 119+88.86

10' X 10' BOX CULVERT (PEDESTRIAN UNDERPASS)

PROP. R.O.W. (C.A.) & FENCE

115+00 120+00 125+00 130+00 135+00 140+00

250'

48'

72'

48'

16'

16'

MATCH LINE STA. 140+00 SEE SHEET NO. 5

N 17° 28' 16" E
 3,571.06'

 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 112+00 TO STA. 140+00
 SCALE: 1"=100'

07/15/2002
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TYPE	YEAR	PROJECT NO.	SHEET NO.
			5



MATCH LINE STA. 154+00 SEE SHEET NO. 5A

MATCH LINE STA. 140+00 SEE SHEET NO. 4

140+00 145+00 150+00 155+00 160+00 165+00

MATCH LINE STA. 173+00 SEE SHEET NO. 5D

PROP. R.O.W.

PROP. R.O.W.

SYCAMORE VIEW ROAD

PROP. R.O.W. (C.A.) & FENCE

PROP. R.O.W. (C.A.) & FENCE

PROP. R.O.W.

PROP. R.O.W.

FARM ROAD

FARM ROAD



CURVE ALG-2
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 E 850,738.9740
 ΔS 88° 19' 01" (RT)
 ΔS 10° 30' 00"
 ΔC 67° 19' 01" (RT)
 D 4° 00' 00"
 R 1,432.39
 Lc 1,682.92
 Ts 1,660.90
 Ls 525.00

 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR L00 & TIED TO THE TGRN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 140+00 TO STA. 169+00
 SCALE: 1"=100'

07/15/2002
 of N5860\vol2_walnut\roadway\5861p03.dgn



TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			5A

CURVE SYCAMORE-1
 PI 134+18.67
 N 297,622.4920
 E 846,626.5910
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 D 3° 00' 00"
 R 1,909.86
 Lc 2,368.32
 T 1,363.53



07/15/2002
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COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 130+00 TO STA. 154+00
 SCALE: 1"=100'

TYPE	YEAR	PROJECT NO.	SHEET NO.
			5B



CURVE SYCAMORE-1
 PI 134+18.67
 N 297,622.4920
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 Δ 71° 02' 58" (LT)
 Δ 3° 00' 00"
 R 1,909.86
 LG 2,368.32
 T 1,363.53



 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TGN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 106+00 TO STA. 130+00
 SCALE: 1"=100'

07/15/2002
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TENNESSEE D.O.T.
 DESIGN DIVISION
 FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			5C



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 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.000000 & TIED TO THE TGN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 100+00 TO STA. 106+00
 SCALE: 1"=100'

TENNESSEE D.O.T.
 DESIGN DIVISION
 FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			6



CURVE ALG-2

PI	173+20.82
N	299,362.3310
E	850,738.9740
Δs	88° 19' 01" (RT)
θs	10° 30' 00"
Δc	67° 19' 01" (RT)
D	4° 00' 00"
R	1,432.39
Lo	1,682.92
Ts	1,660.90
Ls	525.00

COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TGN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 169+00 TO STA. 188+00
 SCALE: 1"=100'

07/15/2002
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TYPE	YEAR	PROJECT NO.	SHEET NO.
			7



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COORDINATE VALUES ARE NAD/83(995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TGN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 188+00 TO STA. 217+00
 SCALE: 1"=100'

TYPE	YEAR	PROJECT NO.	SHEET NO.
			8

CURVE APPLING-1
PI 106+82.29
N 298,143.0350
E 857,559.0320
A 32° 06' 46" (RT)
D 3° 30' 00"
L 1,637.02
Lo 917.50
T 471.15

CURVE TRINITY-1
PI 104+11.53
N 298,014.5730
E 858,052.9800
A 16° 19' 53" (LT)
D 6° 00' 00"
L 954.93
Lo 272.19
T 137.02

CURVE ALG-3
PI 244+76.93
N 297,255.0920
E 858,191.7910
A 24° 47' 20" (RT)
D 8° 50' 15"
L 203.26
Lo 613.48
T 505.00



MATCH LINE STA. 217+00 SEE SHEET NO. 7

MATCH LINE STA. 245+00 SEE SHEET NO. 9

AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
STA. 217+00 TO STA. 245+00
SCALE: 1"=100'

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TYPE	YEAR	PROJECT NO.	SHEET NO.
			8A



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CURVE TRINITY-2
 PT 110+12.44
 N 297,782.8020
 E 858,609.4070
 Δ 34° 47' 55" (RT)
 R 6° 00' 00"
 L 95.00
 T 573.24
 T 299.24

CURVE TRINITY-1
 PT 111+28.64
 N 295,000.6050
 E 858,609.4070
 Δ 34° 47' 55" (RT)
 R 6° 00' 00"
 L 95.00
 T 573.24
 T 299.24

COORDINATE VALUES ARE NAD/83(1995)
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 FACTOR 1.0000000000 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 111+00 TO STA. 122+76
 SCALE: 1"=100'

TYPE	YEAR	PROJECT NO.	SHEET NO.
			9



CURVE TRINITY-2
 PI 110+12.44
 N 297,782.8020
 E 858,609.4070
 Δ 34° 47' 55" (RT)
 D 6° 00' 00"
 R 954.93
 Lc 519.99
 Ts 299.24

CURVE TRINITY
 PI 117+47.39
 N 297,139.5750
 E 820,609.6090
 Δ 1° 23' 30" (RT)
 D 0° 00' 00"
 R 1,159.15
 Lc 268.43
 Ts 134.39

CURVE TRINITY-4
 PI 126+96.12
 N 296,336.9610
 E 859,507.5510
 Δ 17° 52' 34" (LT)
 D 6° 00' 00"
 R 954.93
 Lc 297.93
 Ts 150.19

CURVE ALG-3
 PI 244+76.93
 N 27,255.0920
 E 858,191.7910
 Δ 24° 47' 20" (RT)
 Δ 8° 00' 15"
 Δ 7° 06' 50" (RT)
 D 3° 30' 00"
 R 1,637.02
 Lc 203.26
 Ts 613.48
 Ls 505.00

COORDINATE VALUES ARE NAD/83(1995)
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 FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 245+00 TO STA. 272+00
 SCALE: 1"=100'

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TYPE	YEAR	PROJECT NO.	SHEET NO.
			10

CURVE TRINITY-5
 PI 143+47.62
 N 295,254.5550
 E 860,758.1080
 Δs 6° 42' 36" (LT)
 θs 1° 30' 00"
 Δc 3,819.72
 Lc 447.34
 Ls 223.92

CURVE TRINITY-6
 PI 166+11.70
 N 293,982.7300
 E 862,631.8540
 Δs 73° 15' 22" (LT)
 θs 5° 00' 00"
 Δc 1,145.92
 Lc 1,465.12
 Ls 851.90

CURVE ALG-4
 PI 277+16.14
 N 295,139.1710
 E 860,662.4920
 Δs 6° 14' 15" (LT)
 θs 1° 19' 30"
 Δc 3° 35' 15" (LT)
 D 1° 00' 00"
 R 5,729.58
 Lc 358.75
 Ts 444.71
 Ls 265.00

CURVE ALG-5
 PI 301+23.72
 N 293,780.6880
 E 862,651.0150
 Δs 39° 42' 30" (RT)
 θs 8° 50' 15"
 Δc 22° 02' 00" (RT)
 D 3° 30' 00"
 R 1,637.02
 Lc 629.52
 Ts 845.76
 Ls 505.00



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 DEPARTMENT OF TRANSPORTATION
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PROPOSED LAYOUT
 STA. 272+00 TO STA. 300+00
 SCALE: 1"=100'

TYPE	YEAR	PROJECT NO.	SHEET NO.
			11

CURVE TRINITY-6
 PI 166+11.70
 M 293,982.7300
 E 862,651.8340
 Δs 73° 15' 22" (LT)
 Δc 5° 00' 00"
 Δl 1,145.92
 Lc 1,422.12
 Ls 851.90

CURVE ALC-6
 PI 321+45.85
 M 291,786.85
 E 863,721.0570
 Δs 47° 50' 15" (LT)
 Δc 3° 30' 00" (LT)
 Δl 1,637.02
 Lc 1,822.33
 Ls 505.00

CURVE ALC-5
 PI 301+23.72
 M 293,780.6880
 E 862,651.0150
 Δs 39° 02' 30" (RT)
 Δc 8° 50' 15"
 Δl 1,637.02
 Lc 629.52
 Ls 845.76
 Ls 505.00

MATCH LINE STA. 300+00 SEE SHEET NO. 10

MATCH LINE STA. 328+00 SEE SHEET NO. 12

10' X 10' BOX CULVERT
(PEDESTRIAN UNDERPASS)

 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
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FACTOR 1.00 & TIED TO THE TORN

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DEPARTMENT OF TRANSPORTATION
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PROPOSED LAYOUT

STA. 300+00 TO STA. 328+00
SCALE: 1"=100'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			12



COORDINATE VALUES ARE NAD/83(1995)
AND ARE DATUM ADJUSTED BY THE
FACTOR 1.000 & TIED TO THE TORN

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**PROPOSED
LAYOUT**

STA. 328+00 TO STA. 337+54.16

SCALE: 1"=100'

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TENNESSEE D.O.T.
 DESIGN DIVISION
 FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			13



 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.000 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

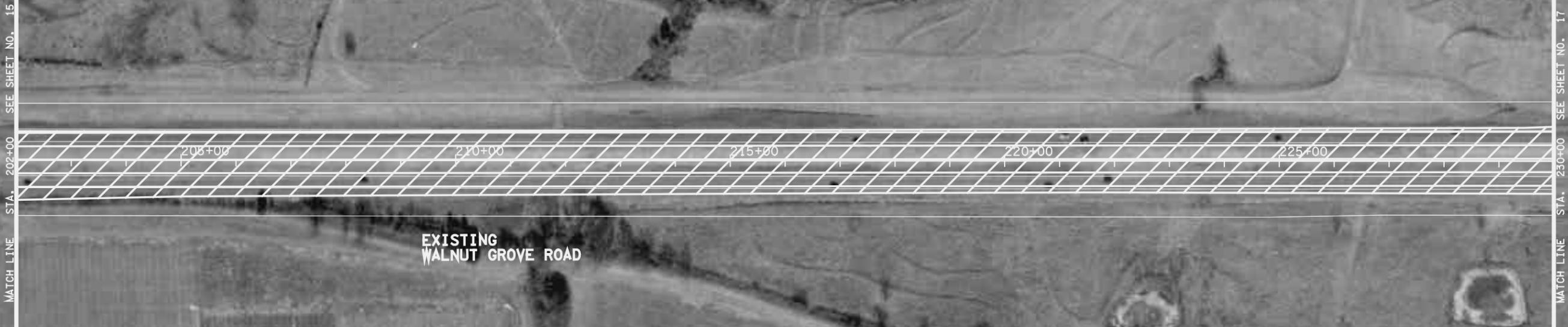
PROPOSED LAYOUT
 STA. 119+00 TO STA. 146+00
 SCALE: 1"=100'

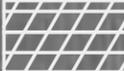
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			16



 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

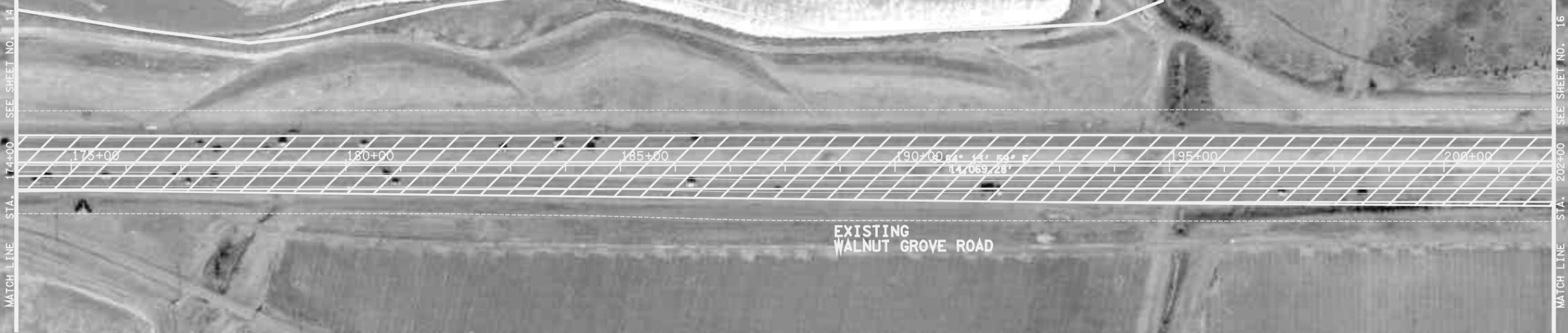
PROPOSED LAYOUT
STA. 202+00 TO STA. 230+00
SCALE: 1"=100'

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TENNESSEE D.O.T.
 DESIGN DIVISION
 FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			15



 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
 AND ARE DATUM ADJUSTED BY THE
 FACTOR 1.00 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 174+00 TO STA. 202+00
 SCALE: 1"=100'

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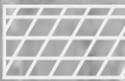
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			14



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 AREA TO BE SCARIFIED AND OBLITERATED

COORDINATE VALUES ARE NAD/83(1995)
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 FACTOR 1.00 & TIED TO THE TORN

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 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT
 STA. 146+00 TO STA. 174+00
 SCALE: 1"=100'

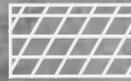
TYPE	YEAR	PROJECT NO.	SHEET NO.
			17



MATCH LINE STA. 230+00 SEE SHEET NO. 16

MATCH LINE STA. 259+00 SEE SHEET NO. 12

EXISTING WALNUT GROVE ROAD

 AREA TO BE SCARIFIED AND OBLITERATED

DUCKS UNLIMITED

MATCH LINE SEE SHEET NO. 17A

COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR 1.000 & TIED TO THE TORN

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT

STA. 230+00 TO STA. 259+00

SCALE: 1"=100'

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TENNESSEE D.O.T.
 DESIGN DIVISION
 FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
			17A



COORDINATE VALUES ARE NAD/83
 AND ARE BEING ADJUSTED BY THE
 FACTOR 1.000 & TIED TO THE BENCH

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

**PROPOSED
 LAYOUT**

SCALE: 1"=100'

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