

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0348

INTERCHANGE MODIFICATION STUDY

INTERSTATE ROUTE 75
AT
STATE ROUTE 131 (EMORY ROAD)

KNOX COUNTY

OCTOBER 2002



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0348

INTERCHANGE MODIFICATION STUDY

INTERSTATE ROUTE 75
AT
STATE ROUTE 131 (EMORY ROAD)

KNOX COUNTY

PREPARED FOR

TENNESSEE DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING AND DEVELOPMENT

BY

TRC INTERNATIONAL, LTD.
CONSULTING ENGINEERS
BRENTWOOD, TENNESSEE

OCTOBER 2002

TABLE OF CONTENTS

ITEM	PAGE
CHAPTER ONE	
INTRODUCTION	1
A. Study Purpose and Scope	1
B. Description of Project Location	1
C. Background	1
D. Relationship to Other Highway	1
Improvement Plans and Programs	
CHAPTER TWO	
PRELIMINARY PLANNING DATA	3
A. Land Use	3
B. Traffic Served	3
C. Design Alternatives	4
D. Proposed Improvement	4
E. Environmental Concerns	6
CHAPTER THREE	
ENGINEERING INVESTIGATIONS	7
A. Traffic Operations	7
2006 Summary	8
2026 Summary	9
B. Access Analysis	10
C. Cost	13
Alternate 1	14
Alternate 2	15
CHAPTER FOUR	
SUMMARY AND CONCLUSIONS	16

MAPS	FIGURE NO.
Area Location Map.....	1
Project Location Map.....	2
General Location Map, Knoxville Beltway.....	3

APPENDIX A	SHEET NO.
Traffic Volumes – 2006 ADT and 2026 ADT Existing System.....	A-1
Traffic Volumes – 2006 DHV Existing System.....	A-2
Traffic Volumes – 2026 DHV Existing System.....	A-3
Single Line Sketch for Analysis Existing System 2006..... (Includes 2006 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	A-4
Single Line Sketch for Analysis Existing System 2026..... (Includes 2026 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	A-5
Traffic Volumes – 2006 ADT and 2026 ADT Alternate 1.....	A-6
Traffic Volumes – 2006 DHV Alternate 1.....	A-7
Traffic Volumes – 2026 DHV Alternate 1.....	A-8

Single Line Sketch for Analysis Alternate 1 - 2006	A-9
(Includes 2006 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	
Single Line Sketch for Analysis Alternate 1 - 2026	A-10
(Includes 2026 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	
Traffic Volumes – 2006 ADT and 2026 ADT Alternate 2	A-11
Traffic Volumes – 2006 DHV Alternate 2	A-12
Traffic Volumes – 2026 DHV Alternate 2	A-13
Single Line Sketch for Analysis Alternate 2 - 2006	A-14
(Includes 2006 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	
Single Line Sketch for Analysis Alternate 2 - 2026	A-15
(Includes 2026 DHV, Merge and Diverge Points, Number of Lanes Provided, And Level-of-Service.)	
Capacity Analysis – Existing System	A-16
Capacity Analysis – Alternate 1	A-78

Capacity Analysis – Alternate 2 **A-156**

APPENDIX B

State Route 131 Construction Plans (Existing System)

Functional Plans- Alternate 1 & Alternate 2

CHAPTER ONE

INTRODUCTION

A. Purpose of Study

The purpose of this study is to determine the feasibility of modifying the existing interchange at Interstate Route 75 and State Route 131 (Emory Road), in order to improve traffic operations at this location.

This report will review the background, current and future needs, the traffic operational aspects, develop functional plans, estimate the costs of the proposed improvements, and identify any environmental concerns for the proposed project.

B. Description of Project Location

The existing interchange is located on Interstate Route 75 at State Route 131 (Emory Road) north of Knoxville in Knox County, Tennessee. (See Area Location Map, Figure 1.) The Project Location Map (Figure 2) shows the subject interchange is located 2.31 miles north of the Callahan Drive interchange and 4.84 miles south of the State Route 170 interchange.

C. Background

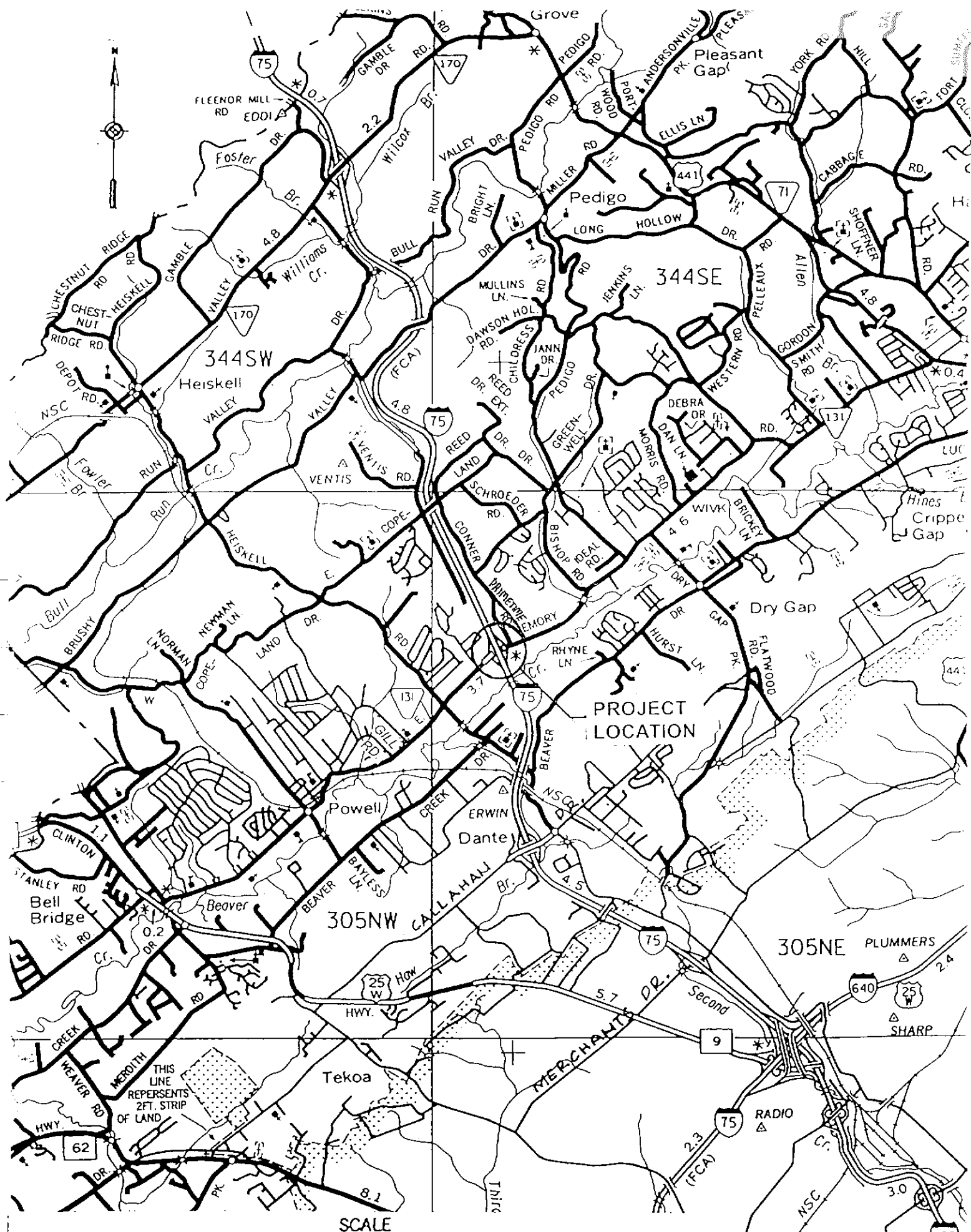
The section of Interstate Route 75 shown on the Project Location Map was completed in 1972. Since its completion the Interstate Route 75 corridor north of Knoxville, particularly the State Route 131 (Emory Road) area has experienced tremendous growth.

To accommodate the rapid growth, additional traffic lanes have been added to the interstate system. The latest project was the addition of two lanes, one in each direction, between Merchants Drive and Emory Road. This project was completed in 1999.

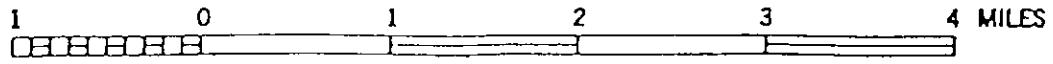
D. Relationship to Other Highway Improvement Plans and Programs

The Knoxville Regional Transportation Planning Organization's 2002-2025 Long Range Transportation Plan Reaffirmation identified the need for a four-lane undivided roadway with a center turn lane to be constructed along the existing alignment of State Route 131 (Emory Road) between U.S. 25 W (State Route 9) and U.S. 441 (State Route 33). The portion of the route between Gill Road and Bishop Road is presently under construction.

As part of the construction project, the portion of SR 131 through the Interstate 75 interchange will be reconstructed to provide a six lane section. Lane



SCALE



AREA LOCATION MAP
FIGURE 1

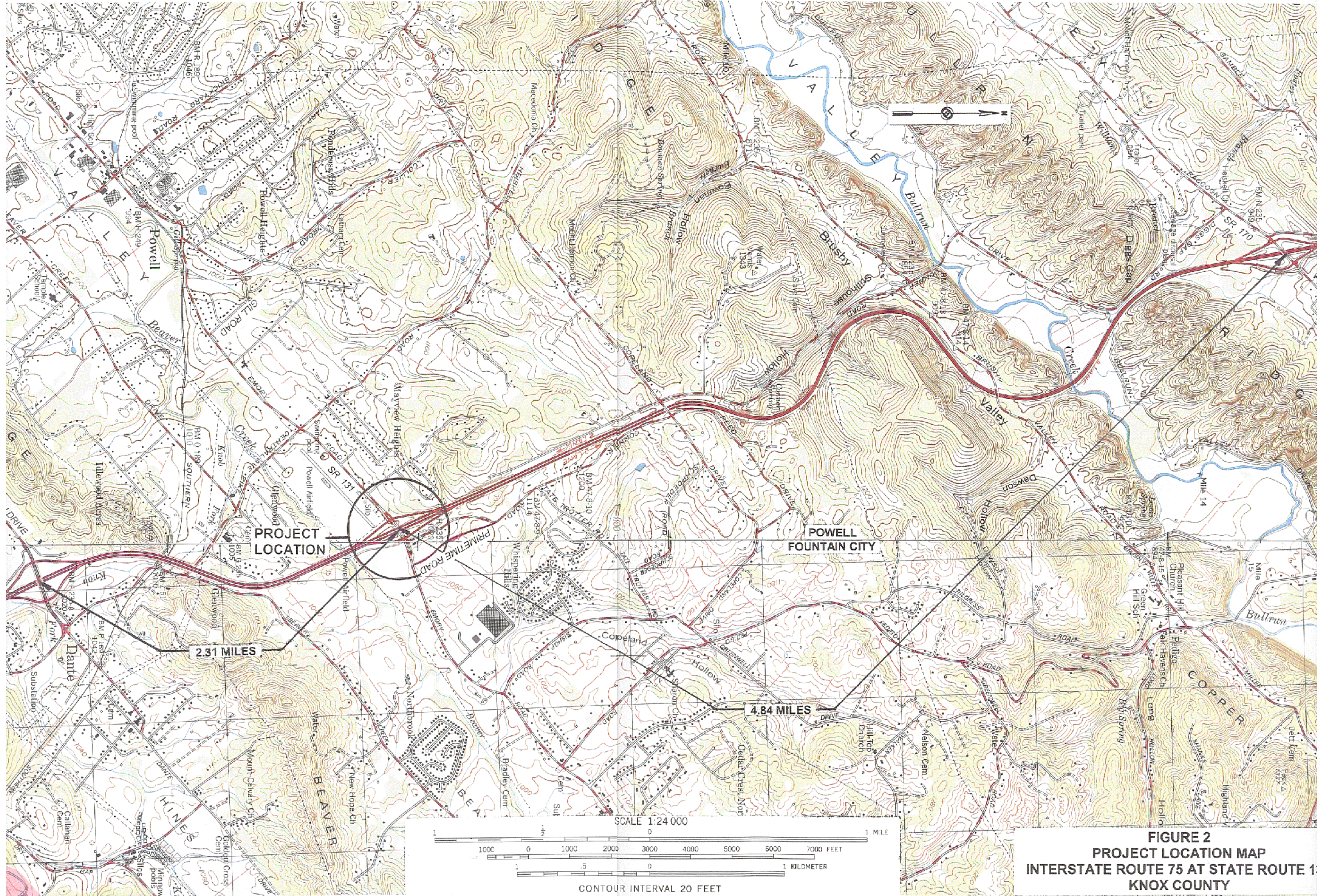


FIGURE 2
PROJECT LOCATION MAP
INTERSTATE ROUTE 75 AT STATE ROUTE 1
KNOX COUNTY

designations for State Route 131 through the interchange in the eastbound direction include a section with two through lanes and an exclusive left turn lane at the I-75 northbound entrance ramp. The westbound lane designations for State Route 131 through the interchange include an exclusive left turn lane, one shared through or left turn lane, and an exclusive through lane at the I-75 southbound entrance ramp. This study refers to the construction project as the existing system, because it will be in place for the base year of study, 2006. Proposed layout sheets from the construction plans are included in Appendix B.

The Knoxville Regional Transportation Planning Organization, by resolution, requested that the Tennessee Department of Transportation prepare a study for constructing a Knoxville Beltway. A corridor location was recently selected. The north end will tie into Interstate 75, 7.2 miles north of the SR-131 interchange, in Anderson County. The south end will tie into Interstate 75 at the Interstate 40 junction in Loudon County. The location of the corridor is shown on the General Location Map-Knoxville Beltway (Figure 3).

The primary purpose of the Knoxville Beltway is to improve traffic service on the Interstate System, State Highways, and local roads now serving the area. It will serve as an alternative route for traffic wanting to bypass the downtown Knoxville area and the congestion generally associated with the urban interstate facilities, especially during peak travel times.

The addition of the Knoxville Beltway is expected to reduce the growth rate of traffic on Interstate Route 75 through the State Route 131 interchange. The reduction in traffic is expected to be greater south of the interchange.



GENERAL LOCATION MAP
 KNOXVILLE BELTWAY
 FIGURE 3

CHAPTER TWO

PRELIMINARY PLANNING DATA

A. Land Use

The existing interchange is located north of the Knoxville Urban Boundary. The land area adjacent to the interchange is predominantly commercial, including a private airfield located adjacent to the interstate in the southwest quadrant.

Most of the residential development in the study area has occurred north of State Route 131 (Emory Road) between U.S. 25 W (State Route 9) and U.S. 441 (State Route 33). The residential growth in these areas is expected to continue.

B. Traffic Served

Existing State Route 131 (Emory Road) within the project limits is an Urban Minor Arterial Route on the Surface Transportation Program System. Daily volumes for this road are expected to be 19,100 west of the interchange and 28,400 east of the interchange in the base year (2006). In the design year (2026), daily volumes are expected to be 24,820 west of the interchange and 36,920 east of the interchange. Truck volumes on State Route 131 are 3% of total volumes. All volumes are based on the development of the Knoxville Beltway.

The daily volume of traffic expected to be served by I-75 in the design year (2026) is 68,540 south of the interchange and 47,520 north of the interchange. The daily volume that would use I-75 in the base year (2006) is 52,720 south of the interchange and 36,560 north of the interchange. North of the interchange trucks are 28% of the traffic on I-75. South of the interchange trucks are 16% of the traffic on I-75. All volumes are based on the development of the Knoxville Beltway.

Average Daily Traffic (ADT) volumes and Design Hour Volumes (DHV) are shown in the Appendix.

C. Design Alternates

Two alternates were studied to determine the more feasible modification of the existing interchange. Brief summaries of these alternates are as follows:

Alternate One

This alternate is a “single-point” interchange. To accommodate the left turn movements to and from the interstate, two lanes are proposed for all left turn movements. While this alternate is operationally feasible, the high volume of left turns from SR 131 westbound to I-75 southbound creates two significant, unfavorable impacts. First, widening of the ramp roadways is required to provide adequate capacity. This affects the interstate laneage at the merge and diverge points. Second, significant delays will be felt for other movements in order to provide enough green time for the single movement. Functional layouts, traffic analyses, and cost estimates for this alternate are in the Appendix.

Alternate Two

This alternate proposes utilizing the six lane section through the interchange, and for providing a loop ramp in the northwest quadrant to remove the heavy left turn movement from westbound State Route 131 (Emory Road) to southbound I-75.

Due to costs associated with acquiring enough right-of-way for higher design speeds, the loop ramp would have a design speed of 25 mph. To provide for the merge with I-75 southbound, the loop ramp would be constructed as an additional interstate lane.

These two alternates were reviewed and evaluated in meetings with representatives from TDOT’s Design Division and Planning Division. While both the alternatives are operationally feasible, Alternate Two was selected as the recommended interchange modification based on comparative benefits and costs.

D. Proposed Improvement

The specific improvements needed to provide the traffic service and ease of movement are discussed below and are shown on the attached Functional Plans:

1. Utilize the westbound left turn lane of the existing SR 131 cross-section for westbound through traffic and designate the outside westbound lane as an exclusive right turn lane for the southbound loop ramp. The proposed SR131 cross-section includes curb and gutter and sidewalks.

2. To provide for a more efficient operation at the Primetime Road intersection, the existing signal is to be modified to provide the necessary phasing and timing required at this location.
3. A loop ramp is to be constructed in the northwest quadrant to remove the heavy westbound to southbound left turn from State Route 131 (Emory Road). Because of the existing development in this quadrant, the design speed of the loop will be limited to 25 mph. An additional lane on I-75 southbound is required to facilitate the merge.
4. Relocate the I-75 southbound off-ramp westward to accommodate the loop ramp. A barrier median is proposed between the two ramps to minimize the required right-of-way.
5. Construct a retaining wall along the outside section of the relocated I-75 southbound off ramp that impacts the Shoney's property.
6. Add an auxiliary lane to the three existing I-75 northbound lanes south of the interchange in order to reconstruct the off-ramp as a "major junction." This allows for a three-two split to provide for a two lane off ramp. The ramp roadway can then be widened to the three lanes necessary for one exclusive left turn lane and the two exclusive right turn lanes at the junction with State Route 131 (Emory Road). The existing traffic signal is to be modified in order to provide the necessary phasing and timing required at this location.
7. Rather than drop a through traffic lane within the interchange as it now exists, it is proposed to extend the third lane northward beyond the I-75 northbound on ramp before transitioning from three lanes to the existing two lanes.
8. Widen the bridges over Beaver Creek to accommodate the proposed interstate laneage.
9. Due to the proposed loop ramp, the I-75 southbound exit ramp intersection with State Route 131 (Emory Road) has been relocated just west of its current location. A new traffic signal is proposed for this location.
10. Minor adjustments in the alignment and grade of the ramps will be required to meet the proposed improvements at the State Route 131 (Emory Road) intersections and also at their junction with the I-75 mainline.

E. Environmental Concerns

Beaver Creek is located along the southern periphery of the existing interchange. The existing structures of I-75 over this stream are proposed to be widened.

A blue line stream tributary of Beaver Creek also traverses the interchange from northwest of I-75 and State Route 131 (Emory Road) to Beaver Creek southeast of the interchange.

Any fill material being placed in these areas is governed by U.S. Army Corps of Engineers, Section 404 permitting requirements.

Impacts associated with flood plain encroachment will be limited because the project will be designed to accommodate projected flood waters. Design of the project will utilize current hydrological data to insure flood waters are not impeded.

Erosion controls should be implemented and maintained throughout the construction project.

Underground tanks are located at the Rocky Top Market and Pride Food Mart on the south side of State Route 131 (Emory Road) west of I-75. East of I-75 underground tanks are located at Ken Jo Market on the north side of State Route 131 (Emory Road) and at Pilot Food Mart and Ken Jo Market on the south side. The underground tanks at these locations should not be impacted by any of the improvements proposed for the interchange.

CHAPTER THREE

ENGINEERING INVESTIGATIONS

A. Traffic Operations

An analysis was made to determine what impacts the proposed interchange modification would have on Interstate Route 75. For the existing system the three basic lanes in each direction south of the interchange will provide for a Level-of-Service (LOS) C in the Base Year (2006) and will remain at LOS C through the Design Year (2026). North of the interchange the two basic lanes in each direction will provide for a LOS C in the Base Year (2006) and will also remain at LOS C through the Design Year (2026).

The proposed modification will not have any impacts to the basic lane requirements for the interstate system.

Traffic volumes, merge and diverge points, laneage for the proposed improvements, and Level-of-Service (LOS), together with the analysis for both the Base Year (2006) and the Design Year (2026) are shown in Appendix "A".

LOS summary tables for the existing interchange and the two alternates are on the following two pages.

Analysis Summary
2006 Traffic and Existing and Proposed Geometrics

Location	Type Analysis	Design Hour	LOS		
			Existing	Alt. 1	Alt. 2
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B	B	B
		PM	B	B	B
I-75 Northbound , South of D-1 Major Diverge	Basic Freeway Segments	AM	n.a.	A	A
		PM	n.a.	B	B
D-1, I-75 Northbound Off-ramp to SR131	Ramp and Ramp Junctions, Ln. Drop	AM	B	n.a.	n.a.
		PM	B	n.a.	n.a.
I-75 Northbound , North of D-1 Major Diverge	Basic Freeway Segments	AM	n.a.	A	A
		PM	n.a.	A	A
I-75 Northbound Through Interchange	Basic Freeway Segments	AM	B	n.a.	n.a.
		PM	B	n.a.	n.a.
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B	B	B
		PM	B	B	B
I-75 Northbound, North of M-1 On-ramp from SR 131	Ramp and Ramp Junctions	AM	n.a.	B	B
		PM	n.a.	B	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	B	B	B
		PM	B	B	B
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	B	B	B
		PM	B	B	B
I-75 Southbound, North of D-2 Off-ramp	Basic Freeway Segments	AM	n.a.	B	n.a.
		PM	n.a.	B	n.a.
D-2, I-75 Southbound Off-ramp to SR 131	Ramp and Ramp Junctions	AM	C	B	C
		PM	C	B	C
I-75 Southbound, South of D-2 Off-ramp to SR 131	Basic Freeway Segments	AM	n.a.	A	B
		PM	n.a.	A	B
I-75 Southbound Through Interchange	Basic Freeway Segments	AM	B	n.a.	n.a.
		PM	B	n.a.	n.a.
M-2, I-75 Southbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	n.a.	B	n.a.
		PM	n.a.	A	n.a.
I-75 Southbound, South of M-2, Add Lane On-ramp	Basic Freeway Segments	AM	n.a.	n.a.	B
		PM	n.a.	n.a.	B
M-3, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	n.a.	n.a.	C
		PM	n.a.	n.a.	B
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C	C	C
		PM	B	B	B
SR 131 West of I-75	Multilane Highways	AM	A	A	A
		PM	A	A	A
SR 131/I-75 SB Ramps	Signalized Intersections	AM	C (26.3)	n.a.	B (12.4)
		PM	C (27.8)	n.a.	B (12.6)
SR 131/I-75 Ramps	Signalized Intersection	AM	n.a.	C (32.6)	n.a.
		PM	n.a.	C (36.1)	n.a.
SR 131/I-75 NB Ramps	Signalized Intersections	AM	C (30.7)	n.a.	C (33.8)
		PM	C (27.4)	n.a.	C (27.8)
SR 131/Primetime Rd.	Signalized Intersections	AM	C (29.6)	C (29.6)	C (29.6)
		PM	C (28.1)	C (28.1)	C (28.1)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B	B	B
		PM	B	B	B

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

Analysis Summary
2026 Traffic and Existing and Proposed Geometrics

Location	Type Analysis	Design Hour	LOS		
			Existing	Alt. 1	Alt. 2
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B	B	B
		PM	C	C	C
I-75 Northbound , South of D-1 Major Diverge	Basic Freeway Segments	AM	n.a.	B	B
		PM	n.a.	B	B
D-1, I-75 Northbound Off-ramp to SR131	Ramp and Ramp Junctions, Ln. Drop	AM	C	n.a.	n.a.
		PM	C	n.a.	n.a.
I-75 Northbound , North of D-1 Major Diverge	Basic Freeway Segments	AM	n.a.	B	B
		PM	n.a.	B	B
I-75 Northbound Through Interchange	Basic Freeway Segments	AM	C	n.a.	n.a.
		PM	C	n.a.	n.a.
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	C	B	B
		PM	C	B	B
I-75 Northbound, North of M-1 On-ramp from SR 131	Ramp and Ramp Junctions	AM	n.a.	B	B
		PM	n.a.	B	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	C	C	C
		PM	C	C	C
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	C	C	C
		PM	C	C	C
I-75 Southbound, North of D-2 Off-ramp	Basic Freeway Segments	AM	n.a.	B	n.a.
		PM	n.a.	B	n.a.
D-2, I-75 Southbound Off-ramp to SR 131	Ramp and Ramp Junctions	AM	C	B	C
		PM	D	B	D
I-75 Southbound, South of D-2 Off-ramp to SR 131	Basic Freeway Segments	AM	n.a.	B	C
		PM	n.a.	B	C
I-75 Southbound Through Interchange	Basic Freeway Segments	AM	C	n.a.	n.a.
		PM	C	n.a.	n.a.
M-2, I-75 Southbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	n.a.	B	n.a.
		PM	n.a.	A	n.a.
I-75 Southbound, South of M-2, Add Lane On-ramp	Basic Freeway Segments	AM	n.a.	n.a.	C
		PM	n.a.	n.a.	B
M-3, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	n.a.	n.a.	C
		PM	n.a.	n.a.	B
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C	C	C
		PM	B	B	B
SR 131 West of I-75	Multilane Highways	AM	B	B	B
		PM	B	B	B
SR 131/I-75 SB Ramps	Signalized Intersections	AM	D(49.7)	n.a.	B (13.6)
		PM	D(44.7)	n.a.	B (16.4)
SR 131/I-75 Ramps	Signalized Intersection	AM	n.a.	D(36.1)	n.a.
		PM	n.a.	D(40.9)	n.a.
SR 131/I-75 NB Ramps	Signalized Intersections	AM	D(43.1)	n.a.	D(44.7)
		PM	D(42.5)	n.a.	D(36.4)
SR 131/Primetime Rd.	Signalized Intersections	AM	D(37.7)	D(37.3)	D(37.3)
		PM	D(41.7)	D(44.5)	D(44.5)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B	B	B
		PM	C	C	B

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

B. Access Analysis

This study has been undertaken in accordance with the Federal Highway Administration's (FHWA) policy for granting new or modified interstate access. The original policy described in FHWA Docket No. 89-23, "Additional Interchanges to the Interstate System" (Federal Register 55: No. 204, October 22, 1990) has been revised. The effective date of the new policy is February 11, 1998 and is provided in the following paragraphs along with comments for consideration.

It is in the national interest to maintain the Interstate System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to provide such service. Therefore, new or revised access points to the existing Interstate System should meet the following requirements:

- 1. The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal.**

State Route 131 (Emory Road) is a Urban Minor Arterial Route on the Surface Transportation Program System, traversing the northwest quadrant of Knox County. Due to the rapid growth in this area the need for improving this route to a four-lane undivided roadway with a center turn lane was identified and included in the Knox County Long Range Transportation Plan. That portion of the route between Gill Road and Bishop Road, excluding the I-75 interchange, is presently under construction.

By eliminating left turns from State Route 131 to Interstate Route 75 southbound, the loop ramp provides a satisfactory level of service along State Route 131 through the interchange, while also providing a satisfactory level of service for the merge area on Interstate Route 75 southbound. The addition of the Interstate 75 northbound auxiliary lane provides satisfactory merge and diverge areas for the State Route 131 access ramps.

- 2. All reasonable alternatives for design options, location, and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.**

After the two alternates discussed in this study were developed and evaluated in meetings with representatives from TDOT's Design Division and Planning Division, the alternate proposing to provide a loop ramp in the northwest quadrant (Alternate 2) was selected as the preferred alternate.

Park-and-Ride lots, other types of mass transit, and system management type improvements, will continue to be studied in order to alleviate the congestion and to improve the traffic operations in this area.

- 3. The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on analysis of current and future traffic. The operational analysis for existing conditions shall particularly in an urbanized area, included an analysis of sections of Interstate to and including the first adjacent or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with a new or revised access point.**

An analysis was made to determine what impacts the proposed modification would have on the operation of the Interstate facility. Using Base Year volumes (2006), the existing three basic lanes in each direction will provide a Level-of-Service C between Callahan Drive and State Route 131 (Emory Road). The existing two basic lanes in each direction between State Route 131 (Emory Road) and State Route 170 will also provide a Level-of-Service C during the Base Year. Based on the projected traffic volumes for the Design Year (2026), the basic lanes will continue to provide a Level-of-Service C. Due to the distance between adjacent interchanges, 2.31 miles north of Callahan Drive and 4.84 miles south of SR 170 (Raccoon Valley Road), the proposed modification will have no significant impact on the Interstate facility.

Further analysis of the improvements to State Route 131 (Emory Road), which is presently under construction, reveals this route will also operate at a Level-of-Service D or better, including the Primetime Road intersection, through to 2026 Design Year. This assures the local roads and streets have the ability to collect and distribute traffic to and from the modified interchange.

- 4. The proposed access connects to a public road only and will provide for all turning movements. Less than "full interchanges" for special purpose access for transit vehicles, for HOV's, or into Park-and-Ride lots may be considered on a case-by-case basis. The**

proposed access will be designed to meet or exceed current standards for Federal Aid projects on the Interstate System.

The proposal is a modification to the existing “Diamond Type” interchange at I-75 and State Route 131 (Emory Road). The proposed modification is a complete interchange, also a “Diamond Type” design with a loop ramp in the northwest quadrant, and will provide for all traffic movements. The interchange will be designed to meet or exceed all American Association of State Highway and Transportation Officials (AASHTO) criteria. Though the 2001 AASHTO Policy on Geometric Design of Highways and Streets limits the design capacity of a loop ramp to 1200 vph, the Highway Capacity Manual 2000 approximates the capacity of a ramp with free flow speed between 20 and 30 mph to be 1900 vph.

- 5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.**

The proposal is consistent with the Knoxville Regional Transportation Planning Organization’s 2002-2025 Long Range Transportation Plan Reaffirmation, a conforming plan. The proposal is also consistent with the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

- 6. In areas where the potential exists for future multiple interchange additions, all requests for a new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.**

The only interchange addition proposed in the area on Interstate Route 75 is for the Knoxville Beltway. It will be located 7.2 miles north of the State Route 131 interchange, in Anderson County.

- 7. The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and**

related or otherwise required transportation system improvements.

The primary objectives of the proposed modification to the I-75 and State Route 131 (Emory Road) interchange are incorporating the improvements to State Route 131 (Emory Road) presently under construction, improving access to and from the State Route 131 (Emory Road) corridor, and reducing the congestion that currently exists at the interchange. According to this study, the proposed design will meet each objective.

- 8. The request for a new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.**

Due to the observed low level of environmental consequences, no substantial impacts are anticipated. However, environmental impacts will be assessed with an appropriate document.

C. Cost

The total estimated project cost for Alternate 1 is \$9,888,000. The total estimated project cost for Alternate 2, the recommended alternate, is \$6,453,000. Detailed estimates for the two alternates are on the following two pages.

**ALTERNATE 1
COST DATA SHEET**

Clear and Grubbing.....	\$ 21,000
Earthwork.....	\$ 519,000
Pavement Removal.....	\$ 57,000
Drainage (Includes \$36,000 Erosion Control).....	\$ 178,000
Structures.....	\$3,377,000
Paving.....	\$1,973,000
Sidewalks.....	\$ 14,000
Retaining Walls.....	\$ 0
Maintenance of Traffic.....	\$ 409,000
Topsoil.....	\$ 27,000
Seeding.....	\$ 8,000
Sodding.....	\$ 2,000
Signing.....	\$ 233,000
Signalization (2).....	\$ 100,000
Fence.....	\$ 12,000
Guardrail (Median Barrier).....	\$ 195,000
Rip-Rap or Slope Protection.....	\$ 10,000
Other Construction Items (8.5%).....	\$ 607,000
Mobilization.....	\$ 340,000
Construction Cost.....	\$8,082,000
10% Engineering & Contingencies.....	\$ 808,000
Total Construction Cost.....	\$8,890,000
10% Preliminary Engineering.....	\$ 808,000
Total Engineering and Construction.....	\$9,698,000
 <u>Right-Of-Way</u>	
Land, Improvements and Damages	
2.51 Acres.....	\$ 132,000
Incidentals (9 tracts).....	\$ 12,000
Relocation Payments.....	\$ 0
Total Right-of-Way Cost.....	\$ 144,000
 <u>Utility Relocation</u>	
Reimbursable.....	\$ 9,000
Non-Reimbursable.....	\$ 37,000
Total Adjustment Cost.....	\$ 46,000
 TOTAL PROJECT COST.....	 \$9,888,000

**ALTERNATE 2
COST DATA SHEET**

Clear and Grubbing.....	\$ 23,000
Earthwork.....	\$ 252,000
Pavement Removal.....	\$ 52,000
Drainage (Includes \$31,000 Erosion Control).....	\$ 155,000
Structures.....	\$ 915,000
Paving.....	\$1,863,000
Sidewalks.....	\$ 15,000
Retaining Walls.....	\$ 180,000
Maintenance of Traffic.....	\$ 409,000
Topsoil.....	\$ 27,000
Seeding.....	\$ 8,000
Signing.....	\$ 233,000
Signalization (3).....	\$ 150,000
Fence.....	\$ 12,000
Guardrail (Median Barrier).....	\$ 195,000
Rip-Rap or Slope Protection.....	\$ 10,000
Other Construction Items (8.5%).....	\$ 383,000
Mobilization.....	<u>\$ 225,000</u>
Construction Cost.....	\$5,107,000
10% Engineering & Contingencies.....	\$ 511,000
Total Construction Cost.....	\$5,618,000
10% Preliminary Engineering.....	<u>\$ 511,000</u>
Total Engineering and Construction.....	\$6,129,000
 <u>Right-Of-Way</u>	
Land, Improvements and Damages	
2.51 Acres.....	\$ 251,000
Incidentals (9 tracts).....	\$ 27,000
Relocation Payments.....	<u>\$ 0</u>
Total Right-of-Way Cost.....	\$ 278,000
 <u>Utility Relocation</u>	
Reimbursable.....	\$ 9,000
Non-Reimbursable.....	<u>\$ 37,000</u>
Total Adjustment Cost.....	\$ 46,000
 TOTAL PROJECT COST.....	 \$6,453,000

CHAPTER FOUR

SUMMARY AND CONCLUSIONS

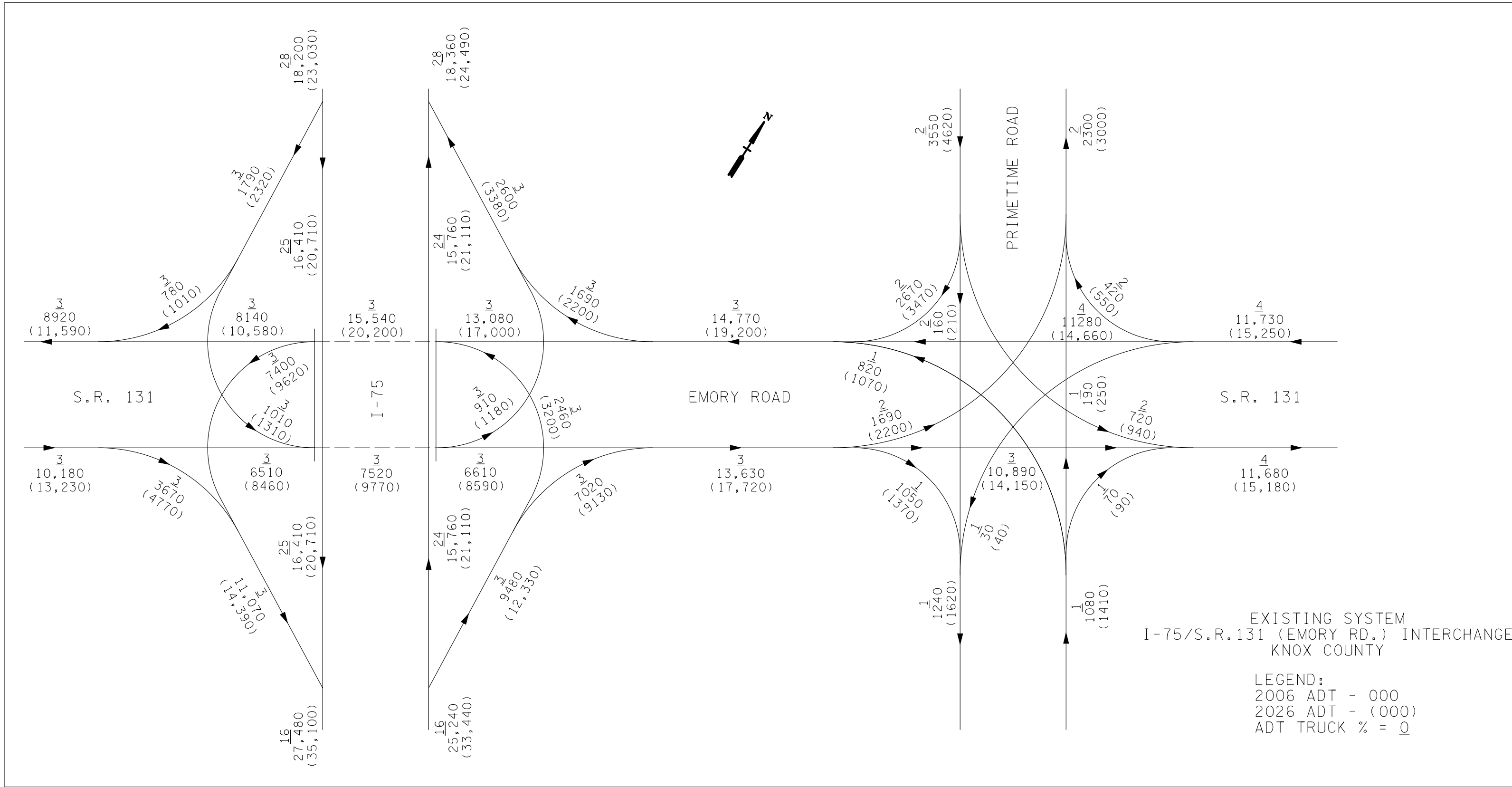
The preceding study was conducted in order to evaluate the justification for modifying the existing access to Interstate Route 75 at State Route 131 (Emory Road) in Knox County, Tennessee.

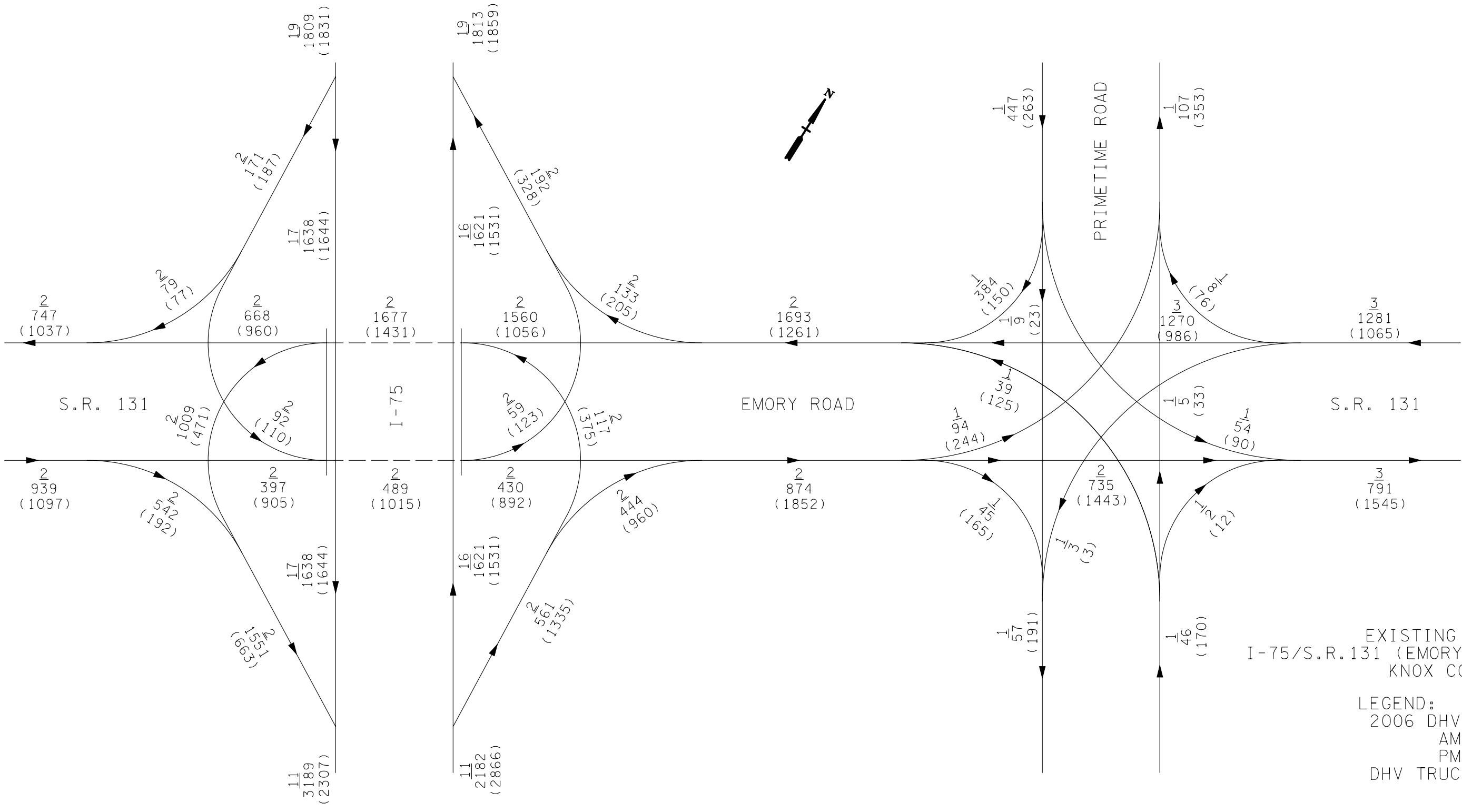
The proposal is consistent with the Knoxville Regional Transportation Planning Organization's 2002-2025 Long Range Transportation Plan Reaffirmation.

The traffic analysis for this study confirmed that the number of existing basic lanes on Interstate Route 75 are adequate for Design Year (2026) traffic volumes. It further confirmed the six lane section currently under construction on State Route 131 (Emory Road) will provide the required traffic service needed to assure its ability to collect and distribute traffic to and from the interchange.

Therefore, it is recommended this study be approved and the specific modifications listed under Proposed Improvements be implemented as soon as funds are available.

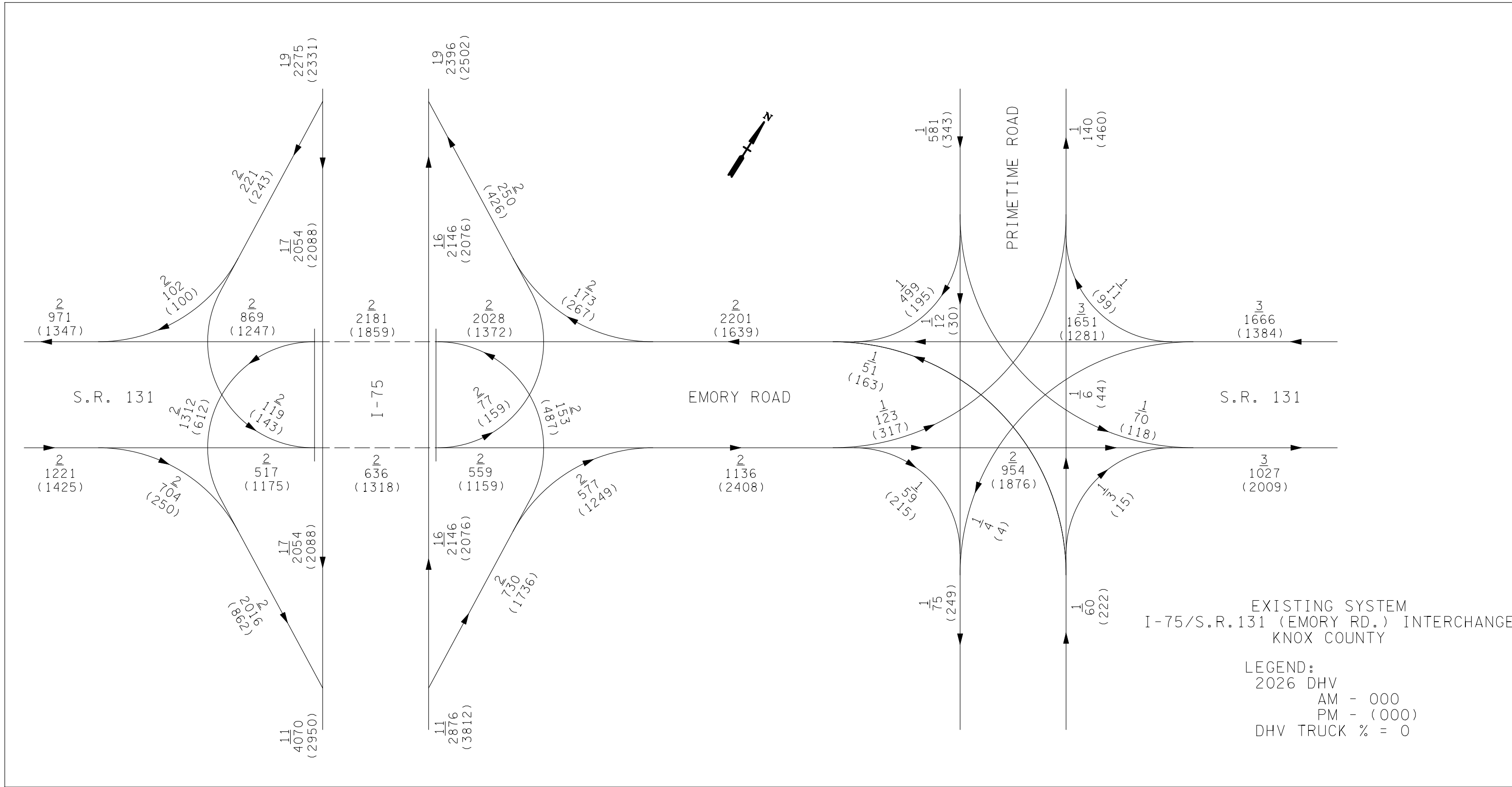
APPENDIX A





EXISTING SYSTEM
 I-75/S.R. 131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY

LEGEND:
 2006 DHV
 AM - 000
 PM - (000)
 DHV TRUCK % = 0



$\frac{2}{971}$ (1347)
 $\frac{2}{869}$ (1247)
 $\frac{2}{1221}$ (1425)
 $\frac{2}{517}$ (1175)
 $\frac{11}{4070}$ (2950)
 $\frac{17}{2054}$ (2088)
 $\frac{17}{2054}$ (2088)
 $\frac{19}{2275}$ (2331)

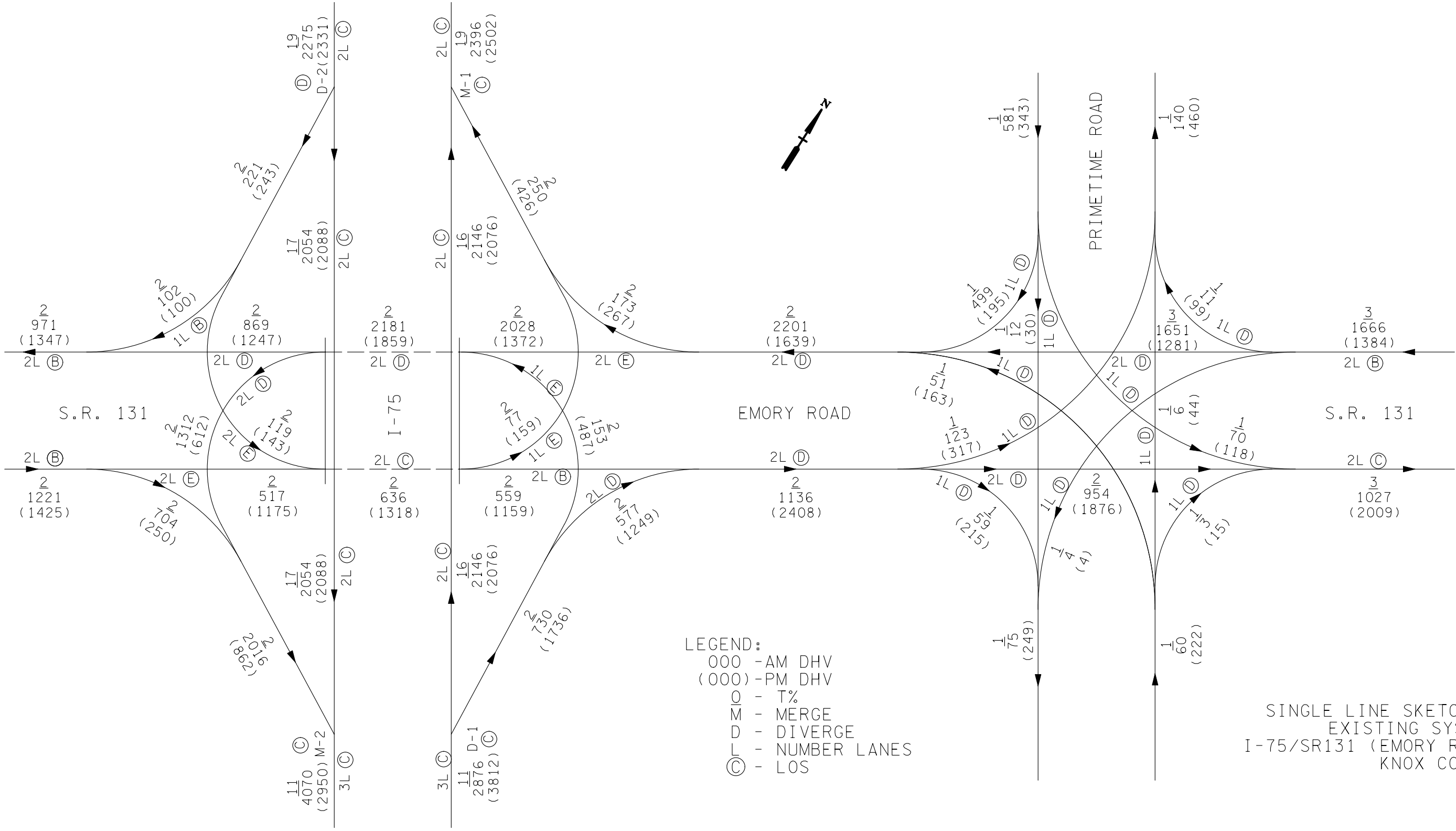
$\frac{2}{2181}$ (1859)
 $\frac{2}{2028}$ (1372)
 $\frac{2}{636}$ (1318)
 $\frac{2}{559}$ (1159)
 $\frac{11}{2876}$ (3812)
 $\frac{16}{2146}$ (2076)
 $\frac{16}{2146}$ (2076)
 $\frac{19}{2396}$ (2502)

$\frac{2}{2201}$ (1639)
 $\frac{2}{1136}$ (2408)
 $\frac{2}{153}$ (487)
 $\frac{2}{577}$ (1249)

$\frac{1}{581}$ (343)
 $\frac{1}{499}$ (195)
 $\frac{1}{12}$ (30)
 $\frac{1}{51}$ (163)
 $\frac{1}{123}$ (317)
 $\frac{1}{59}$ (215)
 $\frac{1}{75}$ (249)

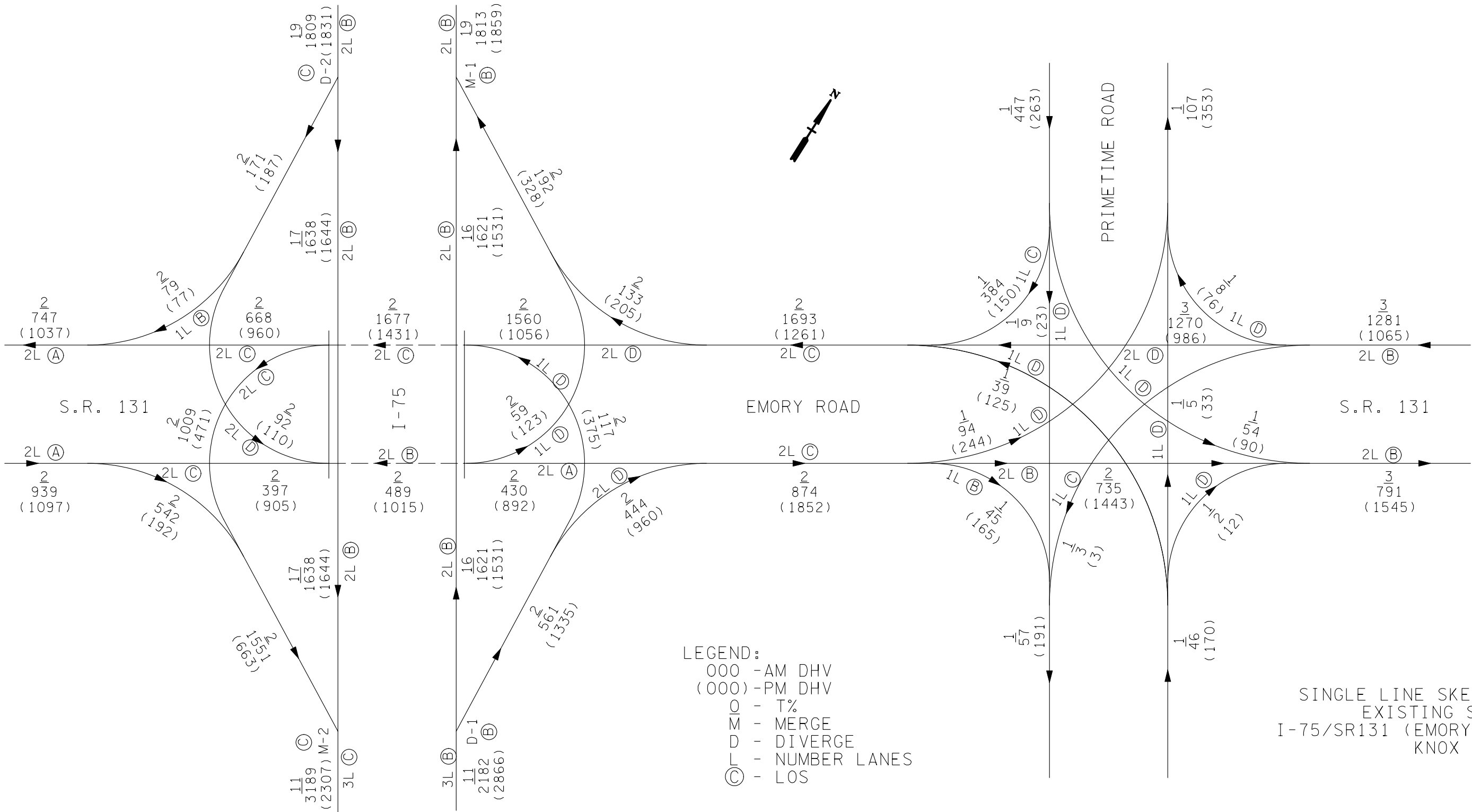
$\frac{1}{140}$ (460)
 $\frac{3}{1651}$ (1281)
 $\frac{1}{6}$ (44)
 $\frac{1}{70}$ (118)
 $\frac{1}{99}$ (44)
 $\frac{1}{60}$ (222)

$\frac{3}{1666}$ (1384)
 $\frac{3}{1027}$ (2009)

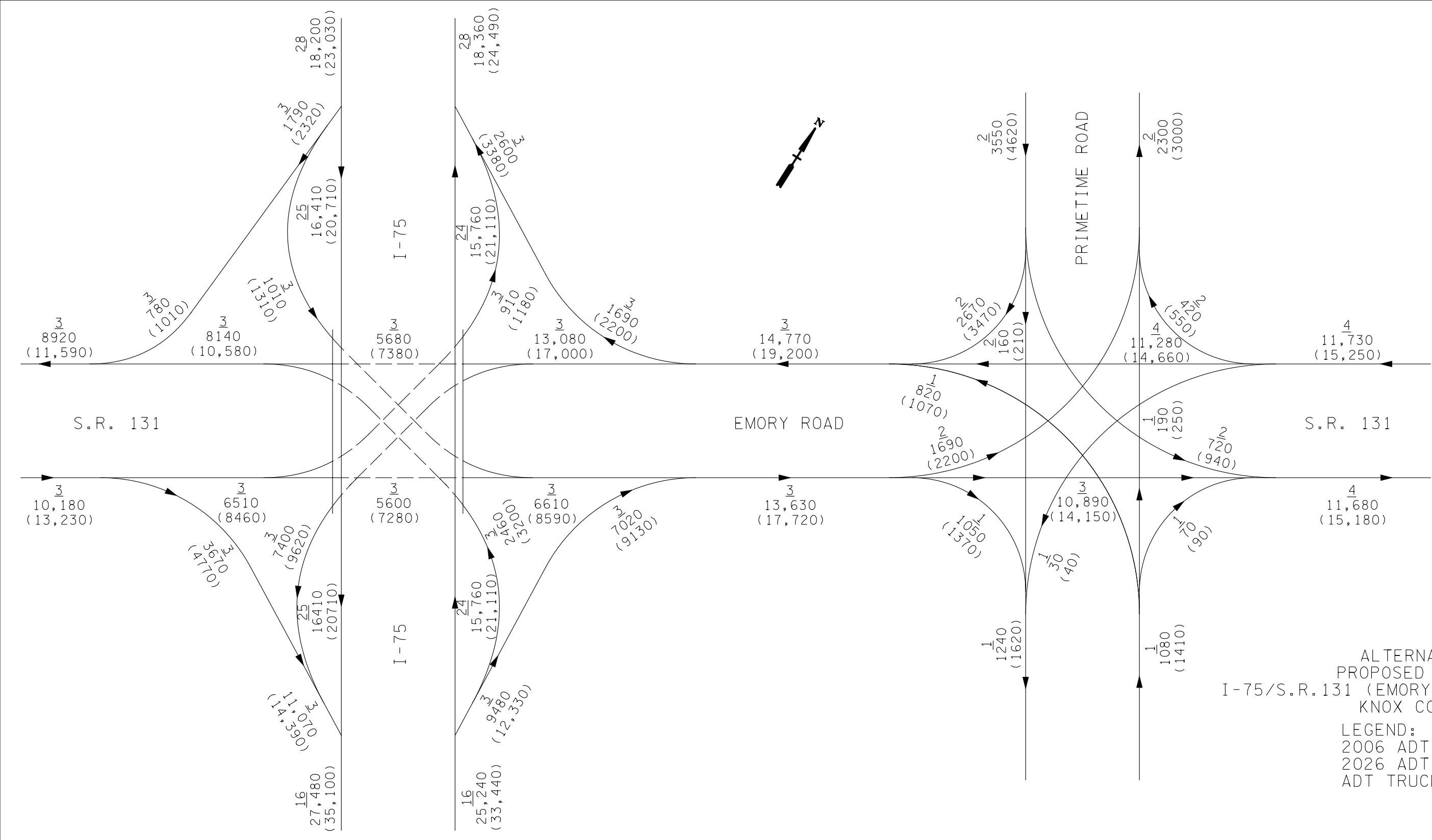


LEGEND:
 000 -AM DHV
 (000) -PM DHV
 O - T%
 M - MERGE
 D - DIVERGE
 L - NUMBER LANES
 (C) - LOS

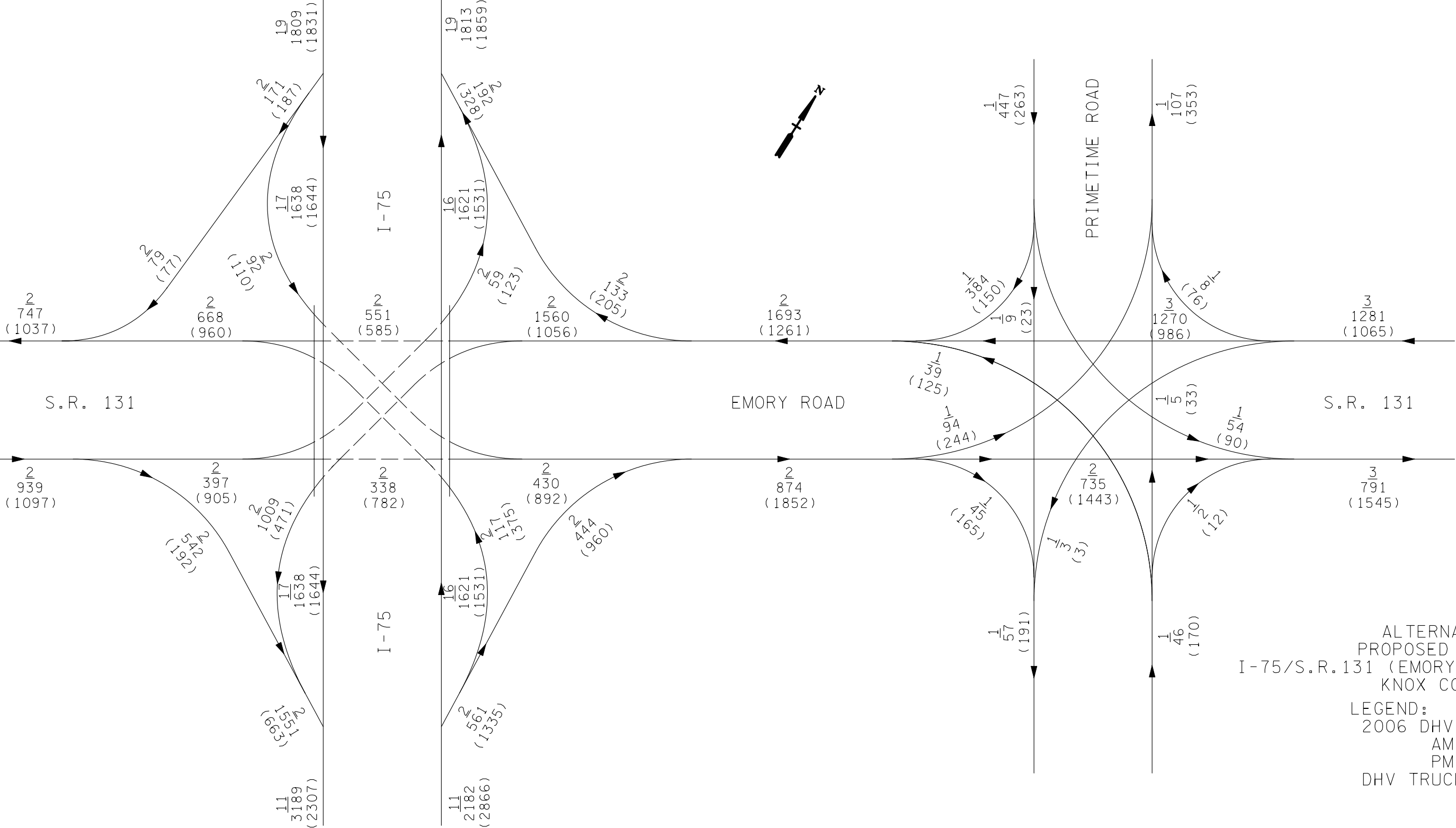
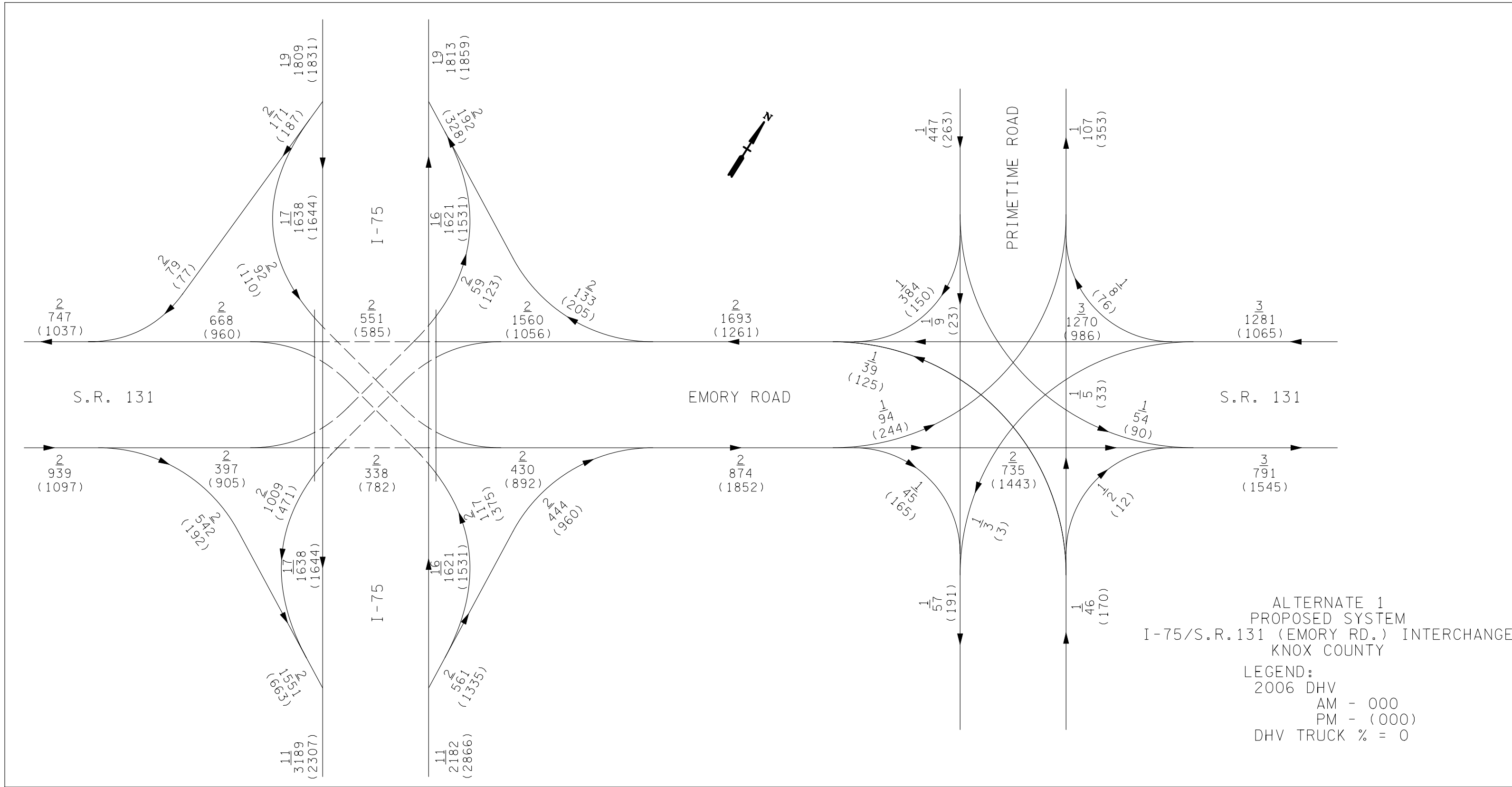
SINGLE LINE SKETCH FOR ANALYSIS
 EXISTING SYSTEM 2026
 I-75/SR131 (EMORY ROAD) INTERCHANGE
 KNOX COUNTY

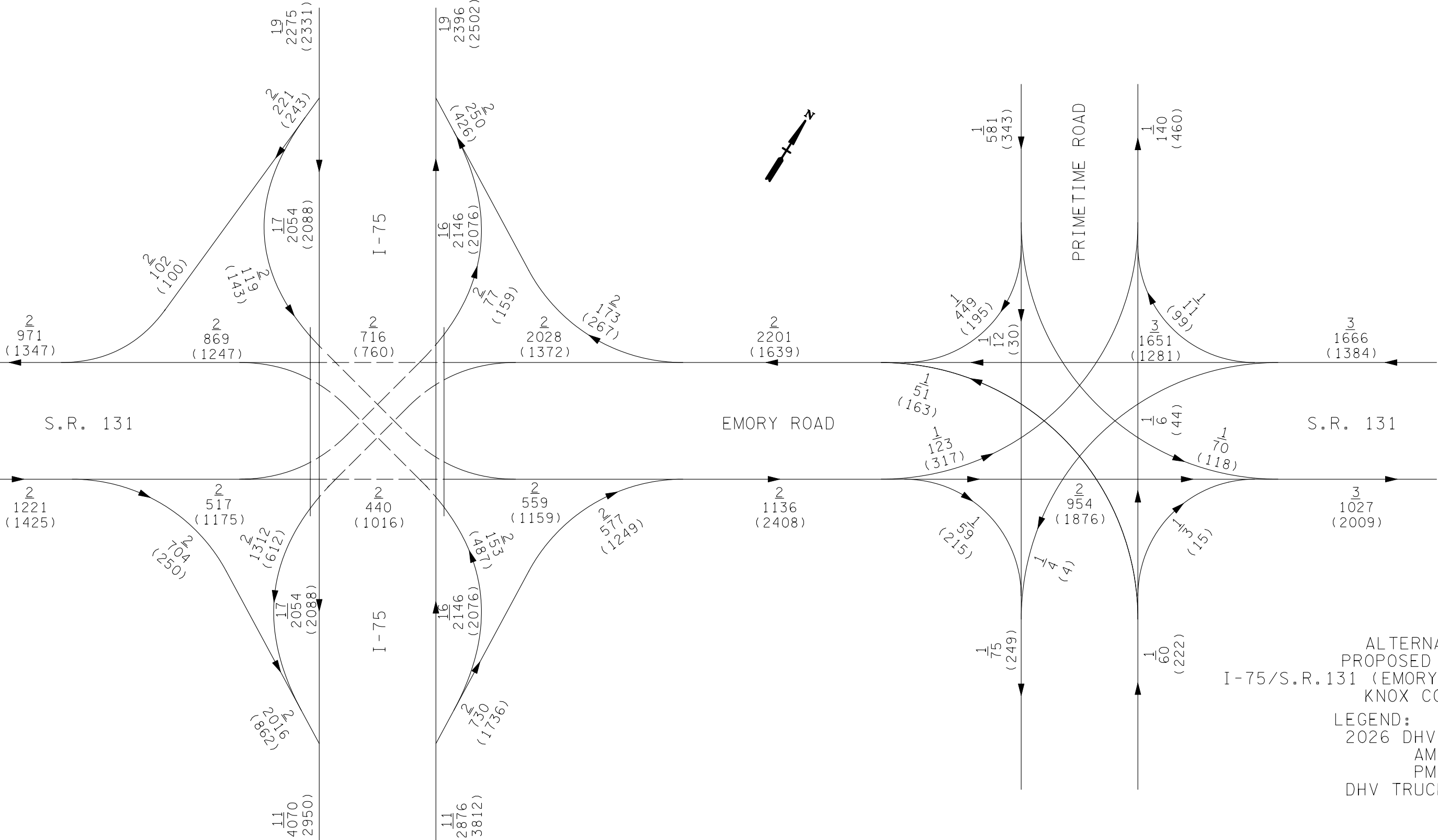
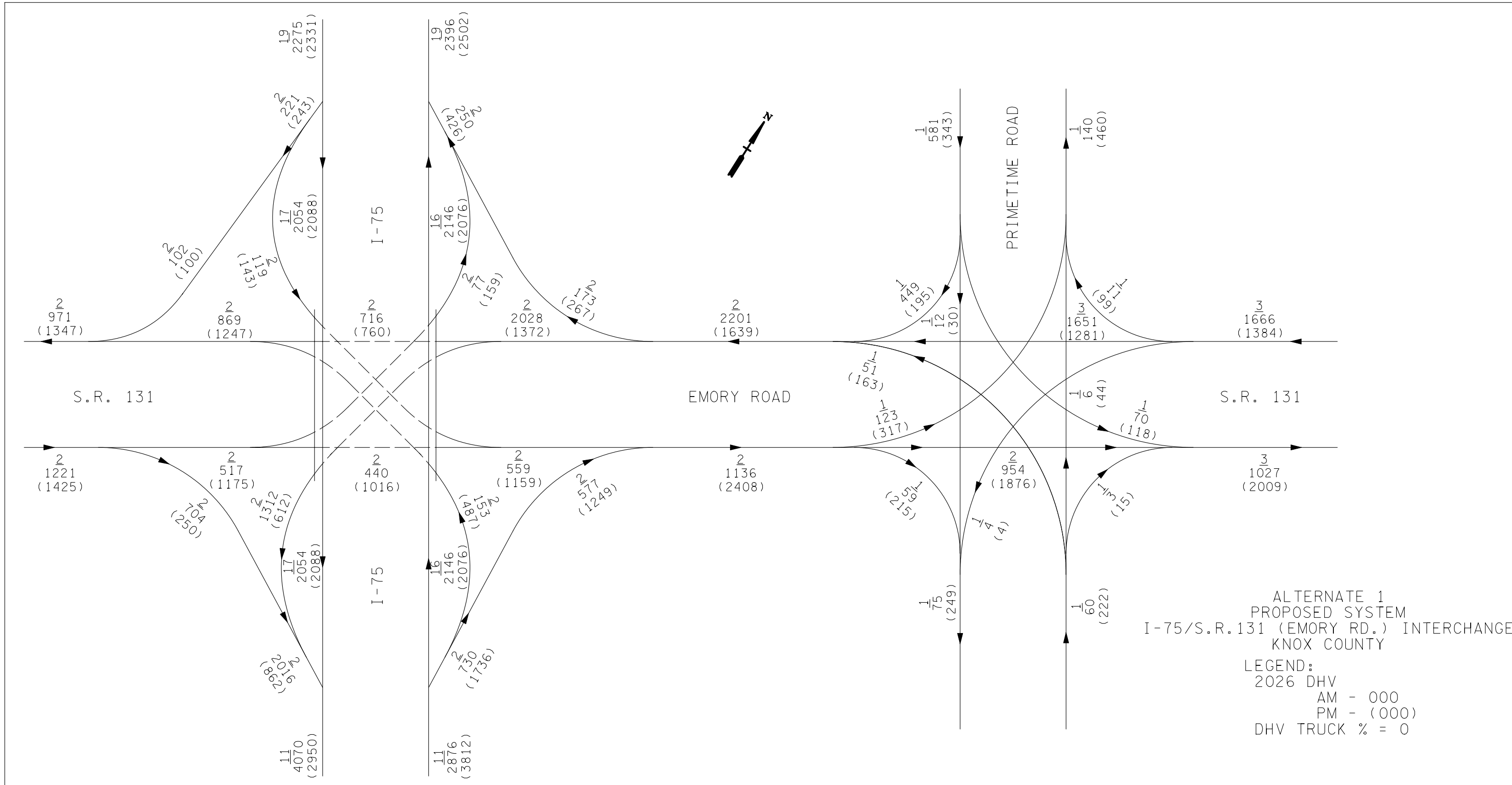


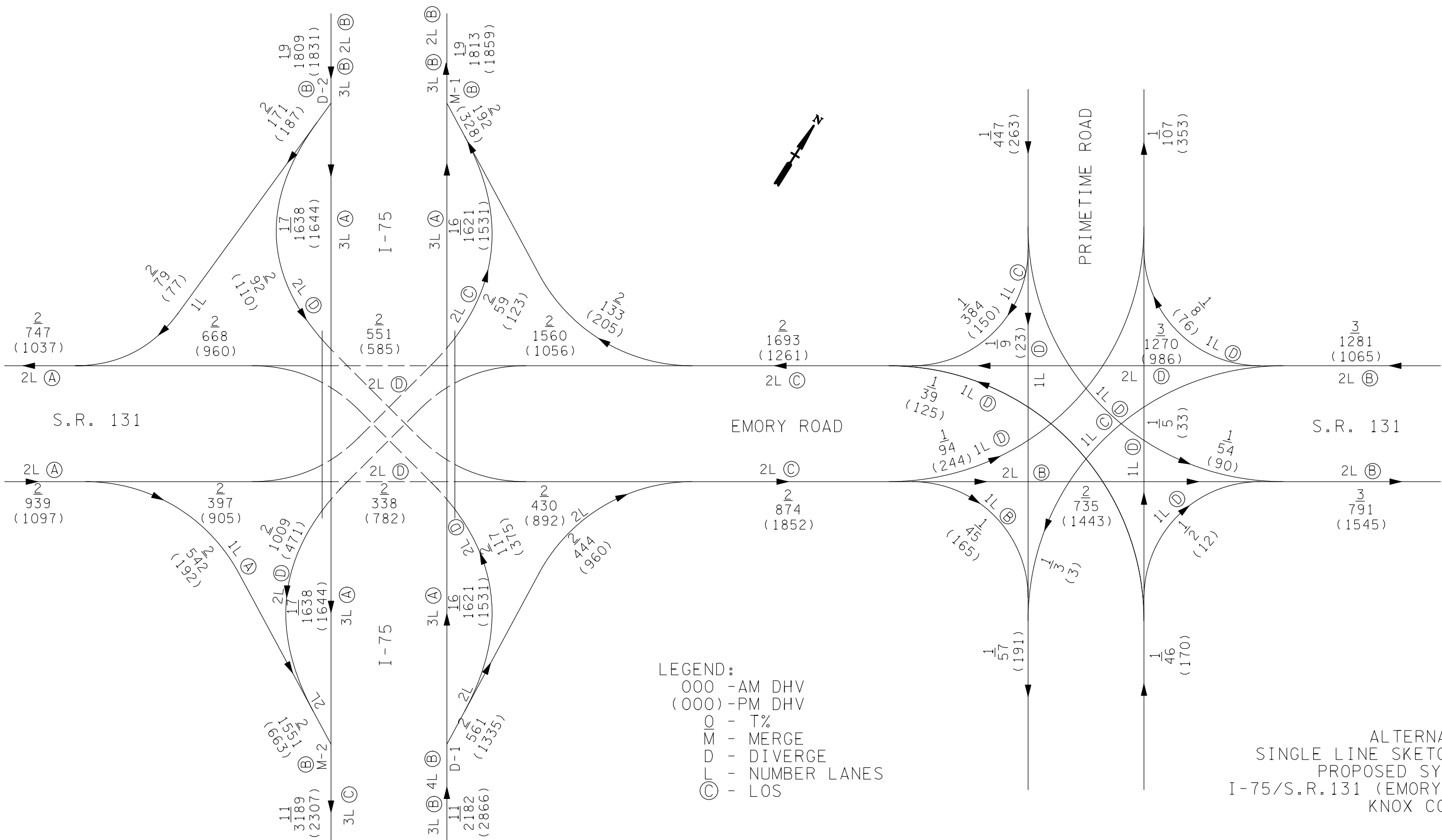
SINGLE LINE SKETCH FOR ANALYSIS
 EXISTING SYSTEM 2006
 I-75/SR131 (EMORY ROAD) INTERCHANGE
 KNOX COUNTY



ALTERNATE 1
 PROPOSED SYSTEM
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY

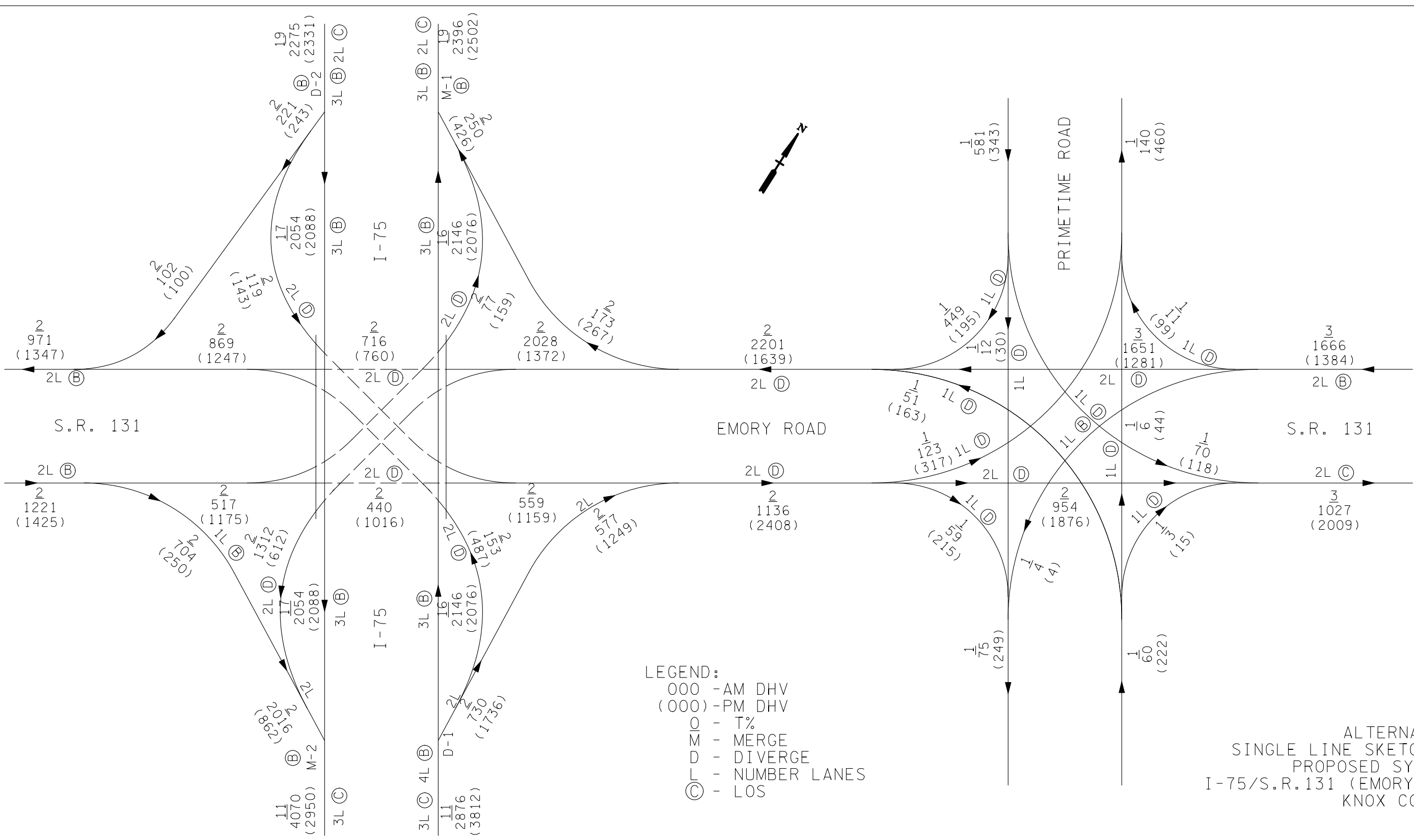






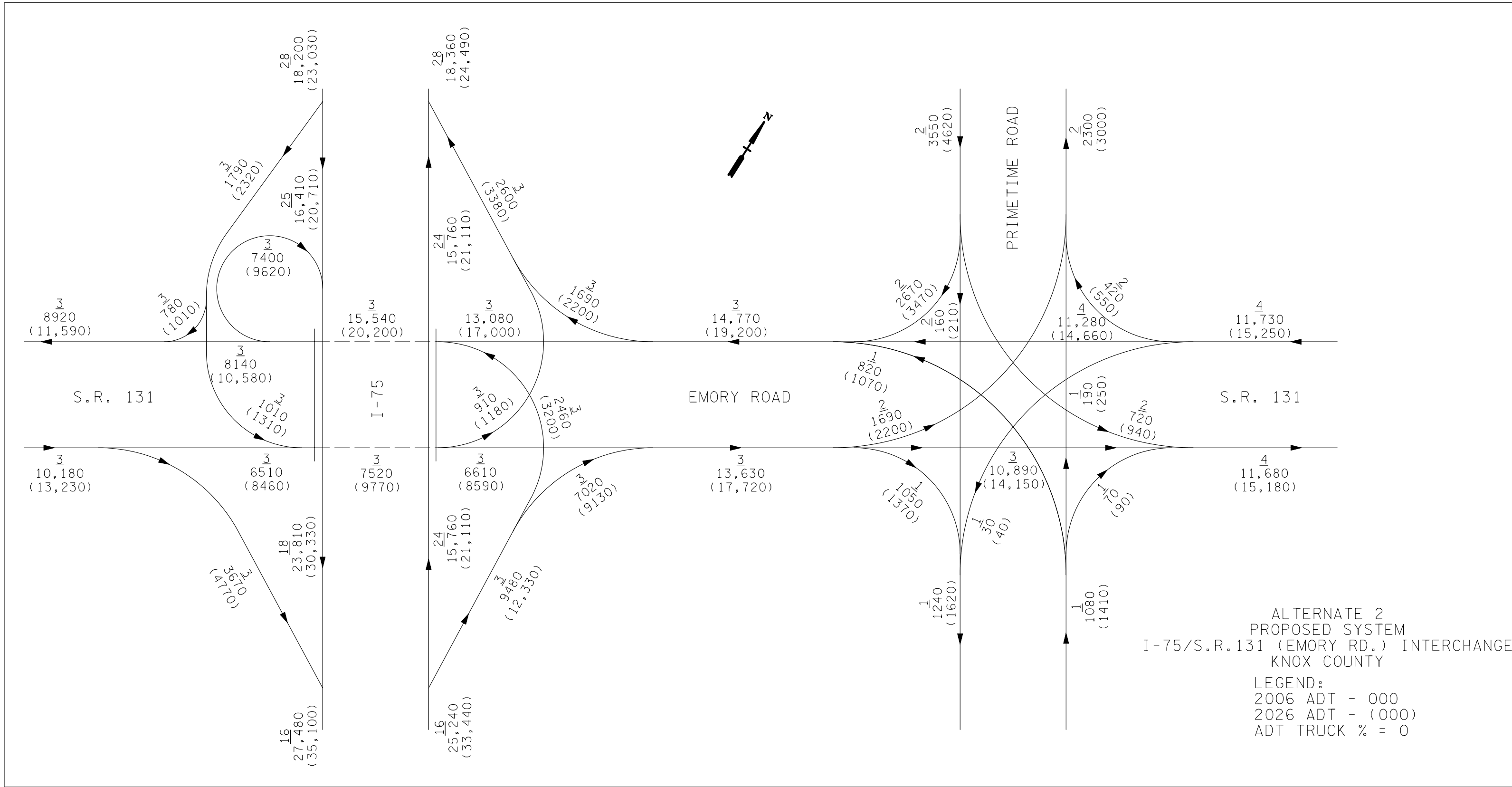
LEGEND:
 000 -AM DHV
 (000) -PM DHV
 O - T%
 M - MERGE
 D - DIVERGE
 L - NUMBER LANES
 C - LOS

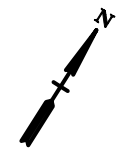
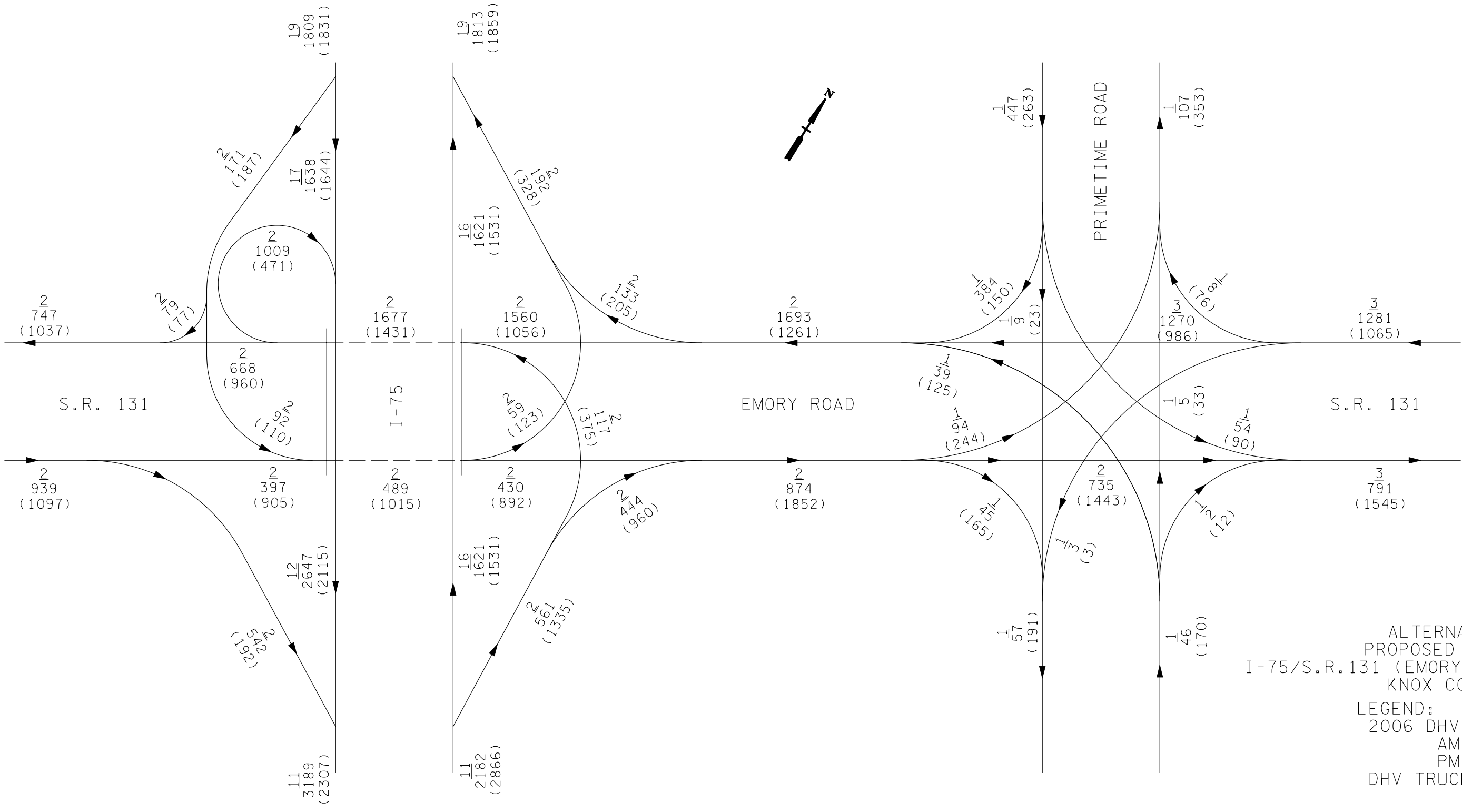
ALTERNATE 1
 SINGLE LINE SKETCH FOR ANALYSIS
 PROPOSED SYSTEM 2006
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY



LEGEND:
 000 -AM DHV
 (000) -PM DHV
 O - T%
 M - MERGE
 D - DIVERGE
 L - NUMBER LANES
 © - LOS

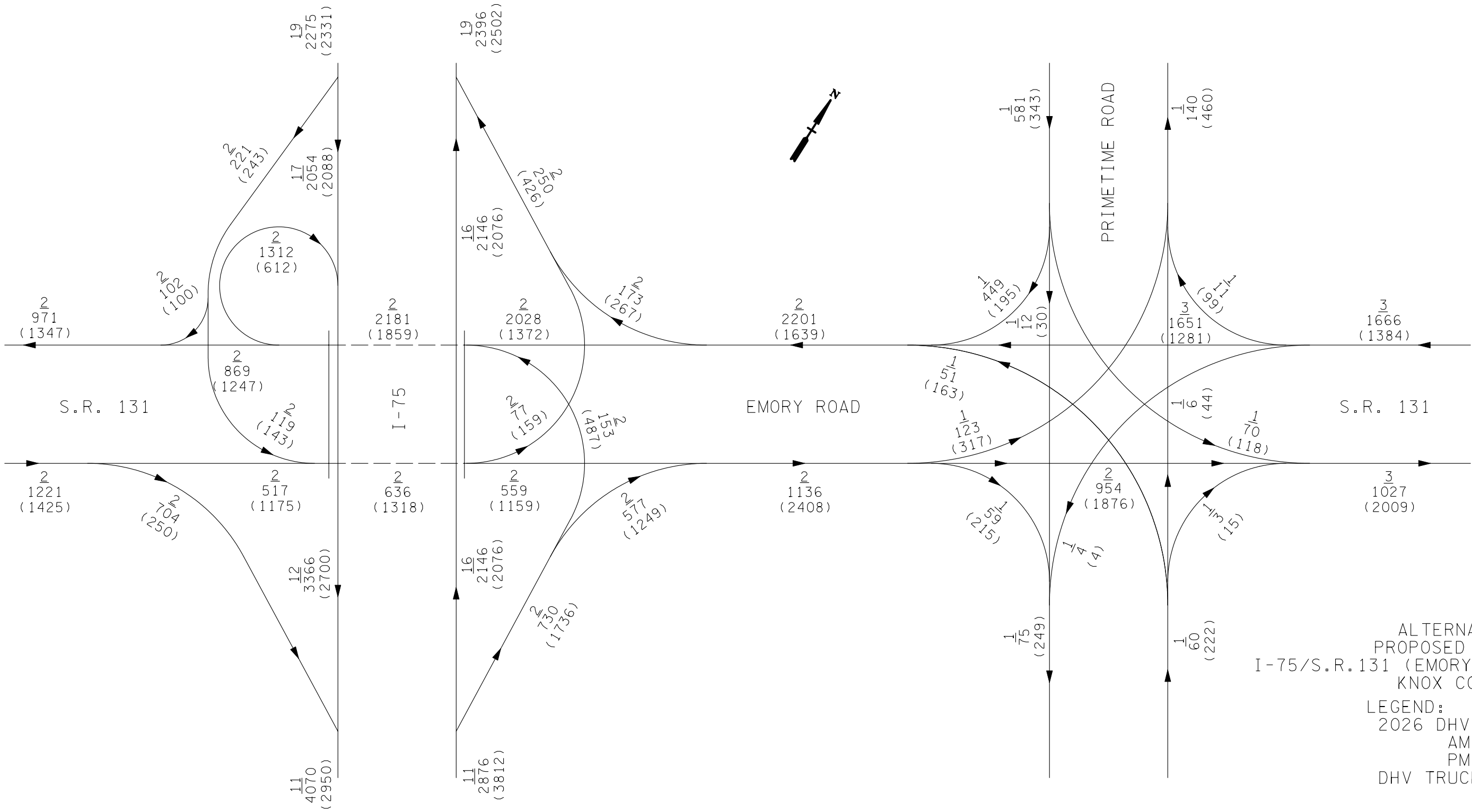
ALTERNATE 1
 SINGLE LINE SKETCH FOR ANALYSIS
 PROPOSED SYSTEM 2026
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY





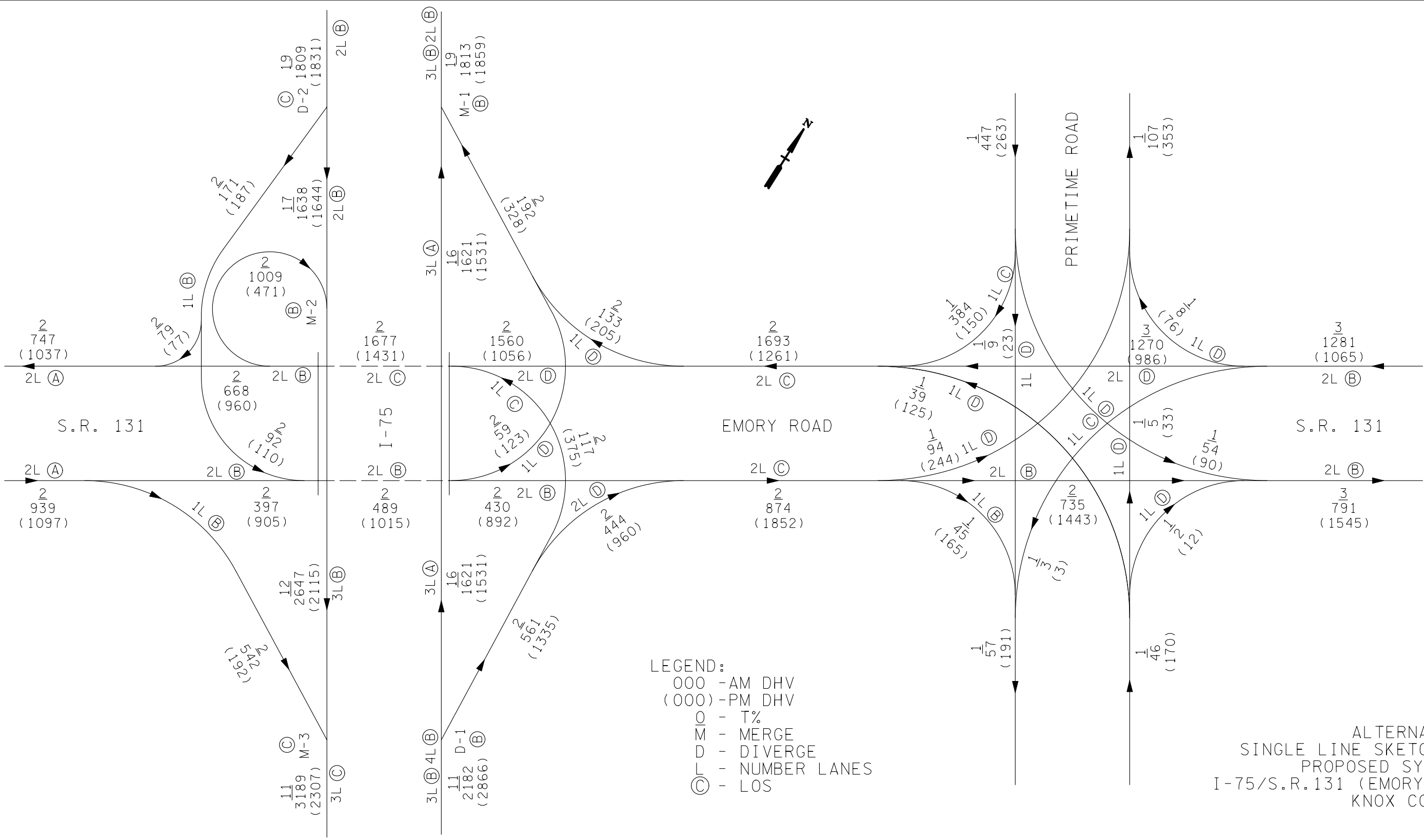
ALTERNATE 2
 PROPOSED SYSTEM
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY

LEGEND:
 2006 DHV
 AM - 000
 PM - (000)
 DHV TRUCK % = 0



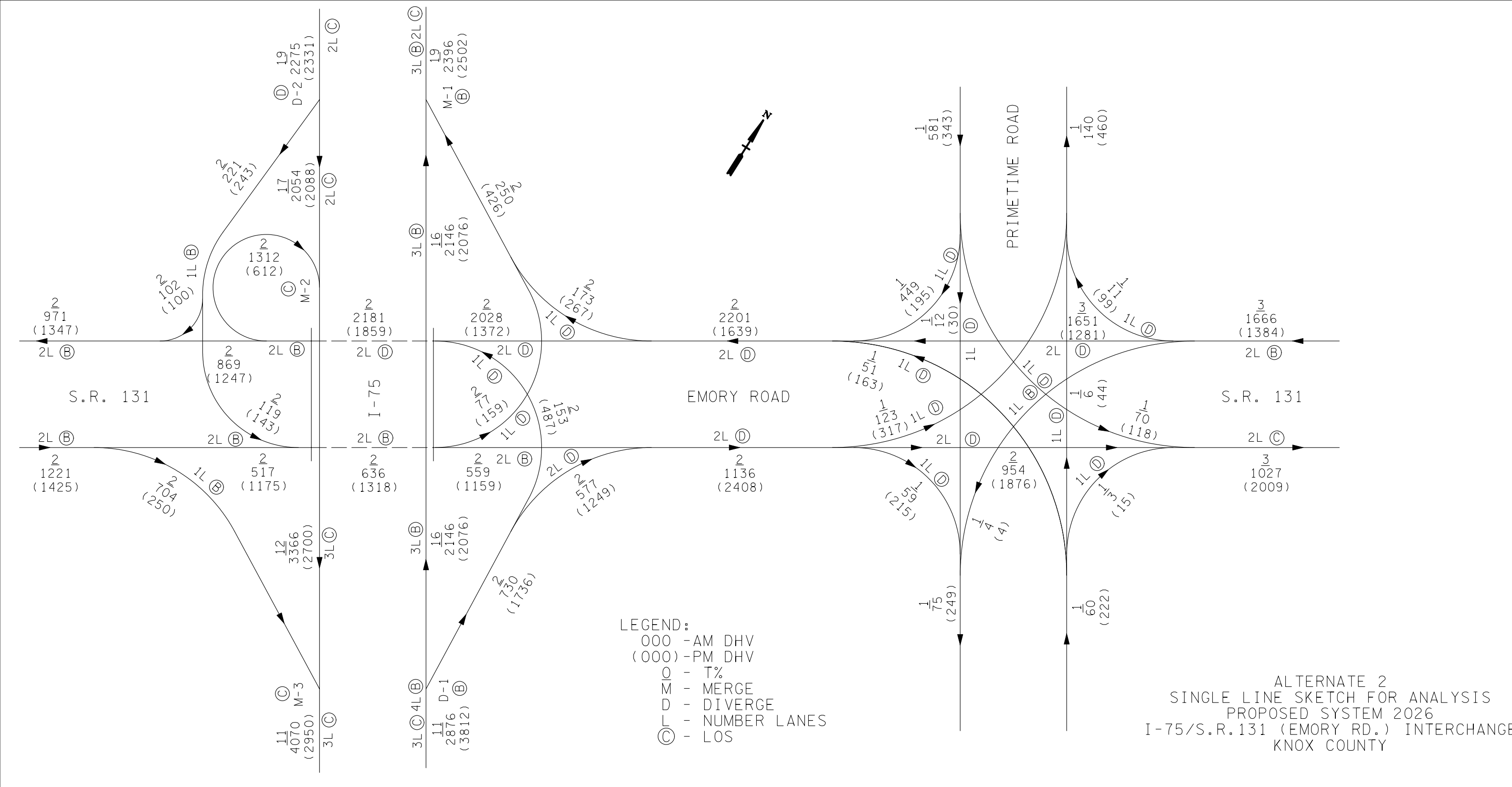
ALTERNATE 2
 PROPOSED SYSTEM
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY

LEGEND:
 2026 DHV
 AM - (000)
 PM - (000)
 DHV TRUCK % = 0



LEGEND:
 000 - AM DHV
 (000) - PM DHV
 O - T%
 M - MERGE
 D - DIVERGE
 L - NUMBER LANES
 © - LOS

ALTERNATE 2
 SINGLE LINE SKETCH FOR ANALYSIS
 PROPOSED SYSTEM 2006
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY



ALTERNATE 2
 SINGLE LINE SKETCH FOR ANALYSIS
 PROPOSED SYSTEM 2026
 I-75/S.R.131 (EMORY RD.) INTERCHANGE
 KNOX COUNTY

Analysis Summary
2006 Traffic and Existing Geometrics

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	B
D-1, I-75 Northbound Off-ramp to SR131	Ramp and Ramp Junctions, Ln. Drop	AM	B
		PM	B
I-75 Northbound Through Interchange	Basic Freeway Segments	AM	B
		PM	B
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	B
		PM	B
D-2, I-75 Southbound Off-ramp to SR 131	Ramp and Ramp Junctions	AM	C
		PM	C
I-75 Southbound Through Interchange	Basic Freeway Segments	AM	B
		PM	B
M-2, I-75 Southbound On-ramp from SR 131	Ramp and Ramp Junctions, Add Ln.	AM	C
		PM	B
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 West of I-75	Multilane Highways	AM	A
		PM	A
SR 131/I-75 SB Ramps	Signalized Intersections	AM	C (26.3)
		PM	C (27.8)
SR 131/I-75 NB Ramps	Signalized Intersections	AM	C (30.7)
		PM	C (27.4)
SR 131/Primetime Rd.	Signalized Intersections	AM	C (29.6)
		PM	C (28.1)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B
		PM	B

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 NB
From/To: South of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V 2182 veh/h
Peak-hour factor, PHF 0.95
Peak 15-min volume, v15 574 v
Trucks and buses 11 %
Recreational vehicles 0 %
Terrain type: Rolling
Grade 0.00 %
Segment length 0.00 mi
Trucks and buses PCE, ET 2.5
Recreational vehicle PCE, ER 2.0
Heavy vehicle adjustment, fhv 0.858
Driver population factor, vp 1.00
Flow rate, vp 892 pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 ft
Right-shoulder lateral clearance 6.0 ft
Interchange density 0.50 interchange/mi
Number of lanes, N 3
Free-flow speed: Measured
FFS or BFFS 70.0 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 70.0 mi/h
Urban Freeway

LOS and Performance Measures

Flow rate, vp 892 pc/h/ln
Free-flow speed, FFS 70.0 mi/h
Average passenger-car speed, S 70.0 mi/h
Number of lanes, N 3
Density, D 12.7 pc/mi/ln
Level of service, LOS B

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: 4: PM ✓
Freeway/Direction: I75 NB
From/To: South of Interchange
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	2866 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	754	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
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	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1172	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.7	pc/mi/ln
Level of service, LOS	B -	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I75 NB
From/To: Through Interchange ✓
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	1621 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	427	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	994	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	994	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	14.2	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 NB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	1531	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	403	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	939	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	939	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	13.4	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 7/12/02
Analysis time period: AM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (EMORY ROAD)
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO. M-1, N.B. ON RAMP FROM STATE ROUTE 131, EXISTING SYSTEM

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1621	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	192	vph
Length of first accel/decel lane	840	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)	1621	192	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	427	51	v
Trucks and buses	16	2	%
Recreational vehicles	0	0	%
Terrain type:	Rolling	Rolling	Level
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5	
Recreational vehicle PCE, ER	2.0	2.0	
Heavy vehicle adjustment, fHV	0.806	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2116	208	pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 E_Q
 $P = 1.000$ Using Equation 0
 FM
 $v_{12} = v_F (P_{FM}) = 2116$ pc/h
 12 F FM

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2324	4800	No
v_{R12}	2324	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	$M = 0.277$	
Space mean speed in ramp influence area,	$S_R = 62.2$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 62.2$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 9/12/02
Analysis time period: PM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (EMORY ROAD)
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO, M-1, N.B. ON RAMP FROM STATE ROUTE 131, EXISTING SYSTEM

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1531	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	328	vph
Length of first accel/decel lane	840	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)	1531	328		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	403	86		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	1998	356		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 $E0$
 $P = 1.000$ Using Equation 0
 FM
 $v_{12} = v_F (P_{FM}) = 1998$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2354	4800	No
v_{R12}	2354	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.4$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	$M = 0.278$	
Space mean speed in ramp influence area,	$S_R = 62.2$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 62.2$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 NB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	1813	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	477	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1226	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1226	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 NB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	1813	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	477	v
Trucks and buses	1.9	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1226	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1226	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 SB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	1809	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	476	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1223	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1223	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 SB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	1831	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	482	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1238	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1238	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 9/16/02
Analysis time period: AM DHV
Freeway/dir or travel: I-75
Junction: S-R. 131 (EMORY ROAD)
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO, D-2, S.B. OFF RAMP TO S-R. 131, EXISTING SYSTEM

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1809	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	171	vph
Length of first accel/decel lane	360	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)	1809	171		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	476	45		v
Trucks and buses	19	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2447	185		pcph

 Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 1.000 \quad \text{Using Equation 0}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2447 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	2447	4800	No
v_{12}	2447	4400	No
$v_{F0} = v_F - v_R$	2262	4800	No
v_R	185	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 22.1 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D_S = 0.250$	
Space mean speed in ramp influence area,	$S_R = 63$	mph
Space mean speed in outer lanes,	$S_0 = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 63.0$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 9/16/02
Analysis time period: PM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (EMORY ROAD)
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO, D-2, S.B. OFF RAMP TO S.R. 131, EXISTING SYSTEM

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1831	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	187	vph
Length of first accel/decel lane	360	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)	1831	187		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	482	49		v
Trucks and buses	19	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2477	203		pcph

 Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 1.000 \quad \text{Using Equation 0}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2477 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_{Fi}$	2477	4800	No
v_{12}	2477	4400	No
$v_{F0} = v_F - v_R$	2274	4800	No
v_R	203	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 22.3 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D = 0.251$	
Space mean speed in ramp influence area,	$S = 63$	mph
Space mean speed in outer lanes,	$S = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 63.0$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 SB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	1638	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	431	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1082	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1082	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 SB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	1644	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	433	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1086	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1086	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 SB
From/To: South of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	3189 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	839	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1304	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1304	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	18.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 SB
From/To: South of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2307	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	607	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	943	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	943	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM ✓
 Highway: S.R. 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			5		22	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			1.3	mph	5.5	mph
Free-flow speed			57.8	mph	53.6	mph

VOLUME

	Direction		1		2	
Volume, V			939 ✓	vph	747 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			247		197	
Trucks and buses			2 ✓	%	2 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.971		0.971	
Flow rate, vp			509	pcphpl	404	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			509	pcphpl	404	pcphpl
Free-flow speed, FFS			57.8	mph	53.6	mph
Avg. passenger-car travel speed, S			57.8	mph	53.6	mph
Level of service, LOS			A		A	
Density, D			8.8	pc/mi/ln	7.5	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: S.R. 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			5		22	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			1.3	mph	5.5	mph
Free-flow speed			57.8	mph	53.6	mph

VOLUME

	Direction		1		2	
Volume, V			1097	vph	1037	vph
Peak-hour factor, PHF			0.95		0.95	
Peak 15-minute volume, v15			289		273	
Trucks and buses			2	%	2	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling		Rolling	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2		2	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.971		0.971	
Flow rate, vp			594	pcphpl	562	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			594	pcphpl	562	pcphpl
Free-flow speed, FFS			57.8	mph	53.6	mph
Avg. passenger-car travel speed, S			57.8	mph	53.6	mph
Level of service, LOS			A		A	
Density, D			10.3	pc/mi/ln	10.5	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA
 Agency: TRC INTERNATIONAL
 Date: 8/29/02
 Period: AM
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD)
 Inter.: I-75/S.R. 131
 Area Type: All other areas
 Jurisd:
 Year : 2006
 N/S St: I-75 S.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	2	0	1
LGConfig	TR-			L	LT					L	R	
Volume	397 542			1009 668						192 79		
Lane Width	12.0			12.0 12.0						12.0 12.0		
RTOR Vol	100									8		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru			
Right			A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru			
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right			A		WB Right			
Green	40.0	30.0				5.0		
Yellow	3.0	3.0				3.0		
All Red	2.0	2.0				2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach Delay LOS
			v/c	g/C		
Eastbound						
TR	1108	3325	0.80	0.33	31.4 C	31.4 C
Westbound						
L	802	1805	0.73	0.44	23.9 C	
LT	1572	3538	0.75	0.44	22.9 C	23.3 C
Northbound						
Southbound						
L	195	3502	0.50	0.06	43.3 D	30.8 C
R	718	1615	0.10	0.44	14.6 B	
Intersection Delay = 26.3 (sec/veh)					Intersection LOS = C	

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S-R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: PM Year : 2006
 Project ID: KNOX CO, EXISTING SYSTEM /
 E/W St: S-R. 131 (EMORY ROAD) / N/S St: I-75 S-B. RAMPS /

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	2	0	1
LGConfig		TR		L	LT					L		R
Volume		905	192	1471	960					110		77
Lane Width		12.0		12.0	12.0					12.0		12.0
RTOR Vol			74									8

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru								
Right			A					
Peds								
WB Left		A						
Thru		A						
Right								
Peds								
NB Right								
SB Right			A					
Green		38.0	32.0					5.0
Yellow		3.0	3.0					3.0
All Red		2.0	2.0					2.0

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach Delay LOS	
			v/c	g/C			
Eastbound							
TR	1262	3548	0.85	0.36	32.7	C	32.7 C
Westbound							
L	762	1805	0.44	0.42	18.8	B	
LT	1514	3585	0.78	0.42	25.0	C	23.6 C
Northbound							
Southbound							
L	195	3502	0.59	0.06	46.4	D	
R	754	1615	0.10	0.47	13.5	B	33.7 C
Intersection Delay = 27.8 (sec/veh)				Intersection LOS = C			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: am Year : 2006
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: I-75 n.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T			TR		L		R			
Volume	159	430		1560	133		117		444			
Lane Width	12.0	12.0		12.0			12.0		12.0			
RTOR Vol					44				148			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		13.0	45.0			17.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group	Approach	
			v/c	g/C	Delay LOS	Delay LOS	
Eastbound							
L	261	1805	0.24	0.14	34.6	C	
T	2527	3610	0.18	0.70	4.7	A	8.3 A
Westbound							
TR	1791	3581	0.97	0.50	36.5	D	36.5 D
Northbound							
L	341	1805	0.36	0.19	32.4	C	
R	537	2842	0.58	0.19	34.9	C	34.2 C
Southbound							

Intersection Delay = 30.7 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: PM Year : 2006
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: I-75 N.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T			TR		L		R			
Volume	1123	892			1056	205	1375		960			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol					68				320			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru	A	A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		13.0	36.0			26.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Approach		
			v/c	g/C	Delay	LOS	Delay
Eastbound							
L	261	1805	0.49	0.14	36.9	D	
T	2166	3610	0.43	0.60	9.9	A	13.1 B
Westbound							
TR	1419	3548	0.89	0.40	32.1	C	32.1 C
Northbound							
L	521	1805	0.76	0.29	35.5	D	
R	821	2842	0.82	0.29	36.5	D	36.1 D
Southbound							

Intersection Delay = 27.4 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: PRIMETIME ROAD/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: AM Year : 2006
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: PRIMETIME ROAD

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	194	735	45	13	1270	8	139	5	2	154	9	384
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			15			3			1			128

Duration 0.25 Area Type: All other areas

Phase Combination	Signal Operations							
	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left			A		SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green	21.0	42.0			11.0	11.0		
Yellow	3.0	3.0			3.0	3.0		
All Red	2.0	2.0			2.0	2.0		

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach	
			v/c	g/C		Delay LOS	Delay LOS
Eastbound							
L	361	1805	0.27	0.20	36.0	D	
TR	2324	3589	0.35	0.65	8.5	A	11.5 B
Westbound							
L	264	660	0.01	0.40	19.0	B	
TR	1443	3608	0.93	0.40	41.1	D	41.0 D
Northbound							
L	189	1805	0.22	0.10	43.6	D	
TR	194	1853	0.03	0.10	42.3	D	43.5 D
Southbound							
LT	191	1821	0.35	0.10	44.7	D	30.5 C
R	569	1615	0.47	0.35	27.0	C	
Intersection Delay = 29.6 (sec/veh) Intersection LOS = C							

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: PRIMETIME ROAD/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: PM Year : 2006
 Project ID: KNOX CO, EXISTING SYSTEM / N/S St: PRIMETIME ROAD /
 E/W St: S.R. 131 (EMORY ROAD) -

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LG Config	L	TR		L	TR		L	TR			LT	R
Volume	1244	1443	165	13	986	76	125	33	12	190	23	150
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			55			25			4			50

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left			A		SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		22.0	37.0			13.0	13.0	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS		
Eastbound								
L	378	1805	0.68	0.21	43.2	D		
TR	2177	3572	0.75	0.61	16.3	B	19.9	B
Westbound								
L	86	244	0.03	0.35	22.5	C		
TR	1263	3583	0.86	0.35	38.2	D	38.1	D
Northbound								
L	223	1805	0.59	0.12	47.7	D		
TR	229	1847	0.19	0.12	41.7	D	46.2	D
Southbound								
LT	226	1827	0.53	0.12	45.4	D	34.3	C
R	615	1615	0.17	0.38	21.7	C		
Intersection Delay = 28.1 (sec/veh)					Intersection LOS = C			

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: SR 131 (Emory Road)
 From/To: Primetime Road/Bishop
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

	Direction	1		2	
Lane width		12.0	ft	12.0	ft
Lateral clearance:					
Right edge		2.0	ft	2.0	ft
Left edge		6.0	ft	6.0	ft
Total lateral clearance		8.0	ft	8.0	ft
Access points per mile		10		10	
Median type		Divided		Divided	
Free-flow speed:		Base		Base	
FFS or BFFS		60.0	mph	60.0	mph
Lane width adjustment, FLW		0.0	mph	0.0	mph
Lateral clearance adjustment, FLC		0.9	mph	0.9	mph
Median type adjustment, FM		0.0	mph	0.0	mph
Access points adjustment, FA		2.5	mph	2.5	mph
Free-flow speed		56.6	mph	56.6	mph

VOLUME

	Direction	1		2	
Volume, V		791	vph	1281	vph
Peak-hour factor, PHF		0.95		0.95	
Peak 15-minute volume, v15		208		337	
Trucks and buses		3	%	3	%
Recreational vehicles		0	%	0	%
Terrain type		Rolling		Rolling	
Grade		0.00	%	0.00	%
Segment length		0.00	mi	0.00	mi
Number of lanes		2		2	
Driver population adjustment, fP		1.00		1.00	
Trucks and buses PCE, ET		2.5		2.5	
Recreational vehicles PCE, ER		2.0		2.0	
Heavy vehicle adjustment, fHV		0.957		0.957	
Flow rate, vp		435	pcphpl	704	pcphpl

RESULTS

	Direction	1		2	
Flow rate, vp		435	pcphpl	704	pcphpl
Free-flow speed, FFS		56.6	mph	56.6	mph
Avg. passenger-car travel speed, S		56.6	mph	56.6	mph
Level of service, LOS		A		B	
Density, D		7.7	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: SR 131 (Emory Road)
 From/To: Primetime Road/Bishop
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

	Direction	1		2	
Lane width		12.0	ft	12.0	ft
Lateral clearance:					
Right edge		2.0	ft	2.0	ft
Left edge		6.0	ft	6.0	ft
Total lateral clearance		8.0	ft	8.0	ft
Access points per mile		10		10	
Median type		Divided		Divided	
Free-flow speed:		Base		Base	
FFS or BFFS		60.0	mph	60.0	mph
Lane width adjustment, FLW		0.0	mph	0.0	mph
Lateral clearance adjustment, FLC		0.9	mph	0.9	mph
Median type adjustment, FM		0.0	mph	0.0	mph
Access points adjustment, FA		2.5	mph	2.5	mph
Free-flow speed		56.6	mph	56.6	mph

VOLUME

	Direction	1		2	
Volume, V		1545	vph	1281	vph
Peak-hour factor, PHF		0.95		0.95	
Peak 15-minute volume, v15		407		337	
Trucks and buses		3	%	3	%
Recreational vehicles		0	%	0	%
Terrain type		Rolling		Rolling	
Grade		0.00	%	0.00	%
Segment length		0.00	mi	0.00	mi
Number of lanes		2		2	
Driver population adjustment, fP		1.00		1.00	
Trucks and buses PCE, ET		2.5		2.5	
Recreational vehicles PCE, ER		2.0		2.0	
Heavy vehicle adjustment, fHV		0.957		0.957	
Flow rate, vp		849	pcphpl	704	pcphpl

RESULTS

	Direction	1		2	
Flow rate, vp		849	pcphpl	704	pcphpl
Free-flow speed, FFS		56.6	mph	56.6	mph
Avg. passenger-car travel speed, S		56.6	mph	56.6	mph
Level of service, LOS		B		B	
Density, D		15.0	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Analysis Summary
2026 Traffic and Existing Geometric

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	C
D-1, I-75 Northbound Off-ramp to SR131	Ramp and Ramp Junctions, Ln. Drop	AM	C
		PM	C
I-75 Northbound Through Interchange	Basic Freeway Segments	AM	C
		PM	C
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	C
		PM	C
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	C
		PM	C
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	C
		PM	C
D-2, I-75 Southbound Off-ramp to SR 131	Ramp and Ramp Junctions	AM	C
		PM	D
I-75 Southbound Through Interchange	Basic Freeway Segments	AM	C
		PM	C
M-2, I-75 Southbound On-ramp from SR 131	Ramp and Ramp Junctions, Add Ln	AM	C
		PM	C
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 West of I-75	Multilane Highways	AM	B
		PM	B
SR 131/I-75 SB Ramps	Signalized Intersections	AM	D (49.7)
		PM	D (44.7)
SR 131/I-75 NB Ramps	Signalized Intersections	AM	D (43.1)
		PM	D (42.5)
SR 131/Primetime Rd.	Signalized Intersections	AM	D (37.7)
		PM	D (41.7)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B
		PM	C

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I75 NB ✓
From/To: South of Interchange ✓
Jurisdiction:
Analysis Year: 2026-
Description: Knox Co., Exist. System, DHV ✓

 Flow Inputs and Adjustments

Volume, V	2876 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	757	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1176	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1176	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.8	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM ✓
Freeway/Direction: I75 NB ✓
From/To: South of Interchange ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Exist. System, DHV ✓

 Flow Inputs and Adjustments

Volume, V	3812 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1003	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1558	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1558	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	3	
Density, D	22.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I 75 NB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2146	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	565	v
Trucks and buses	16%	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	1401	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1401	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	20.0	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I 75 NB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2076	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	546	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	1355	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1355	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	19.4	pc/mi/ln
Level of service, LOS	C	

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

HCS2000: Ramps and Ramp Junctions Release 4.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 9/12/02
Analysis time period: AM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (Emory Road)
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, N.B. on ramp from S.R. 131, Existing System

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2146	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	840	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)	2146	250		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	565	66		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2801	271		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 E_Q
 $P = 1.000$ Using Equation 0
 FM
 $v_{12} = v_F(P_{FM}) = 2801$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3072	4800	No
v_{R12}	3072	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.0$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

 Speed Estimation

Intermediate speed variable,	$M = 0.321$	
Space mean speed in ramp influence area,	$S_R = 61.0$	mph
Space mean speed in outer lanes,	$S_0 = N/A$	mph
Space mean speed for all vehicles,	$S = 61.0$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 9/12/02
Analysis time period: PM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (Emory Road)
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, N.B. on ramp from

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2076	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	426	vph
Length of first accel/decel lane	840	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)	2076	426		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	546	112		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2710	462		pcph

Estimation of V12 Merge Areas

L = 0.00 (Equation 25-2 or 25-3)

EQ
 P = 1.000 Using Equation 0
 FM
 $v_{12} = v_{F, FM} = 2710$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3172	4800	No
v_{R12}	3172	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.7$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

 Speed Estimation

Intermediate speed variable,	M = 0.330	
Space mean speed in ramp influence area,	S _S = 60.8	mph
Space mean speed in outer lanes,	S _R = N/A	mph
Space mean speed for all vehicles,	S _D = 60.8	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 NB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Cp., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	2396	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	631	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1620	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1620	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.3	mi/h
Number of lanes, N	2	
Density, D	23.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 NB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Cp., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2502	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	658	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1692	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1692	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.9	mi/h
Number of lanes, N	2	
Density, D	24.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75 SB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	2275	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	599	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1539	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1539	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	2	
Density, D	22.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 SB
From/To: North of Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2331	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	613	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fhv	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1576	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1576	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	2	
Density, D	22.7	pc/mi/ln
Level of service, LOS	C	

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

HCS2000: Ramps and Ramp Junctions Release 4.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Diverge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 9/16/02
Analysis time period: AM DHV
Freeway/dir or travel: I-75
Junction: S.R. 131 (Emory Road)
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., D-2, SB off ramp to S.R 131, Existing System

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2275	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	221	vph
Length of first accel/decel lane	360	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)	2275	221		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	599	58		v
Trucks and buses	19	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3077	240		pcph

Estimation of V12 Diverge Areas

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

$$P = 1.000 \quad \text{Using Equation 0}$$

$$v_{12} = v_R + (v_F - v_R) P = 3077 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3077	4800	No
v_{12}	3077	4400	No
$v_{F0} = v_F - v_R$	2837	4800	No
v_R	240	2100	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 27.5 \quad \text{pc/mi/ln}$$

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

Speed Estimation

Intermediate speed variable,	$D = 0.255$	
Space mean speed in ramp influence area,	$S = 63$	mph
Space mean speed in outer lanes,	$S = \text{N/A}$	mph
Space mean speed for all vehicles,	$S = 62.9$	mph

HCS2000: Ramps and Ramp Junctions Release 4.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 9/16/02
Analysis time period: PM DHV
Freeway/dir or travel: I-75
Junction: S-R. 131 (Emory Road)
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., D-2, S-B, off ramp to S-R. 131, Existing System

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2331	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	243	vph
Length of first accel/decel lane	360	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)	2331	243		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	613	64		v
Trucks and buses	19	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3153	263		pcph

 Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 1.000 \quad \text{Using Equation D}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 3153 \quad \text{pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3153	4800	No
v_{12}	3153	4400	No
$v_{F0} = v_F - v_R$	2890	4800	No
v_R	263	2100	No

Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 28.1 \quad \text{pc/mi/ln}$$

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

Speed Estimation

Intermediate speed variable,	$D = 0.257$	
Space mean speed in ramp influence area,	$S = 63$	mph
Space mean speed in outer lanes,	$S = N/A$	mph
Space mean speed for all vehicles,	$S = 62.8$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I-75 SB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2054	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	541	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1357	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1357	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	19.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I-75 SB
From/To: Through Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

Flow Inputs and Adjustments

Volume, V	2088	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	549	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1379	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1379	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	19.7	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 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979
 E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
 Agency or Company: TRC International
 Date Performed: 5/20/02
 Analysis Time Period: AM ✓
 Freeway/Direction: I75 SB ✓
 From/To: South of Interchange ✓
 Jurisdiction:
 Analysis Year: 2026 ✓
 Description: Knox Co., Exist. System, DHV ✓

Flow Inputs and Adjustments

Volume, V	4070 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1071	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1664	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1664	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.1	mi/h
Number of lanes, N	3	
Density, D	24.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75 SB
From/To: South of Interchange
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Exist. System, DHV

 Flow Inputs and Adjustments

Volume, V	2950 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	776	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1206	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1206	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	17.2	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026
 Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			5		22	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			1.3	mph	5.5	mph
Free-flow speed			57.8	mph	53.6	mph

VOLUME

	Direction		1		2	
Volume, V			1221 ✓	vph	971 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			321		256	
Trucks and buses			2 ✓	%	2 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling ✓	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2		2	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.971		0.971	
Flow rate, vp			661	pcphpl	526	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			661	pcphpl	526	pcphpl
Free-flow speed, FFS			57.8	mph	53.6	mph
Avg. passenger-car travel speed, S			57.8	mph	53.6	mph
Level of service, LOS			B		A	
Density, D			11.4	pc/mi/ln	9.8	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026
 Project ID: Knox Co., *Exist. System*

FREE-FLOW SPEED

	Direction			
	1	2	1	2
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	5		22	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	1.3	mph	5.5	mph
Free-flow speed	57.8	mph	53.6	mph

VOLUME

	Direction			
	1	2	1	2
Volume, V	1425 ✓	vph	1347 ✓	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	375		354	
Trucks and buses	2 ✓	%	2 ✓	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling ✓		Rolling ✓	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, FP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.971		0.971	
Flow rate, vp	772	pcphpl	730	pcphpl

RESULTS

	Direction			
	1	2	1	2
Flow rate, vp	772	pcphpl	730	pcphpl
Free-flow speed, FFS	57.8	mph	53.6	mph
Avg. passenger-car travel speed, S	57.8	mph	53.6	mph
Level of service, LOS	B		B	
Density, D	13.3	pc/mi/ln	13.6	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: AM Year: 2026
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: I-75 S.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	2	0	1
LGConfig		TR		L	LT					L		R
Volume		517	704	1312	869					119		102
Lane Width		12.0		12.0	12.0					12.0		12.0
RTOR Vol			130									10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru		A						
Right		A						
Peds								
WB Left		A						
Thru		A						
Right								
Peds								
NB Right								
SB Right			A					
Green		40.0	30.0			5.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
TR	1108	3325	1.04	0.33	66.8	E	66.8	E
Westbound								
L	802	1805	0.95	0.44	44.1	D		
LT	1572	3538	0.98	0.44	42.0	D	42.7	D
Northbound								
Southbound								
L	195	3502	0.64	0.06	48.6	D	33.8	C
R	718	1615	0.14	0.44	14.9	B		
Intersection Delay = 49.7 (sec/veh)					Intersection LOS = D			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/27/02 Jurisd:
 Period: PM Year : 2026 ✓
 Project ID: KNOX CO. EXISTING SYSTEM ✓
 E/W St: S.R. 131 (EMORY ROAD) ✓ N/S St: I-75 S.B. RAMPS ✓

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	2	0	1
LG Config		TR		L	LT					L		R
Volume		1175	250	1612	1247					1143		100
Lane Width		12.0		12.0	12.0					12.0		12.0
RTOR Vol			130									10

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru								
Right		A						
Peds								
WB Left		A						
Thru		A						
Right								
Peds								
NB Right								
SB Right			A					
Green		35.0	35.0			5.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group	Approach	
			v/c	g/C	Delay LOS	Delay LOS	
Eastbound							
TR	1384	3560	0.98	0.39	47.8 D	47.8 D	
Westbound							
L	702	1805	0.83	0.39	32.8 C		
LT	1401	3602	0.98	0.39	47.2 D	42.9 D	
Northbound							
Southbound							
L	195	3502	0.77	0.06	59.5 E		
R	808	1615	0.12	0.50	12.0 B	41.1 D	
Intersection Delay = 44.7 (sec/veh)					Intersection LOS = D		

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: AM Year : 2026
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: I-75 N.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T		TR			L		R			
Volume	177	559		2026	173		153		577			
Lane Width	12.0	12.0		12.0			12.0		12.0			
RTOR Vol					58				192			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	54.0				15.0		
Yellow	3.0	3.0				3.0		
All Red	2.0	2.0				2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	120	1805	0.68	0.07	55.1	E		
T	2607	3610	0.23	0.72	4.2	A	10.4	B
Westbound								
TR	2149	3581	1.05	0.60	52.0	D	52.0	D
Northbound								
L	301	1805	0.53	0.17	36.2	D		
R	474	2842	0.85	0.17	50.6	D	46.5	D
Southbound								

Intersection Delay = 43.1 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: PM Year : 2026
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: I-75 N.B. RAMPS

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T			TR		L		R			
Volume	1159	1159			1372	267	1487		1249			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol					120				600			

Duration 0.25 Area Type: All other areas

		Signal Operations							
Phase Combination	1	2	3	4	5	6	7	8	
EB Left		A							NB Left
EB Thru		A							Thru
EB Right			A						Right
EB Peds									Peds
WB Left									SB Left
WB Thru			A						Thru
WB Right				A					Right
WB Peds									Peds
NB Right									EB Right
SB Right									WB Right
Green		10.0	39.0						26.0
Yellow		3.0	3.0						3.0
All Red		2.0	2.0						2.0

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS	Delay LOS	Delay LOS
Eastbound								
L	201	1805	0.83	0.11	63.7	E		
T	2166	3610	0.56	0.60	11.2	B	17.5	B
Westbound								
TR	1542	3558	1.04	0.43	58.6	E	58.6	E
Northbound								
L	521	1805	0.98	0.29	67.2	E		
R	821	2842	0.83	0.29	37.3	D	50.1	D
Southbound								

Intersection Delay = 42.5 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: PRIMETIME ROAD/...
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: AM Year : 2026
 Project ID: KNOX CO. EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD) N/S St: PRIMETIME ROAD

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	123	954	59	4	1651	11	51	6	3	70	12	499
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			20			4			1			166

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
WB Left			A		SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		14.5	50.0			10.0	10.5	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	249	1805	0.52	0.14	43.9	D		
TR	2376	3589	0.44	0.66	8.6	A	12.5	B
Westbound								
L	248	521	0.02	0.48	14.5	B		
TR	1718	3608	1.02	0.48	53.2	D	53.1	D
Northbound								
L	172	1805	0.31	0.10	45.4	D		
TR	174	1829	0.05	0.10	43.3	D	45.1	D
Southbound								
LT	182	1822	0.48	0.10	46.6	D	42.6	D
R	461	1615	0.76	0.29	41.6	D		
Intersection Delay = 37.7 (sec/veh)					Intersection LOS = D			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA
 Agency: TRC INTERNATIONAL
 Date: 8/29/02
 Period: PM
 Project ID: KNOX CO, EXISTING SYSTEM
 E/W St: S.R. 131 (EMORY ROAD)
 Inter.: PRIMETIME ROAD/J...
 Area Type: All other areas
 Jurisd:
 Year : 2026
 N/S St: PRIMETIME ROAD

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	1317	1876	215	14	1281	99	163	44	15	118	30	195
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			100			50			7			90

Duration 0.25 Area Type: All other areas

Phase Combination	Signal Operations							
	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left		A			SB Left		A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		21.4	40.6			12.1	10.9	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	368	1805	0.91	0.20	66.3	E		
TR	2284	3579	0.92	0.64	23.1	C	29.0	C
Westbound								
L	72	187	0.06	0.39	20.5	C		
TR	1388	3590	1.01	0.39	58.5	E	58.4	E
Northbound								
L	208	1805	0.83	0.12	68.7	E		
TR	214	1858	0.25	0.12	43.0	D	62.5	E
Southbound								
LT	190	1827	0.82	0.10	70.2	E	50.8	D
R	574	1615	0.19	0.36	23.6	C		
Intersection Delay = 41.7 (sec/veh)					Intersection LOS = D			

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: AM
Highway: SR 131 (Emory Road)
From/To: Primetime Road/Bishop
Jurisdiction:
Analysis Year: 2026
Project ID: Knox Co., *Exist. System*

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	10		10	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	2.5	mph	2.5	mph
Free-flow speed	56.6	mph	56.6	mph

VOLUME

Direction	1		2	
Volume, V	1027 ✓	vph	1666 ✓	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	270		438	
Trucks and buses	3 ✓	%	3 ✓	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling ✓		Rolling ✓	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.957		0.957	
Flow rate, vp	564	pcphpl	916	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	564	pcphpl	916	pcphpl
Free-flow speed, FFS	56.6	mph	56.6	mph
Avg. passenger-car travel speed, S	56.6	mph	56.6	mph
Level of service, LOS	A		B	
Density, D	10.0	pc/mi/ln	16.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: PM ✓
Highway: SR 131 (Emory Road)
From/To: Primitime Road/Bishop
Jurisdiction:
Analysis Year: 2026 ✓
Project ID: Knox Co., Exist. System

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	10		10	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	2.5	mph	2.5	mph
Free-flow speed	56.6	mph	56.6	mph

VOLUME

Direction	1		2	
Volume, V	2009 ✓	vph	1384 ✓	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	529		364	
Trucks and buses	3 ✓	%	3 ✓	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling ✓		Rolling ✓	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2 ✓		2 ✓	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.957		0.957	
Flow rate, vp	1104	pcphpl	761	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1104	pcphpl	761	pcphpl
Free-flow speed, FFS	56.6	mph	56.6	mph
Avg. passenger-car travel speed, S	56.6	mph	56.6	mph
Level of service, LOS	C		B	
Density, D	19.5	pc/mi/ln	13.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

**Analysis Summary , Alternate 1
2006 Traffic and Proposed Geometrics**

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound , South of D-1 Major Diverge	Basic Freeway Segments	AM	A
		PM	B
I-75 Northbound , North of D-1 Major Diverge	Basic Freeway Segments	AM	A
		PM	A
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound, North of M-1 On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Southbound, North of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Southbound, North of D-2 Off-ramp	Basic Freeway Segments	AM	B
		PM	B
D-2, I-75 Southbound Off-ramp to SR131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Southbound, South of D-2 Off-ramp to SR 131	Basic Freeway Segments	AM	A
		PM	A
M-2, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	B
		PM	A
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 west of I-75	Multilane Highways	AM	A
		PM	A
SR 131/I-75 Ramps	Signalized Intersection	AM	C(32.6)
		PM	D(36.1)
SR 131/Primetime Rd.	Signalized Intersection	AM	C (29.6)
		PM	C (28.1)
SR 131 east of Primetime Rd.	Multilane Highways	AM	B
		PM	B

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: N.B. SO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

 Flow Inputs and Adjustments

Volume, V	2182 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	574	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	892	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	892	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: N.B. SO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

 Flow Inputs and Adjustments

Volume, V	2866 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	754	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
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	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1172	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: N.B. SO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

 Flow Inputs and Adjustments

Volume, V	2182 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	574	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	669	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	669	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	9.6	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: N.B. SO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	2866 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	754	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	879	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	879	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	12.6	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: N.B. NO. OF D-1 ✓
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

 Flow Inputs and Adjustments

Volume, V	1621 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	427	v
Trucks and buses	16 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	705	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	705	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	10.1	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: N.B. ,NO. OF D-1 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

 Flow Inputs and Adjustments

Volume, V	1531 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	403	v
Trucks and buses	16 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	666	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	666	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	9.5	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 AM DHV
Freeway/dir or travel: I-75
Junction: M-1
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., N.B. ON RAMP FROM S.R. 131, Alt. 1

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1621	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	192	vph
Length of first accel/decel lane	840	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)	1621	192		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	427	51		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2116	208		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.601$ Using Equation 1
 FM
 $v_{12} = v_{F, FM} = 1272$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2324	7200	No
v_{R12}	1480	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.7$ pc/mi/ln

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

 Speed Estimation

Intermediate speed variable,	$M = 0.254$	
Space mean speed in ramp influence area,	$S_R = 62.9$	mph
Space mean speed in outer lanes,	$S_0 = 68.8$	mph
Space mean speed for all vehicles,	$S = 64.9$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 PM DHV ✓
Freeway/dir or travel: I-75
Junction: M-1 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO.-N.B. ON RAMP FROM S.R. 131, Alt. 1

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1531 ✓	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	328 ✓	vph
Length of first accel/decel lane	840	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)	1531 ✓	328 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	403	86		v
Trucks and buses	16 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	%	%		%
Length	mi	mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fhv	0.806	0.971		
Driver population factor, fp	1.00	1.00		
Flow rate, vp	1998	356		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 E_Q
 $P = 0.601$ Using Equation 1
 FM
 $v_{12} = v_F(P_{FM}) = 1201$ pc/h
 12

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2354	7200	No
v_{R12}	1557	4600	No

 Level of Service Determination (if not F)

$Density, D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.2$ pc/mi/ln
 R

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

 Speed Estimation

Intermediate speed variable,	$M = 0.256$	
Space mean speed in ramp influence area,	$S = 62.8$	mph
Space mean speed in outer lanes,	$S = 68.9$	mph
Space mean speed for all vehicles,	$S = 64.8$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: N.B., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1813 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	477	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	817	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	817	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	11.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: N.B., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1859 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	489	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	838	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange ² density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	838	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.0	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: N.B., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1813 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	477	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1226	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1226	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: N.B., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1859 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	489	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1257	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1257	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	18.0-	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: SB, NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1809 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	476	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1223	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1223	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: SB., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1831 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	482	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1238	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1238	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: SB., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1809 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	476	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	816	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	816	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	11.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL\
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: SB., NO. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1831 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	482	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	826	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	826	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	11.8	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 AM DHV ✓
Freeway/dir or travel: I-75
Junction: D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., S.B. OFF RAMP, *PROP. SYSTEM, ALT. 1*

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1809 ✓	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	171 ✓	vph
Length of first accel/decel lane	360	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)	1809 ✓	171 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	476	45		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2447	185		pcph

 Estimation of V_{12} Diverge Areas

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

$$E_Q$$

$$P = 0.690 \quad \text{Using Equation 5}$$

$$F_D$$

$$v_{12} = v_R + (v_F - v_R) P = 1746 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{F1} = v_F$	2447	7200	No
v_{12}	1746	4400	No
$v_{F0} = v_F - v_R$	2262	7200	No
v_R	185	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 16.0 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D = 0.250$	
Space mean speed in ramp influence area,	$S_R = 63$	mph
Space mean speed in outer lanes,	$S_D = 76.8$	mph
Space mean speed for all vehicles,	$S = 66.4$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 PM DHV ✓
Freeway/dir or travel: I-75
Junction: D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., S.B. OFF RAMP, PROP. SYSTEM, ALT. 1

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1831 ✓	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	187 ✓	vph
Length of first accel/decel lane	360	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)	1831 ✓	187 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	482	49		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2477	203		pcph

 Estimation of V₁₂ Diverge Areas

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

$$EQ$$

$$P = 0.689 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 1769 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2477	7200	No
v_{12}	1769	4400	No
$v_{F0} = v_F - v_R$	2274	7200	No
v_R	203	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 16.2 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D = 0.251$	
Space mean speed in ramp influence area,	$S_R = 63$	mph
Space mean speed in outer lanes,	$S_0 = 76.8$	mph
Space mean speed for all vehicles,	$S_D = 66.4$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: S.B., SOUTH OF D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1638 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	431	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	721	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	721	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	10.3	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: S-B., SOUTH OF D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	1644 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	433	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	724	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	724	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	10.3	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 AM DHV ✓
Freeway/dir or travel: I-75
Junction: M-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: KNOX CO. M-2, S.B. ON RAMP, PROP. SYSTEM, ALT. 1.

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1638 ✓	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	1551 ✓	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	600	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)	1638 ✓	1551 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	431	408		v
Trucks and buses	17 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	%	%		%
Length	mi	mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.797	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2164	1682		pcph

Estimation of V12 Merge Areas

L = 0.00 (Equation 25-2 or 25-3)
 EQ
 P = 0.555 Using Equation 0
 FM
 $v_{12} = v_{F \text{ FM}} (P) = 1201 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3846	7200	No
v_{R12}	2883	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.9 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $M = 0.211$
 S
 Space mean speed in ramp influence area, $S = 64.1 \text{ mph}$
 R
 Space mean speed in outer lanes, $S = 68.3 \text{ mph}$
 0
 Space mean speed for all vehicles, $S = 65.1 \text{ mph}$

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC INTERNATIONAL
Date performed: 10/8/02
Analysis time period: 2006 PM DHV ✓
Freeway/dir or travel: I-75
Junction: M-2 ✓
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., M-2, S.B. ON RAMP, PROP. SYSTEM, ALT. 1.

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1644 ✓	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	663 ✓	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	600	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)	1644 ✓	663 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	433	174		v
Trucks and buses	17 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	%	%		%
Length	mi	mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.797	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2172	719		pcph

 Estimation of V12 Merge Areas

$$L = 0.00 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.555 \quad \text{Using Equation 0}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1205 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2891	7200	No
v_{R12}	1924	4600	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 8.9 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$M = 0.168$	
Space mean speed in ramp influence area,	$S_R = 65.3$	mph
Space mean speed in outer lanes,	$S_0 = 68.3$	mph
Space mean speed for all vehicles,	$S = 66.3$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 AM DHV ✓
Freeway/Direction: I-75
From/To: S.B., S.O. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., PROP. SYSTEM, ALTERENATE 1 ✓

Flow Inputs and Adjustments

Volume, V	3189 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	839	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1304	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1304	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3 ✓	
Density, D	18.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC INTERNATIONAL
Date Performed: 10/8/02
Analysis Time Period: 2006 PM DHV ✓
Freeway/Direction: I-75
From/To: S.B., S.O. OF INTERCHANGE ✓
Jurisdiction:
Analysis Year: 2006
Description: KNOX CO., PROP. SYSTEM, ALTERNATE 1 ✓

Flow Inputs and Adjustments

Volume, V	2307 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	607	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	943	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	943	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: S.R. 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Prop. System, **Alt. 1**

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			5		22	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			1.3	mph	5.5	mph
Free-flow speed			57.8	mph	53.6	mph

VOLUME

	Direction		1		2	
Volume, V			939 ✓	vph	747 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			247		197	
Trucks and buses			2 ✓	%	2 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling ✓	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.971		0.971	
Flow rate, vp			509	pcphpl	404	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			509	pcphpl	404	pcphpl
Free-flow speed, FFS			57.8	mph	53.6	mph
Avg. passenger-car travel speed, S			57.8	mph	53.6	mph
Level of service, LOS			A		A	
Density, D			8.8	pc/mi/ln	7.5	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM ✓
 Highway: S.R. 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2006 ✓
 Project ID: Knox Co., Prop. System, **Alt 1**

FREE-FLOW SPEED

	Direction	1		2	
Lane width		12.0	ft	12.0	ft
Lateral clearance:					
Right edge		2.0	ft	2.0	ft
Left edge		6.0	ft	6.0	ft
Total lateral clearance		8.0	ft	8.0	ft
Access points per mile		5		22	
Median type		Divided		Divided	
Free-flow speed:		Base		Base	
FFS or BFFS		60.0	mph	60.0	mph
Lane width adjustment, FLW		0.0	mph	0.0	mph
Lateral clearance adjustment, FLC		0.9	mph	0.9	mph
Median type adjustment, FM		0.0	mph	0.0	mph
Access points adjustment, FA		1.3	mph	5.5	mph
Free-flow speed		57.8	mph	53.6	mph

VOLUME

	Direction	1		2	
Volume, V		1097 ✓	vph	1037 ✓	vph
Peak-hour factor, PHF		0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15		289		273	
Trucks and buses		2 ✓	%	2 ✓	%
Recreational vehicles		0	%	0	%
Terrain type		Rolling ✓		Rolling ✓	
Grade		0.00	%	0.00	%
Segment length		0.00	mi	0.00	mi
Number of lanes		2 ✓		2 ✓	
Driver population adjustment, fP		1.00		1.00	
Trucks and buses PCE, ET		2.5		2.5	
Recreational vehicles PCE, ER		2.0		2.0	
Heavy vehicle adjustment, fHV		0.971		0.971	
Flow rate, vp		594	pcphpl	562	pcphpl

RESULTS

	Direction	1		2	
Flow rate, vp		594	pcphpl	562	pcphpl
Free-flow speed, FFS		57.8	mph	53.6	mph
Avg. passenger-car travel speed, S		57.8	mph	53.6	mph
Level of service, LOS		A		A	
Density, D		10.3	pc/mi/ln	10.5	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA
 Agency: TRC International
 Date: 10/08/02
 Period: AM
 Project ID: Knox Co., Prop. System, Alt. 1
 E/W St: S.R. 131 (Emory Road)
 Inter.:
 Area Type: All other areas
 Jurisd:
 Year : 2006
 N/S St: I 75 Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	2	2	0	2	0	0	2	0	0
LGConfig	L	T		L	T		L			L		
Volume	159	338		1009	551		117			192		
Lane Width	12.0	12.0		12.0	12.0		12.0			12.0		
RTOR Vol												

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right			
Peds					Peds			
WB Left			A		SB Left	A		
Thru			A		Thru			
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		30.0	48.0			27.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach	
			v/c	g/C		Delay LOS	Delay LOS
Eastbound							
L	876	3502	0.07	0.25	34.4 C		
T	903	3610	0.39	0.25	37.7 D	37.2	D
Westbound							
L	1401	3502	0.76	0.40	33.4 C		
T	1444	3610	0.40	0.40	25.9 C	30.8	C
Northbound							
L	788	3502	0.16	0.22	37.4 D		
						37.4	D
Southbound							
L	788	3502	0.12	0.22	37.1 D		
						37.1	D

Intersection Delay = 32.6 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.:
 Agency: TRC International Area Type: All other areas
 Date: 10/08/02 Jurisd:
 Period: PM Year : 2006
 Project ID: Knox Co., Prop. System, Alt. 1
 E/W St: S-R. 131 (Emory Road) N/S St: I 75 Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	2	2	0	2	0	0	2	0	0
LGConfig	L	T		L	T		L			L		
Volume	1123	782		1471	585		1375			1110		
Lane Width	12.0	12.0		12.0	12.0		12.0			12.0		
RTOR Vol												

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left			A		SB Left	A		
Thru			A		Thru			
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	40.0	35.0			30.0			
Yellow	3.0	3.0			3.0			
All Red	2.0	2.0			2.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	1167	3502	0.11	0.33	27.7	C		
T	1203	3610	0.68	0.33	36.2	D	35.0+	D
Westbound								
L	1021	3502	0.49	0.29	35.4	D		
T	1053	3610	0.58	0.29	37.1	D	36.4	D
Northbound								
L	876	3502	0.45	0.25	38.4	D	38.4	D
Southbound								
L	876	3502	0.13	0.25	35.0-	C	35.0-	C

Intersection Delay = 36.1 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: PRIMETIME ROAD/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: AM Year : 2006
 Project ID: KNOX CO. PROP. SYSTEM, ALT.1
 E/W St: S.R. 131 (EMORY ROAD) N/S St: PRIMETIME ROAD

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	194	735	45	13	1270	8	139	5	2	154	9	384
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			15			3			1			128

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left		A			SB Left		A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		21.0	42.0			11.0	11.0	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS		
Eastbound								
L	361	1805	0.27	0.20	36.0	D		
TR	2324	3589	0.35	0.65	8.5	A	11.5	B
Westbound								
L	264	660	0.01	0.40	19.0	B		
TR	1443	3608	0.93	0.40	41.1	D	41.0	D
Northbound								
L	189	1805	0.22	0.10	43.6	D		
TR	194	1853	0.03	0.10	42.3	D	43.5	D
Southbound								
LT	191	1821	0.35	0.10	44.7	D	30.5	C
R	569	1615	0.47	0.35	27.0	C		
Intersection Delay = 29.6 (sec/veh)					Intersection LOS = C			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: PRIMETIME ROAD/S.R. 131
 Agency: TRC INTERNATIONAL Area Type: All other areas
 Date: 8/29/02 Jurisd:
 Period: PM Year : 2006 /
 Project ID: KNOX CO, PROP. SYSTEM, ALT. I
 E/W St: S.R. 131 (EMORY ROAD) - N/S St: PRIMETIME ROAD /

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LG Config	L	TR		L	TR		L	TR			LT	R
Volume	1244	1443	165	13	986	76	125	33	12	190	23	150
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			55			25			4			50

Duration 0.25 Area Type: All other areas
 Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left		A			SB Left		A	
Thru		A			Thru		A	
Right		A			Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		22.0	37.0			13.0	13.0	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS	Delay LOS	Delay LOS
Eastbound								
L	378	1805	0.68	0.21	43.2	D		
TR	2177	3572	0.75	0.61	16.3	B	19.9	B
Westbound								
L	86	244	0.03	0.35	22.5	C		
TR	1263	3583	0.86	0.35	38.2	D	38.1	D
Northbound								
L	223	1805	0.59	0.12	47.7	D		
TR	229	1847	0.19	0.12	41.7	D	46.2	D
Southbound								
LT	226	1827	0.53	0.12	45.4	D	34.3	C
R	615	1615	0.17	0.38	21.7	C		
Intersection Delay = 28.1 (sec/veh)					Intersection LOS = C			

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM ✓
 Highway: SR 131 (Emory Road) ✓
 From/To: Primetime Road/Bishop ✓
 Jurisdiction:
 Analysis Year: 2006 -
 Project ID: Knox Co., Prop. System, Alt. 1

FREE-FLOW SPEED

	Direction			
	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	10		10	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	2.5	mph	2.5	mph
Free-flow speed	56.6	mph	56.6	mph

VOLUME

	Direction			
	1		2	
Volume, V	791	vph	1281	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	208		337	
Trucks and buses	3	%	3	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling		Rolling	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.957		0.957	
Flow rate, vp	435	pcphpl	704	pcphpl

RESULTS

	Direction			
	1		2	
Flow rate, vp	435	pcphpl	704	pcphpl
Free-flow speed, FFS	56.6	mph	56.6	mph
Avg. passenger-car travel speed, S	56.6	mph	56.6	mph
Level of service, LOS	A		B	
Density, D	7.7	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: SR 131 (Emory Road)
 From/To: Primetime Road/Bishop
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Prop. System, Alt. 1

FREE-FLOW SPEED

	Direction 1		Direction 2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	10		10	
Median type	Divided		Divided	
Free-flow speed:				
Base				
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	2.5	mph	2.5	mph
Free-flow speed	56.6	mph	56.6	mph

VOLUME

	Direction 1		Direction 2	
Volume, V	1545	vph	1281	vph
Peak-hour factor, PHF	0.95		0.95	
Peak 15-minute volume, v15	407		337	
Trucks and buses	3	%	3	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling		Rolling	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.957		0.957	
Flow rate, vp	849	pcphpl	704	pcphpl

RESULTS

	Direction 1		Direction 2	
Flow rate, vp	849	pcphpl	704	pcphpl
Free-flow speed, FFS	56.6	mph	56.6	mph
Avg. passenger-car travel speed, S	56.6	mph	56.6	mph
Level of service, LOS	B		B	
Density, D	15.0	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

**Analysis Summary , Alternate 1
2026 Traffic and Proposed Geometrics**

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	C
I-75 Northbound , South of D-1 Major Diverge	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound , North of D-1 Major Diverge	Basic Freeway Segments	AM	B
		PM	B
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound, North of M-1 On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	C
		PM	C
I-75 Southbound, North of Interchange	Basic Freeway Segments	AM	C
		PM	C
I-75 Southbound, North of D-2 Off-ramp	Basic Freeway Segments	AM	B
		PM	B
D-2, I-75 Southbound Off-ramp to SR131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Southbound, South of D-2 Off-ramp to SR 131	Basic Freeway Segments	AM	B
		PM	B
M-2, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	B
		PM	A
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 west of I-75	Multilane Highways	AM	B
		PM	B
SR 131/I-75 Ramps	Signalized Intersection	AM	D(36.1)
		PM	D(40.9)
SR 131/Primetime Rd.	Signalized Intersection	AM	D (37.3)
		PM	D (44.5)
SR 131 east of Primetime Rd.	Multilane Highways	AM	B
		PM	C

Note: The LOS shown for the intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 1**

Flow Inputs and Adjustments

Volume, V	2876 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	757	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1176	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1176	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.8	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt. 1

 Flow Inputs and Adjustments

Volume, V	3812 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1003	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1558	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of Lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1558	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	3	
Density, D	22.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt. 1

 Flow Inputs and Adjustments

Volume, V	2876 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	757	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	882	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	882	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	12.6	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B. So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 1**

Flow Inputs and Adjustments

Volume, V	3812 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1003	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1169	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1169	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of D-1
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 1

Flow Inputs and Adjustments

Volume, V	2146	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	565	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	934	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	934	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.3	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of D-1 ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt-1

Flow Inputs and Adjustments

Volume, V	2076 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	546	v
Trucks and buses	16 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	903	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	903	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.9	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: AM
Freeway/dir or travel: I 75/.R. 131
Junction:
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, N.B. on ramp from S.R. 131, Prop. System, Alt. 1

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2146	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	840	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)	2146	250		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	565	66		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2801	271		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.601$ Using Equation 1
 FM
 $v_{12} = v_F(P_{FM}) = 1683$ pc/h
 12 F FM

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3072	7200	No
v_{R12}	1954	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 15.3$ pc/mi/ln

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

 Speed Estimation

Intermediate speed variable,	$M = 0.265$	
Space mean speed in ramp influence area,	$S_R = 62.6$	mph
Space mean speed in outer lanes,	$S_0 = 67.8$	mph
Space mean speed for all vehicles,	$S = 64.4$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: PM
Freeway/dir or travel: I 75/.R. 131
Junction:
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, NB on ramp from S.R. 131, Prop. System, Alt. 1

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2076 /	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	426 /	vph
Length of first accel/decel lane	840	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)	2076	426		vph
Peak-hour factor, PHF	0.95 /	0.95 /		
Peak 15-min volume, v15	546	112		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2710	462		pcph

 Estimation of V12 Merge Areas

$$L = 0.00 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.601 \quad \text{Using Equation 1}$$

$$FM$$

$$v = v (P) = 1629 \quad \text{pc/h}$$

$$12 \quad F \quad FM$$

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3172	7200	No
v_{R12}	2091	4600	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.3 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$M = 0.269$	
Space mean speed in ramp influence area,	$S = 62.5$	mph
Space mean speed in outer lanes,	$S = 67.9$	mph
Space mean speed for all vehicles,	$S = 64.2$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 1**

 Flow Inputs and Adjustments

Volume, V	2396 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	631	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1080	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1080	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.4	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 1

Flow Inputs and Adjustments

Volume, V	2502 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	658	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1128	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1128	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.1	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 1**

 Flow Inputs and Adjustments

Volume, V	2396 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	631	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1620	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1620	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.3	mi/h
Number of lanes, N	2	
Density, D	23.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 1

 Flow Inputs and Adjustments

Volume, V	2502 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	658	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1692	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1692	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.9	mi/h
Number of lanes, N	2	
Density, D	24.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 1

Flow Inputs and Adjustments

Volume, V	2275 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	599	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1539	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1539	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	2	
Density, D	22.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S-B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 1

 Flow Inputs and Adjustments

Volume, V	2331 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	613	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1576	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1576	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	2	
Density, D	22.7	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 10/14/02
Analysis Time Period: AM
Freeway/Direction: I 75 SB
From/To:
Jurisdiction:
Analysis Year: 2026
Description: I 75 Southbound, North of D-2 off-ramp, Alt. 1

Flow Inputs and Adjustments

Volume, V	2275 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	599	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1026	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1026	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	14.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 10/14/02
Analysis Time Period: PM
Freeway/Direction: I 75 SB
From/To:
Jurisdiction:
Analysis Year: 2026
Description: I 75 Southbound, North of D-2 off-ramp, Alt. 1

Flow Inputs and Adjustments

Volume, V	2331 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	613 ✓	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1051	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1051	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.0	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 10/14/02
Analysis time period: AM, DHV
Freeway/dir or travel: I 75 Southbound
Junction:
Jurisdiction:
Analysis Year: 2026
Description: D-2, I-75 Southbound off ramp to S.R. 131, Alt. 1

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2275	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	221	vph
Length of first accel/decel lane	360	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)	2275	221		vph
Peak-hour factor, PHF	0.95	0.90		
Peak 15-min volume, v15	599	61		v
Trucks and buses	19	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3077	253		pcph

 Estimation of V₁₂ Diverge Areas

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

$$EQ$$

$$P = 0.671 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2149 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3077	7200	No
v_{12}	2149	4400	No
$v_{F0} = v_F - v_R$	2824	7200	No
v_R	253	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 19.5 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D = 0.256$	
Space mean speed in ramp influence area,	$S = 63$	mph
Space mean speed in outer lanes,	$S = 76.8$	mph
Space mean speed for all vehicles,	$S = 66.5$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Diverge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 10/14/02
Analysis time period: PM, DHV
Freeway/dir or travel: I 75 Southbound
Junction:
Jurisdiction:
Analysis Year: 2026
Description: D-2, I-75 Southbound off ramp to S.R. 131, Alt. 1

 Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2331 ✓	vph

 Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	221	vph
Length of first accel/decel lane	360	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)	2331 ✓	221		vph
Peak-hour factor, PHF	0.95	0.90		
Peak 15-min volume, v15	613	61		v
Trucks and buses	19 ✓	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3153	253		pcph

 Estimation of V12 Diverge Areas

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

$$EQ$$

$$P = 0.670 \quad \text{Using Equation 5}$$

$$FD$$

$$v_{12} = v_R + (v_F - v_R) P = 2195 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3153	7200	No
v_{12}	2195	4400	No
$v_{F0} = v_F - v_R$	2900	7200	No
v_R	253	2100	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 19.9 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$D = 0.256$	
Space mean speed in ramp influence area,	$S_R = 63$	mph
Space mean speed in outer lanes,	$S_D = 76.8$	mph
Space mean speed for all vehicles,	$S = 66.5$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC International
Date Performed: 10/14/02
Analysis Time Period: AM, DHV ✓
Freeway/Direction: I-75 Southbound ✓
From/To:
Jurisdiction:
Analysis Year: 2026 ✓
Description: I-75 SB, South of D-2 off ramp to S.R. 131, Alt. 1

Flow Inputs and Adjustments

Volume, V	2054 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	541	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	904	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	904	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.9	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: KA
Agency or Company: TRC International
Date Performed: 10/14/02
Analysis Time Period: PM, DHV ✓
Freeway/Direction: I-75 Southbound ✓
From/To:
Jurisdiction:
Analysis Year: 2026 ✓
Description: I-75 SB, South of D-2 off ramp to S.R. 131, Alt. 1

Flow Inputs and Adjustments

Volume, V	2088 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	549	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	919	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	919	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.1	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 10/14/02
Analysis time period: AM, DHV
Freeway/dir or travel: I 75, Southbound
Junction:
Jurisdiction:
Analysis Year: 2026
Description: M-2, I 75 Southbound on ramp from S-R- 131, Alt. 1

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2054	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	50.0	mph
Volume on ramp	2016	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	1200	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)	2054	2016		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	541	531		v
Trucks and buses	17	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.797	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2713	2186		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.555$ Using Equation 0
 FM
 $v_{12} = v_F (P_{FM}) = 1506$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	4899	7200	No
v_{R12}	3692	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	$M = 0.237$	
Space mean speed in ramp influence area,	$S_R = 63.4$	mph
Space mean speed in outer lanes,	$S_0 = 67.5$	mph
Space mean speed for all vehicles,	$S = 64.3$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 10/14/02
Analysis time period: PM, DHV ✓
Freeway/dir or travel: I 75, Southbound ✓
Junction:
Jurisdiction:
Analysis Year: 2026 ✓
Description: M-2, I 75 Southbound on ramp from S.R. 131, Alt. 1

Freeway Data

Type of analysis	Merge ✓	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2088 ✓	vph

On Ramp Data

Side of freeway	Right ✓	
Number of lanes in ramp	2 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	862 ✓	vph
Length of first accel/decel lane	600 ✓	ft
Length of second accel/decel lane	1200	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)	2088 ✓	862 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	549 ✓	227 ✓		v
Trucks and buses	17 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.797	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2758	935		pcph

Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 E_Q
 $P = 0.555$ Using Equation 0
 FM
 $v_{12} = v_F(P_{FM}) = 1531$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3693	7200	No
v_{R12}	2466	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 9.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	$M = 0.127$	
Space mean speed in ramp influence area,	$S = 66.4$	mph
Space mean speed in outer lanes,	$S = 67.4$	mph
Space mean speed for all vehicles,	$S = 66.8$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 1**

Flow Inputs and Adjustments

Volume, V	4070 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1071	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1664	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1664	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.1	mi/h
Number of lanes, N	3	
Density, D	24.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 1**

Flow Inputs and Adjustments

Volume, V	2950 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	776	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1206	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1206	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	17.2	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026
 Project ID: Knox Co., Prop. System, Alt. 1

FREE-FLOW SPEED

	Direction 1		Direction 2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	5		22	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	1.3	mph	5.5	mph
Free-flow speed	57.8	mph	53.6	mph

VOLUME

	Direction 1		Direction 2	
Volume, V	1221	vph	971	vph
Peak-hour factor, PHF	0.95		0.95	
Peak 15-minute volume, v15	321		256	
Trucks and buses	2	%	2	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling		Rolling	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.971		0.971	
Flow rate, vp	661	pcphpl	526	pcphpl

RESULTS

	Direction 1		Direction 2	
Flow rate, vp	661	pcphpl	526	pcphpl
Free-flow speed, FFS	57.8	mph	53.6	mph
Avg. passenger-car travel speed, S	57.8	mph	53.6	mph
Level of service, LOS	B		A	
Density, D	11.4	pc/mi/ln	9.8	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM ✓
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026 ✓
 Project ID: Knox Co., Prop. System, Alt. 1

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			5		22	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			1.3	mph	5.5	mph
Free-flow speed			57.8	mph	53.6	mph

VOLUME

	Direction		1		2	
Volume, V			1425 ✓	vph	1347 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			375		354	
Trucks and buses			2 ✓	%	2 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling ✓	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.971		0.971	
Flow rate, vp			772	pcphpl	730	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			772	pcphpl	730	pcphpl
Free-flow speed, FFS			57.8	mph	53.6	mph
Avg. passenger-car travel speed, S			57.8	mph	53.6	mph
Level of service, LOS			B		B	
Density, D			13.3	pc/mi/ln	13.6	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.:
 Agency: TRC International Area Type: All other areas
 Date: 10/9/02 Jurisd:
 Period: AM Year : 2026
 Project ID: Knox Co., Prop System, Alternate 1
 E/W St: S.R. 131 (Emory Road) N/S St: I-75 Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	2	2	0	2	0	0	2	0	0
LG Config	L	T		L	T		L			L		
Volume	177	440		1312	716		1153			1119		
Lane Width	12.0	12.0		12.0	12.0		12.0			12.0		
RTOR Vol												

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru			
Right					Right			
Peds					Peds			
WB Left			A		SB Left	A		
Thru			A		Thru			
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		29.0	52.0			24.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach Delay LOS	
			v/c	g/C			
Eastbound							
L	846	3502	0.10	0.24	35.4	D	
T	872	3610	0.53	0.24	40.2	D	39.5 D
Westbound							
L	1518	3502	0.91	0.43	40.3	D	
T	1564	3610	0.48	0.43	24.6	C	34.8 C
Northbound							
L	700	3502	0.23	0.20	40.4	D	40.4 D
Southbound							
L	700	3502	0.18	0.20	39.9	D	39.9 D

Intersection Delay = 36.1 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.:
 Agency: TRC International Area Type: All other areas
 Date: 10/9/02 Jurisd:
 Period: PM Year : 2026
 Project ID: Knox Co., Prop. System, Alternate 1
 E/W St: S.R. 131 (Emory Road) N/S St: I-75 Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	2	2	0	2	0	0	2	0	0
LGConfig	L	T		L	T		L			L		
Volume	159	1016		1612	760		1487			1143		
Lane Width	12.0	12.0		12.0	12.0		12.0			12.0		
RTOR Vol												

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru			
Right					Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru			
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		41.0	34.5			29.5		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS	Approach	
			v/c	g/C		Delay LOS	Delay LOS
Eastbound							
L	1197	3502	0.14	0.34	27.4 C		
T	1233	3610	0.87	0.34	43.7 D	41.5	D
Westbound							
L	1007	3502	0.64	0.29	38.7 D		
T	1038	3610	0.77	0.29	42.7 D	40.9	D
Northbound							
L	861	3502	0.60	0.25	41.1 D	41.1	D
Southbound							
L	861	3502	0.18	0.25	35.8 D	35.8	D
Intersection Delay = 40.9 (sec/veh) Intersection LOS = D							

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/Primetime Road
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: AM Year : 2026
 Project ID: Knox Co., Prop. System, **Alt. 1**
 E/W St: SR 131 (Emory Road) N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	123	954	59	14	1651	11	151	6	3	170	12	449
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			20			4			1			166

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A						
Thru		A	A					
Right		A	A					
Peds								
WB Left			A					
Thru			A					
Right			A					
Peds								
NB Right								
SB Right		A						
Green		14.0	50.0		10.5	10.5		
Yellow		3.0	3.0		3.0	3.0		
All Red		2.0	2.0		2.0	2.0		

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS	Delay LOS	Delay LOS
Eastbound								
L	241	1805	0.54	0.13	44.8	D		
TR	2358	3589	0.44	0.66	8.8	A	12.8	B
Westbound								
L	248	521	0.02	0.48	14.5	B		
TR	1718	3608	1.02	0.48	53.2	D	53.1	D
Northbound								
L	181	1805	0.30	0.10	44.8	D		
TR	183	1829	0.04	0.10	42.8	D	44.5	D
Southbound								
LT	182	1822	0.48	0.10	46.6	D	39.0	D
R	454	1615	0.66	0.28	36.7	D		
Intersection Delay = 37.3 (sec/veh)					Intersection LOS = D			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/Primetime Road
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: PM Year : 2026
 Project ID: Knox Co., Prop. System, Alt. 1
 E/W St: SR 131 (Emory Road) N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LG Config	L	TR		L	TR		L	TR			LT	R
Volume	1317	1876	215	14	1281	99	1163	44	15	1118	30	195
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			72			33			5			65

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8	
EB Left	A	A			NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left		A			SB Left		A		
Thru		A			Thru		A		
Right		A			Right		A		
Peds					Peds				
NB Right					EB Right				
SB Right		A			WB Right				
Green		16.0	42.0	0.0	0.0	14.4	12.6	0.0	0.0
Yellow		3.0	3.0	0.0	0.0	3.0	3.0	0.0	0.0
All Red		2.0	2.0	0.0	0.0	2.0	2.0	0.0	0.0

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	381	1805	0.88	0.60	50.9	D		
TR	2143	3572	0.99	0.60	38.3	D	40.0	D
Westbound								
L	72	181	0.06	0.40	19.7	B		
TR	1434	3584	0.99	0.40	52.1	D	52.1	D
Northbound								
L	248	1805	0.69	0.14	51.3	D		
TR	253	1845	0.23	0.14	40.8	D	48.7	D
Southbound								
LT	219	1827	0.71	0.12	54.8	D	41.7	D
R	517	1615	0.26	0.32	26.8	C		
Intersection Delay = 44.5 (sec/veh)					Intersection LOS = D			

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: AM
Highway: SR 131 (Emory Road)
From/To: Primetime Road/Bishop
Jurisdiction:
Analysis Year: 2026
Project ID: Knox Co., Prop. System, **Alt.1**

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			10		10	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			2.5	mph	2.5	mph
Free-flow speed			56.6	mph	56.6	mph

VOLUME

	Direction		1		2	
Volume, V			1027	vph	1666	vph
Peak-hour factor, PHF			0.95		0.95	
Peak 15-minute volume, v15			270		438	
Trucks and buses			3	%	3	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling		Rolling	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2		2	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.957		0.957	
Flow rate, vp			564	pcphpl	916	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			564	pcphpl	916	pcphpl
Free-flow speed, FFS			56.6	mph	56.6	mph
Avg. passenger-car travel speed, S			56.6	mph	56.6	mph
Level of service, LOS			A		B	
Density, D			10.0	pc/mi/ln	16.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: PM
Highway: SR 131 (Emory Road)
From/To: Primetime Road/Bishop
Jurisdiction:
Analysis Year: 2026
Project ID: Knox Co., Prop. System, Alt.1

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			10		10	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			2.5	mph	2.5	mph
Free-flow speed			56.6	mph	56.6	mph

VOLUME

	Direction		1		2	
Volume, V			2009 ✓	vph	1384 ✓	vph
Peak-hour factor, PHF			0.95		0.95	
Peak 15-minute volume, v15			529		364	
Trucks and buses			3 ✓	%	3 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling		Rolling	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.957		0.957	
Flow rate, vp			1104	pcphpl	761	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			1104	pcphpl	761	pcphpl
Free-flow speed, FFS			56.6	mph	56.6	mph
Avg. passenger-car travel speed, S			56.6	mph	56.6	mph
Level of service, LOS			C		B	
Density, D			19.5	pc/mi/ln	13.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Analysis Summary , Alternate 2
2006 Traffic and Proposed Geometrics

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound South of D-1 Major Diverge	Basic Freeway Segments	AM	A
		PM	B
I-75 Northbound North of D-1 Major Diverge	Basic Freeway Segments	AM	A
		PM	A
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound, North of M-1 On-ramp from SR131	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	B
		PM	B
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	B
		PM	B
D-2, I-75 Southbound Off-ramp to SR131	Ramp and Ramp Junctions	AM	C
		PM	C
I-75 Southbound, South of D-2 Off-ramp to SR131	Basic Freeway Segments	AM	B
		PM	B
I-75 Southbound, South of M-2, Add Lane On-ramp	Basic Freeway Segments	AM	B
		PM	B
M-3, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	C
		PM	B
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 West of I-75	Multilane Highways	AM	A
		PM	A
SR 131/I-75 SB Ramps	Signalized Intersections	AM	B (12.4)
		PM	B (12.6)
SR 131/I-75 NB Ramps	Signalized Intersections	AM	C (33.8)
		PM	C (27.8)
SR 131/Primetime Rd.	Signalized Intersections	AM	C (29.6)
		PM	C (28.1)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B
		PM	B

Note: The LOS shown for intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75
From/To: Northbound, So. of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Proposed System, DHV, Alt.2

Flow Inputs and Adjustments

Volume, V	2182	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	574	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	892	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	892	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75
From/To: Northbound, So. of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Proposed System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V 2866 veh/h
Peak-hour factor, PHF 0.95
Peak 15-min volume, v15 754 v
Trucks and buses 11 %
Recreational vehicles 0 %
Terrain type: Rolling
Grade 0.00 %
Segment length 0.00 mi
Trucks and buses PCE, ET 2.5
Recreational vehicle PCE, ER 2.0
Heavy vehicle adjustment, fHV 0.858
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 0.50 interchange/mi
Number of lanes, N 3
Free-flow speed: Measured
FFS or BFFS 70.0 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 70.0 mi/h
Urban Freeway

LOS and Performance Measures

Flow rate, vp 1172 pc/h/ln
Free-flow speed, FFS 70.0 mi/h
Average passenger-car speed, S 70.0 mi/h
Number of lanes, N 3
Density, D 16.7 pc/mi/ln
Level of service, LOS B

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I75
From/To: Northbound, So. of Interchange ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Proposed System, DHV, Alt. 2

 Flow Inputs and Adjustments

Volume, V	2182 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	574	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	669	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	669	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	9.6	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM ✓
Freeway/Direction: I75
From/To: Northbound, So. of Interchange ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Proposed System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V 2866 ✓ veh/h
Peak-hour factor, PHF 0.95 ✓
Peak 15-min volume, v15 754 v
Trucks and buses 11 ✓ %
Recreational vehicles 0 %
Terrain type: Rolling ✓
Grade 0.00 %
Segment length 0.00 mi
Trucks and buses PCE, ET 2.5
Recreational vehicle PCE, ER 2.0
Heavy vehicle adjustment, fHV 0.858
Driver population factor, vp 1.00
Flow rate, vp 879 pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 ft
Right-shoulder lateral clearance 6.0 ft
Interchange density 0.50 interchange/mi
Number of lanes, N 4 ✓
Free-flow speed: Measured
FFS or BFFS 70.0 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 70.0 mi/h
Urban Freeway

LOS and Performance Measures

Flow rate, vp 879 pc/h/ln
Free-flow speed, FFS 70.0 mi/h
Average passenger-car speed, S 70.0 mi/h
Number of lanes, N 4
Density, D 12.6 pc/mi/ln
Level of service, LOS B

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM
Freeway/Direction: I75
From/To: Northbound, North of D-1
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Prop. System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V	1621	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	427	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	705	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	705	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	10.1	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I75
From/To: Northbound, North of D-1
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Prop. System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V	1531	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	403	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	666	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	666	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	9.5	pc/mi/ln
Level of service, LOS	A	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 5/20/02
Analysis time period: AM
Freeway/dir or travel: I-75/S.R. 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., M-1, NB, on ramp from S.R. 131, Alt. 2

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1621	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	192	vph
Length of first accel/decel lane	840	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)	1621	192		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	427	51		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2116	208		pcph

 Estimation of V12 Merge Areas

$$L = 0.00 \quad (\text{Equation 25-2 or 25-3})$$

$$EQ$$

$$P = 0.601 \quad \text{Using Equation 1}$$

$$FM$$

$$v_{12} = v_F(P_{FM}) = 1272 \quad \text{pc/h}$$

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2324	7200	No
v_{R12}	1480	4600	No

 Level of Service Determination (if not F)

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.7 \quad \text{pc/mi/ln}$$

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

 Speed Estimation

Intermediate speed variable,	$M_S = 0.254$	
Space mean speed in ramp influence area,	$S_R = 62.9$	mph
Space mean speed in outer lanes,	$S_0 = 68.8$	mph
Space mean speed for all vehicles,	$S = 64.9$	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 5/20/02
Analysis time period: PM
Freeway/dir or travel: I-75/S.R. 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., M-1, NB, on ramp from S.r. 131, Alt. 2

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1531	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	328	vph
Length of first accel/decel lane	840	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)	1531	328		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	403	86		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	1998	356		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.601$ Using Equation 1
 FM
 $v = v (P) = 1201$ pc/h
 $12 \quad F \quad FM$

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	2354	7200	No
v_{R12}	1557	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	$M = 0.256$	
Space mean speed in ramp influence area,	$S_S = 62.8$	mph
Space mean speed in outer lanes,	$S_R = 68.9$	mph
Space mean speed for all vehicles,	$S_O = 64.8$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: N.B., North of Interchange ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, DHV, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	1813 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	477	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	817	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	817	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	11.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM
Freeway/Direction: I-75/S-R. 131 (Emory Road)
From/To: N-B., North of Interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Prop. System, DHV, Alt. 2

 Flow Inputs and Adjustments

Volume, V	1859 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	489	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	838	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	838	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.0	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: N.B., North of Interchange ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V	1813 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	477	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1226	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1226	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979
 E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
 Agency or Company: TRC International
 Date Performed: 5/20/02
 Analysis Time Period: PM ✓
 Freeway/Direction: I-75/S.R. 131 (Emory Road)
 From/To: N-B., North of Interchange ✓
 Jurisdiction:
 Analysis Year: 2006 ✓
 Description: Knox Co., Prop. System, DHV, **Alt. 2**

Flow Inputs and Adjustments

Volume, V	1859 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	489	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1257	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1257	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	18.0-	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S.B., North of Interchange ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V	1809 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	476	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling-	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1223	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1223	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/20/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S.B., North of Interchange ✓
Jurisdiction:
Analysis Year: 2006 -
Description: Knox Co., Prop. System, DHV, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	1831 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	482	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1238	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1238	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.7	pc/mi/ln
Level of service, LOS	B	

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

Diverge Analysis

Analyst: KA
 Agency/Co.: TRC International
 Date performed: 5/21/02
 Analysis time period: AM ✓
 Freeway/dir or travel: I75/S.R. 131 (Emory Road)
 Junction:
 Jurisdiction:
 Analysis Year: 2006 ✓
 Description: Knox Co., D-2, SB, offramp to SR 131, Alt. 2

Freeway Data

Type of analysis Diverge
 Number of lanes in freeway 2 ✓
 Free-flow speed on freeway 70.0 mph
 Volume on freeway 1809 ✓ vph

Off Ramp Data

Side of freeway Right
 Number of lanes in ramp 1 ✓
 Free-flow speed on ramp 50.0 mph
 Volume on ramp 171 ✓ vph
 Length of first accel/decel lane 360 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)	1809 ✓	171 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	476	45		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2447	185		pcph

Estimation of V12 Diverge Areas

L = 0.00 (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD

$$v_{12} = v_F + (v_R - v_F) P = 2447 \text{ pc/h}$$

Capacity Checks

	Actual	Maximum	LOS F?
v_F	2447	4800	No
v_{12}	2447	4400	No
v_{F0}	2262	4800	No
v_R	185	2100	No

_____ Level of Service Determination (if not F) _____

Density, $D = 4.252 + \frac{0.0086 v}{R} - \frac{0.009 L}{D} = 22.1$ pc...

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

_____ Speed Estimation _____

Intermediate speed variable,	D = 0.250	
Space mean speed in ramp influence area,	S _R = 63	mph
Space mean speed in outer lanes,	S _D = N/A	mph
Space mean speed for all vehicles,	S _D = 63.0	mph

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Diverge Analysis

Analyst: KA
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: PM ✓
Freeway/dir or travel: I75/S.R. 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., D-2, SB, offramp to SR 131, Alt. 2

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1831 ✓	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-Flow speed on ramp	50.0	mph
Volume on ramp	187 ✓	vph
Length of first accel/decel lane	360	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)	1831 ✓	187 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	482	49		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2477	203		pcph

Estimation of V12 Diverge Areas

L = 0.00 (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0
FD
v = v + (v - v) P = 2477 pc/h
12 R F R FD

Capacity Checks

v = v	Actual	Maximum	LOS F?
Fi F	2477	4800	No

v	2477	4400	No
12			
v = v - v	2274	4800	No
F0 F R			
v	203	2100	No
R			

_____ Level of Service Determination (if not F) _____

Density, $D = 4.252 + 0.0086 \frac{v}{12} - 0.009 \frac{L}{D} = 22.3$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

_____ Speed Estimation _____

Intermediate speed variable,	D	= 0.251	
	S		
Space mean speed in ramp influence area,	S	= 63	mph
	R		
Space mean speed in outer lanes,	S	= N/A	mph
	D		
Space mean speed for all vehicles,	S	= 63.0	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S-B., South of D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	1638 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	431	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1082	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1082	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S.B., South of D-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, **Ait. 2**

Flow Inputs and Adjustments

Volume, V	1644 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	433	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1086	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1086	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S.B., South of M-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V	2647 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	697	v
Trucks and buses	12 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.847	
Driver population factor, vp	1.00	
Flow rate, vp	1096	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1096	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/S.R. 131 (Emory Road)
From/To: S.B., South of M-2 ✓
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Prop. System, **Alt. 2**

Flow Inputs and Adjustments

Volume, V 2115 ✓ veh/h
Peak-hour factor, PHF 0.95 ✓
Peak 15-min volume, v15 557 v
Trucks and buses 12 ✓ %
Recreational vehicles 0 %
Terrain type: Rolling ✓
Grade 0.00 %
Segment length 0.00 mi
Trucks and buses PCE, ET 2.5
Recreational vehicle PCE, ER 2.0
Heavy vehicle adjustment, fHV 0.847
Driver population factor, vp 1.00
Flow rate, vp 876 pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 ft
Right-shoulder lateral clearance 6.0 ft
Interchange density 0.50 interchange/mi
Number of lanes, N 3 ✓
Free-flow speed: Measured
FFS or BFFS 70.0 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 70.0 mi/h
Urban Freeway

LOS and Performance Measures

Flow rate, vp 876 pc/h/ln
Free-flow speed, FFS 70.0 mi/h
Average passenger-car speed, S 70.0 mi/h
Number of lanes, N 3
Density, D 12.5 pc/mi/ln
Level of service, LOS B

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

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: AM ✓
Freeway/dir or travel: I-75/SR 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., M-3, SB, on ramp from SR 131, Alt. 2

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2647 ✓	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	542 ✓	vph
Length of first accel/decel lane	500	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)	2647 ✓	542 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	697	143		v
Trucks and buses	12 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.847	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3288	588		pcph

Estimation of V12 Merge Areas

L = 0.00 (Equation 25-2 or 25-3)
E0
P = 0.591 Using Equation 1
FM
v = v (P) = 1945 pc/h
12 F FM

Capacity Checks

v	Actual	Maximum	LOS F?
F0	3876	7200	No

_____ Level of Service Determination (if not F) _____

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.8$$

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

_____ Speed Estimation _____

Intermediate speed variable,	M	=	0.320	
Space mean speed in ramp influence area,	S _R	=	61.0	mph
Space mean speed in outer lanes,	S	=	67.0	mph
Space mean speed for all vehicles,	S _D	=	63.0	mph

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: PM ✓
Freeway/dir or travel: I-75/SR 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., M-3, SB, on ramp from SR 131, Alt. 2

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3 ✓	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2115 ✓	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1 ✓	
Free-flow speed on ramp	50.0	mph
Volume on ramp	192 ✓	vph
Length of first accel/decel lane	840	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)	2115 ✓	192 ✓	vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓	
Peak 15-min volume, v15	557	51	v
Trucks and buses	12 ✓	2 ✓	%
Recreational vehicles	0	0	%
Terrain type:	Rolling ✓	Rolling ✓	Level
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5	
Recreational vehicle PCE, ER	2.0	2.0	
Heavy vehicle adjustment, fHV	0.847	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2627	208	pcph

Estimation of V12 Merge Areas

L = 0.00 (Equation 25-2 or 25-3)
EQ
P = 0.601 Using Equation 1
FM
v = v (P) = 1579 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v	2635	7200	No
F0			

_____ Level of Service Determination (if not F) _____

$$\text{Density, } D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 14.1$$

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

_____ Speed Estimation _____

Intermediate speed variable,	M = 0.260	
	S	
Space mean speed in ramp influence area,	S = 62.7	mph
	R	
Space mean speed in outer lanes,	S = 68.0	mph
	Q	
Space mean speed for all vehicles,	S = 64.6	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM ✓
Freeway/Direction: I75
From/To: Southbound, south of interchange
Jurisdiction:
Analysis Year: 2006
Description: Knox Co., Proposed System, DHV, Alt. 2

Flow Inputs and Adjustments

Volume, V	3189 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	839	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1304	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1304	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	18.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I75
From/To: Southbound, south of interchange
Jurisdiction:
Analysis Year: 2006 ✓
Description: Knox Co., Proposed System, DHV, **Alt. 2**

Flow Inputs and Adjustments

Volume, V	2307 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	607	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	943	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	943	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.5	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: S.R. 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Prop. System, **Alt. 2**

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	5		22	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	1.3	mph	5.5	mph
Free-flow speed	57.8	mph	53.6	mph

VOLUME

Direction	1		2	
Volume, V	1097	vph	1037	vph
Peak-hour factor, PHF	0.95		0.95	
Peak 15-minute volume, v15	289		273	
Trucks and buses	2	%	2	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling		Rolling	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.971		0.971	
Flow rate, vp	594	pcphpl	562	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	594	pcphpl	562	pcphpl
Free-flow speed, FFS	57.8	mph	53.6	mph
Avg. passenger-car travel speed, S	57.8	mph	53.6	mph
Level of service, LOS	A		A	
Density, D	10.3	pc/mi/ln	10.5	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/I-75
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: AM Year : 2006 ✓
 Project ID: I-75 S-B. Ramps, **Alt. 2**
 E/W St: S-R. 131 (Emory Road) N/S St: I-75 S-B. Ramps

SIGNALIZED INTERSECTION SUMMARY												
	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2 ✓	0	0	2 ✓	0	0	0	0	0	1 ✓	0
LGConfig		TR			T						LTR	
Volume		397 ✓	542 ✓		668 ✓					192 ✓	1	79 ✓
Lane Width		12.0			12.0						16.0	
RTOR Vol			271									26

Duration	0.25	Area Type:	All other areas						
Signal Operations									
Phase Combination	1	2	3	4	5	6	7	8	
EB Left					NB Left				
Thru	A				Thru				
Right	A				Right				
Peds					Peds				
WB Left					SB Left	A			
Thru	A				Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		26.0				24.0			
Yellow		3.0				3.0			
All Red		2.0				2.0			
Cycle Length: 60.0 secs									

Intersection Performance Summary									
Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c g/C		Lane Group Delay LOS		Approach Delay LOS		
Eastbound									
TR	1413	3260	0.50	0.43	12.6	B	12.6	B	
Westbound									
T	1504	3471	0.47	0.43	12.3	B	12.3	B	
Northbound									
Southbound									
LTR	764	1909	0.20	0.40	11.9	B	11.9	B	
Intersection Delay = 12.4 (sec/veh)					Intersection LOS = B				

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/I-75
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: PM Year : 2006
 Project ID: I-75 S.B. Ramps, A1t.2
 E/W St: S.R. 131 (Emory Road) N/S St: I-75 S.B. Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	0	2	0	0	0	0	0	1	0
LGConfig		TR			T						LTR	
Volume		905	192		960					110	1	77
Lane Width		12.0			12.0						16.0	
RTOR Vol			271									26

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A				Thru			
Right	A				Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.0				22.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS		Approach Delay LOS	
			v/c	g/C				
Eastbound								
TR	1620	3471	0.59	0.47	12.3	B	12.3	B
Westbound								
T	1620	3471	0.62	0.47	12.8	B	12.8	B
Northbound								
Southbound								
LTR	703	1917	0.24	0.37	13.4	B	13.4	B
Intersection Delay = 12.6 (sec/veh)					Intersection LOS = B			

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/I-75
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: AM Year : 2006 ✓
 Project ID: I-75 N.B. Ramps, Ait. 2
 E/W St: S.R. 131 (Emory Road) N/S St: I-75 N.B. Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LGConfig	L	T			TR		L		R			
Volume	159	430		1560	133		117		444			
Lane Width	12.0	12.0		12.0			12.0		12.0			
RTOR Vol					44				148			

Duration	Area Type: All other areas							
Signal Operations								
Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru	A	A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	13.0	45.0			17.0			
Yellow	3.0	3.0			3.0			
All Red	2.0	2.0			2.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Approach			
			v/c	g/C	Lane Group	Delay	LOS	Delay
Eastbound								
L	256	1770	0.24	0.14	34.6	C		
T	2477	3539	0.18	0.70	4.7	A	8.3	A
Westbound								
TR	1755	3510	0.99	0.50	41.1	D	41.1	D
Northbound								
L	334	1770	0.37	0.19	32.5	C		
R	526	2787	0.59	0.19	35.1	D	34.4	C
Southbound								

Intersection Delay = 33.8 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/I-75
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: PM Year : 2006 ✓
 Project ID: I-75 N.B. Ramps, Alt. 2
 E/W St: S.R. 131 (Emory Road) N/S St: I-75 N.B. Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T			TR		L		R			
Volume	1123	892			1056	205	1375		960			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol					68				320			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		12.0	36.0			27.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	236	1770	0.55	0.13	39.1	D		
T	2084	3539	0.45	0.59	10.5	B	14.0	B
Westbound								
TR	1391	3478	0.90	0.40	33.9	C	33.9	C
Northbound								
L	531	1770	0.74	0.30	34.0	C		
R	836	2787	0.81	0.30	34.9	C	34.6	C
Southbound								

Intersection Delay = 27.8 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: S.R. 131/ Primetime Road
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: AM Year : 2006
 Project ID: Knox Co., Prop. System, Alt. 2
 E/W St: S.R. 131 (Emory Road) N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	194	735	45	13	1270	8	139	5	2	154	9	384
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			15			3			1			128

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left			A		SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		21.0	42.0			11.0	11.0	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	361	1805	0.27	0.20	36.0	D		
TR	2324	3589	0.35	0.65	8.5	A	11.5	B
Westbound								
L	264	660	0.01	0.40	19.0	B		
TR	1443	3608	0.93	0.40	41.1	D	41.0	D
Northbound								
L	189	1805	0.22	0.10	43.6	D		
TR	194	1853	0.03	0.10	42.3	D	43.5	D
Southbound								
LT	191	1821	0.35	0.10	44.7	D	30.5	C
R	569	1615	0.47	0.35	27.0	C		
Intersection Delay = 29.6 (sec/veh) Intersection LOS = C								

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/Primetime Road
 Agency: TRC International Area Type: All other areas
 Date: 5/21/02 Jurisd:
 Period: PM Year: 2006
 Project ID: Knox Co., Prop. System, Alt. 2
 E/W St: S.R. 131 (Emory Road) N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LG Config	L	TR		L	TR		L	TR			LT	R
Volume	1244	1443	165	13	986	76	1125	33	12	190	23	150
Lane Width	112.0	12.0		112.0	12.0		112.0	12.0			16.0	12.0
RTOR Vol			55			25			4			50

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				1 NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left		A			1 SB Left	A		
Thru		A			Thru	A		
Right		A			Right	A		
Peds					Peds			
NB Right					1 EB Right			
SB Right		A			1 WB Right			
Green		22.0	37.0			13.0	13.0	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay LOS	Delay LOS		
Eastbound								
L	378	1805	0.68	0.21	43.2	D		
TR	2171	3561	0.75	0.61	16.3	B	20.0-	B
Westbound								
L	86	244	0.03	0.35	22.5	C		
TR	1263	3583	0.86	0.35	38.2	D	38.1	D
Northbound								
L	223	1805	0.59	0.12	47.7	D		
TR	229	1847	0.19	0.12	41.7	D	46.2	D
Southbound								
LT	247	1991	0.48	0.12	44.3	D	33.7	C
R	592	1553	0.18	0.38	21.7	C		
Intersection Delay = 28.1 (sec/veh)					Intersection LOS = C			

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027
 Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: SR 131 (Emory Road)
 From/To: Primetime Road/Bishop
 Jurisdiction:
 Analysis Year: 2006
 Project ID: Knox Co., Prop. System, Alt. 2

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	10		10	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	2.5	mph	2.5	mph
Free-flow speed	56.6	mph	56.6	mph

VOLUME

Direction	1		2	
Volume, V	791	vph	1281	vph
Peak-hour factor, PHF	0.95		0.95	
Peak 15-minute volume, v15	208		337	
Trucks and buses	3	%	3	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling		Rolling	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.957		0.957	
Flow rate, vp	435	pcphpl	704	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	435	pcphpl	704	pcphpl
Free-flow speed, FFS	56.6	mph	56.6	mph
Avg. passenger-car travel speed, S	56.6	mph	56.6	mph
Level of service, LOS	A		B	
Density, D	7.7	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM ✓
 Highway: SR 131 (Emory Road)
 From/To: Primetime Road/Bishop
 Jurisdiction:
 Analysis Year: 2006 ✓
 Project ID: Knox Co., Prop. System, Alt. 2

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			10		10	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			2.5	mph	2.5	mph
Free-flow speed			56.6	mph	56.6	mph

VOLUME

	Direction		1		2	
Volume, V			1545 ✓	vph	1281 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			407		337	
Trucks and buses			3 ✓	%	3 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling ✓	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.957		0.957	
Flow rate, vp			849	pcphpl	704	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			849	pcphpl	704	pcphpl
Free-flow speed, FFS			56.6	mph	56.6	mph
Avg. passenger-car travel speed, S			56.6	mph	56.6	mph
Level of service, LOS			B		B	
Density, D			15.0	pc/mi/ln	12.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

**Analysis Summary , Alternate 2
2026 Traffic and Proposed Geometrics**

Location	Type Analysis	Design Hour	LOS
I-75 Northbound South of Interchange	Basic Freeway Segments	AM	B
		PM	C
I-75 Northbound South of D-1 Major Diverge	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound North of D-1 Major Diverge	Basic Freeway Segments	AM	B
		PM	B
M-1, I-75 Northbound On-ramp from SR 131	Ramp and Ramp Junctions	AM	B
		PM	B
I-75 Northbound, North of M-1 On-ramp from SR131	Basic Freeway Segments	AM	B
		PM	B
I-75 Northbound North of Interchange	Basic Freeway Segments	AM	C
		PM	C
I-75 Southbound North of Interchange	Basic Freeway Segments	AM	C
		PM	C
D-2, I-75 Southbound Off-ramp to SR131	Ramp and Ramp Junctions	AM	C
		PM	D
I-75 Southbound, South of D-2 Off-ramp to SR131	Basic Freeway Segments	AM	C
		PM	C
I-75 Southbound, South of M-2, Add Lane On-ramp	Basic Freeway Segments	AM	C
		PM	B
M-3, I-75 Southbound On-ramp from SR131	Ramp and Ramp Junctions	AM	C
		PM	B
I-75 Southbound South of Interchange	Basic Freeway Segments	AM	C
		PM	B
SR 131 West of I-75	Multilane Highways	AM	B
		PM	B
SR 131/I-75 SB Ramps	Signalized Intersections	AM	B (13.6)
		PM	B (16.4)
SR 131/I-75 NB Ramps	Signalized Intersections	AM	D (44.7)
		PM	D (36.4)
SR 131/Primetime Rd.	Signalized Intersections	AM	D (37.3)
		PM	D (44.5)
SR 131 East of Primetime Rd.	Multilane Highways	AM	B
		PM	C

Note: The LOS shown for intersections is the total average intersection delay. The delay in parentheses is in seconds per vehicle.

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V 2876 ✓ veh/h
Peak-hour factor, PHF 0.95 ✓
Peak 15-min volume, v15 757 v
Trucks and buses 11 ✓ %
Recreational vehicles 0 %
Terrain type: Rolling ✓
Grade 0.00 %
Segment length 0.00 mi
Trucks and buses PCE, ET 2.5
Recreational vehicle PCE, ER 2.0
Heavy vehicle adjustment, fHV 0.858
Driver population factor, vp 1.00
Flow rate, vp 1176 pc/h/ln

Speed Inputs and Adjustments

Lane width 12.0 ft
Right-shoulder lateral clearance 6.0 ft
Interchange density 0.50 interchange/mi
Number of lanes, N 3 ✓
Free-flow speed: Measured
FFS or BFFS 70.0 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 70.0 mi/h
Urban Freeway

LOS and Performance Measures

Flow rate, vp 1176 pc/h/ln
Free-flow speed, FFS 70.0 mi/h
Average passenger-car speed, S 70.0 mi/h
Number of lanes, N 3
Density, D 16.8 pc/mi/ln
Level of service, LOS B

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 2

 Flow Inputs and Adjustments

Volume, V	3812 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1003	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1558	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1558	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	3	
Density, D	22.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B. So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt. 2

 Flow Inputs and Adjustments

Volume, V	2876 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	757	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	882	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	882	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	12.6	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., So. of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V	3812 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	1003	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1169	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1169	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.7	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of D-1
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V	2146	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	565	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	934	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	934	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.3	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of D-1
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2076 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	546	v
Trucks and buses	16 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.806	
Driver population factor, vp	1.00	
Flow rate, vp	903	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	903	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.9	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: AM
Freeway/dir or travel: I 75/ SR 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, N-B. on ramp from S-R. 131, Alt. 2

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2146	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	840	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)	2146	250		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	565	66		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2801	271		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.601$ Using Equation 1
 FM
 $v = v (P) = 1683$ pc/h
 12 F FM

 Capacity Checks

	Actual	Maximum	LOS F?
v F0	3072	7200	No
v R12	1954	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 15.3$ pc/mi/ln

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

 Speed Estimation

Intermediate speed variable,	M = 0.265	
Space mean speed in ramp influence area,	S = 62.6	mph
Space mean speed in outer lanes,	S = 67.8	mph
Space mean speed for all vehicles,	S = 64.4	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: PM
Freeway/dir or travel: I 75/ SR 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-1, N.B. on ramp from S.R. 131, Alt. 2

 Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2076	vph

 On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	426	vph
Length of first accel/decel lane	840	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)	2076	426	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	546	112	v
Trucks and buses	16	2	%
Recreational vehicles	0	0	%
Terrain type:	Rolling	Rolling	Level
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5	
Recreational vehicle PCE, ER	2.0	2.0	
Heavy vehicle adjustment, fHV	0.806	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2710	462	pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 E_Q
 $P = 0.601$ Using Equation 1
 FM
 $v_{12} = v_F(P_{FM}) = 1629$ pc/h
 12 F FM

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3172	7200	No
v_{R12}	2091	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.3$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	$M = 0.269$	
Space mean speed in ramp influence area,	$S_S = 62.5$	mph
Space mean speed in outer lanes,	$S_R = 67.9$	mph
Space mean speed for all vehicles,	$S_Q = 64.2$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2396 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	631	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1080	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1080	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.4	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979
 E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
 Agency or Company: TRC International
 Date Performed: 5/21/02
 Analysis Time Period: PM
 Freeway/Direction: I-75/SR 131 (Emory Road)
 From/To: N.B., North of Inter.
 Jurisdiction:
 Analysis Year: 2026
 Description: Knox Co., Prop. System, **Alt. 2**

Flow Inputs and Adjustments

Volume, V	2502 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	658	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1128	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1128	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.1	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2396 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	631	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fhv	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1620	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1620	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.3	mi/h
Number of lanes, N	2	
Density, D	23.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: N.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V	2502 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	658	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1692	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1692	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.9	mi/h
Number of lanes, N	2	
Density, D	24.6	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., North of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

Flow Inputs and Adjustments

Volume, V	2275 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	599	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1539	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1539	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	2	
Density, D	22.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., North of Inter. ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2331 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	613	v
Trucks and buses	19 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fhv	0.778	
Driver population factor, vp	1.00	
Flow rate, vp	1576	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1576	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	2	
Density, D	22.7	pc/mi/ln
Level of service, LOS	C	

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

Diverge Analysis

Analyst: Ken Arnold
 Agency/Co.: TRC International
 Date performed: 5/22/02
 Analysis time period: AM ✓
 Freeway/dir or travel: I-75/SR 131 (Emory Road)
 Junction:
 Jurisdiction:
 Analysis Year: 2026
 Description: Knox Co., D-2, SB off ramp to SR 131, Alt. 2

Freeway Data

Type of analysis Diverge
 Number of lanes in freeway 2 ✓
 Free-flow speed on freeway 70.0 mph
 Volume on freeway 2275 ✓ vph

Off Ramp Data

Side of freeway Right
 Number of lanes in ramp 1 ✓
 Free-Flow speed on ramp 50.0 mph
 Volume on ramp 221 ✓ vph
 Length of first accel/decel lane 360 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)	2275 ✓	221 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	599	58		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.771		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3077	240		pcph

Estimation of V12 Diverge Areas

$L = 0.00$ (Equation 25-8 or 25-9)
 E_Q
 $P = 1.000$ Using Equation 0
 F_D
 $v_{12} = v_R + (v_F - v_R) P = 3077$ pc/h
 F_D

Capacity Checks

	Actual	Maximum	LOS F?
$v_{12} = v_F$	3077	4800	No
v_{12}	3077	4400	No
$v_{F0} = v_F - v_R$	2837	4800	No
v_R	240	2100	No

_____ Level of Service Determination (if not F) _____

Density, $D = 4.252 + \frac{0.0086 v}{R} - 0.009 L$ = 27.5
Level of service for ramp-freeway junction areas of influence C

_____ Speed Estimation _____

Intermediate speed variable,	D = 0.255	
Space mean speed in ramp influence area,	S = 63	mph
Space mean speed in outer lanes,	S = N/A	mph
Space mean speed for all vehicles,	S = 62.9	mph

Diverge Analysis

Analyst: Ken Arnold
 Agency/Co.: TRC International
 Date performed: 5/22/02
 Analysis time period: PM
 Freeway/dir or travel: I-75/SR 131 (Emory Road)
 Junction:
 Jurisdiction:
 Analysis Year: 2026 ✓
 Description: Knox Co., D-2, SB off ramp to SR 131, Alt. 2

Freeway Data

Type of analysis Diverge
 Number of lanes in freeway 2
 Free-flow speed on freeway 70.0 mph
 Volume on freeway 2331 ✓ vph

Off Ramp Data

Side of freeway Right
 Number of lanes in ramp 1 ✓
 Free-Flow speed on ramp 50.0 mph
 Volume on ramp 243 ✓ vph
 Length of first accel/decel lane 360 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)	2331 ✓	243 ✓		vph
Peak-hour factor, PHF	0.95 ✓	0.95 ✓		
Peak 15-min volume, v15	613	64		v
Trucks and buses	19 ✓	2 ✓		%
Recreational vehicles	0	0		%
Terrain type:	Rolling ✓	Rolling ✓	Level	
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.778	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3153	263		pcph

Estimation of V12 Diverge Areas

L = 0.00 (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P = 3153$ pc/h
 12 R F R FD

Capacity Checks

	Actual	Maximum	LOS F?
$v = v_{12}$	3153	4800	No
$F_i F$			
v_{12}	3153	4400	No
$v = v_F - v_R$	2890	4800	No
$F_0 F R$			
v_R	263	2100	No

_____ Level of Service Determination (if not F) _____

Density, $D = 4.252 + 0.0086 v - 0.009 L = 28.1$ pc/mi/ln
 $\quad \quad \quad R \quad \quad \quad 12 \quad \quad \quad D$

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

_____ Speed Estimation _____

Intermediate speed variable,	D = 0.257	
	S	
Space mean speed in ramp influence area,	S = 63	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	□	
Space mean speed for all vehicles,	S = 62.8	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of D-2
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2054 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	541	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fhv	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1357	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1357	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	19.4	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of D-2 ✓
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2088 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	549	v
Trucks and buses	17 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi.
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.797	
Driver population factor, vp	1.00	
Flow rate, vp	1379	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1379	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	19.7	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S-B., South of M-2
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	3366 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	886	v
Trucks and buses	12 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.847	
Driver population factor, vp	1.00	
Flow rate, vp	1394	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1394	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	19.9	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM ✓
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of M-2 ✓
Jurisdiction:
Analysis Year: 2026 ✓
Description: Knox Co., Prop. System, **Alt. 2**

 Flow Inputs and Adjustments

Volume, V	2700 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	711	v
Trucks and buses	12 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.847	
Driver population factor, vp	1.00	
Flow rate, vp	1118	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h

Urban Freeway

 LOS and Performance Measures

Flow rate, vp	1118	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	16.0	pc/mi/ln
Level of service, LOS	B	

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

Merge Analysis

Analyst: Ken Arnold
 Agency/Co.: TRC International
 Date performed: 5/21/02
 Analysis time period: AM
 Freeway/dir or travel: I-75/SR 131 (Emory Road)
 Junction:
 Jurisdiction:
 Analysis Year: 2026
 Description: Knox Co., M-3.S.B. on ramp from SR 131, Alt. 2

Freeway Data

Type of analysis Merge
 Number of lanes in freeway 3
 Free-flow speed on freeway 70.0 mph
 Volume on freeway 3366 vph

On Ramp Data

Side of freeway Right
 Number of lanes in ramp 1
 Free-flow speed on ramp 50.0 mph
 Volume on ramp 704 vph
 Length of first accel/decel lane 840 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)	3366	704		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	886	185		v
Trucks and buses	12	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.847	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4181	763		pcph

Estimation of V12 Merge Areas

L = 0.00 (Equation 25-2 or 25-3)
 EQ
 P = 0.601 Using Equation 1
 FM
 $v_{12} = v \left(\frac{P}{F} \right) = 2513$ pc/h
 12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v F0	4944	7200	No
v R12	3276	4600	No

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.4$

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

_____Speed Estimation_____

Intermediate speed variable,	M	=	0.340	
	S			
Space mean speed in ramp influence area,	S	=	60.5	mph
	R			
Space mean speed in outer lanes,	S	=	65.8	mph
	O			
Space mean speed for all vehicles,	S	=	62.2	mph

HCS2000: Ramps and Ramp Junctions Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Merge Analysis

Analyst: Ken Arnold
Agency/Co.: TRC International
Date performed: 5/21/02
Analysis time period: PM
Freeway/dir or travel: I 75/ SR 131 (Emory Road)
Junction:
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., M-3, S.B. on ramp from S.R. 131, Alt. 2

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2700	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	50.0	mph
Volume on ramp	250	vph
Length of first accel/decel lane	840	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)	2700	250		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	711	66		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Rolling	Rolling	Level	
Grade	%	%	%	%
Length	mi	mi	mi	
Trucks and buses PCE, ET	2.5	2.5		
Recreational vehicle PCE, ER	2.0	2.0		
Heavy vehicle adjustment, fHV	0.806	0.971		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3524	271		pcph

 Estimation of V12 Merge Areas

$L = 0.00$ (Equation 25-2 or 25-3)
 EQ
 $P = 0.601$ Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 2118$ pc/h

 Capacity Checks

	Actual	Maximum	LOS F?
v_{F0}	3795	7200	No
v_{R12}	2389	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.7$ pc/mi/ln

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

 Speed Estimation

Intermediate speed variable,	$M = 0.280$	
Space mean speed in ramp influence area,	$S_R = 62.2$	mph
Space mean speed in outer lanes,	$S_D = 66.7$	mph
Space mean speed for all vehicles,	$S = 63.8$	mph

HCS2000: Basic Freeway Segments Release 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

 Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: AM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 2

 Flow Inputs and Adjustments

Volume, V	4070	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1071	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Rolling	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fHV	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1664	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	1664	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.1	mi/h
Number of lanes, N	3	
Density, D	24.1	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 4.1b

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

Operational Analysis

Analyst: Ken Arnold
Agency or Company: TRC International
Date Performed: 5/21/02
Analysis Time Period: PM
Freeway/Direction: I-75/SR 131 (Emory Road)
From/To: S.B., South of Inter.
Jurisdiction:
Analysis Year: 2026
Description: Knox Co., Prop. System, Alt. 2

Flow Inputs and Adjustments

Volume, V	2950 ✓	veh/h
Peak-hour factor, PHF	0.95 ✓	
Peak 15-min volume, v15	776	v
Trucks and buses	11 ✓	%
Recreational vehicles	0	%
Terrain type:	Rolling ✓	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	2.5	
Recreational vehicle PCE, ER	2.0	
Heavy vehicle adjustment, fhv	0.858	
Driver population factor, vp	1.00	
Flow rate, vp	1206	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3 ✓	
Free-flow speed:	Measured	
FFS or BFFS	70.0	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	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1206	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	17.2	pc/mi/ln
Level of service, LOS	B	

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

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: AM
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026
 Project ID: Knox Co., Prop. System, Alt. 2

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	5		22	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	1.3	mph	5.5	mph
Free-flow speed	57.8	mph	53.6	mph

VOLUME

Direction	1		2	
Volume, V	1221 ✓	vph	971 ✓	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	321		256	
Trucks and buses	2 ✓	%	2 ✓	%
Recreational vehicles	0	%	0	%
Terrain type:	Rolling ✓		Rolling ✓	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2 ✓		2 ✓	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.971		0.971	
Flow rate, vp	661	pcphpl	526	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	661	pcphpl	526	pcphpl
Free-flow speed, FFS	57.8	mph	53.6	mph
Avg. passenger-car travel speed, S	57.8	mph	53.6	mph
Level of service, LOS	B		A	
Density, D	11.4	pc/mi/ln	9.8	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

HCS2000: Multilane Highways Release 4.1b

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
 Agency/Co: TRC International
 Date: 5/21/02
 Analysis Period: PM
 Highway: SR 131 (Emory Road)
 From/To: Central Ave./I-75
 Jurisdiction:
 Analysis Year: 2026
 Project ID: Knox Co., Prop. System, Alt. 2

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	2.0	ft	2.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	8.0	ft	8.0	ft
Access points per mile	5		22	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.9	mph	0.9	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	1.3	mph	5.5	mph
Free-flow speed	57.8	mph	53.6	mph

VOLUME

Direction	1		2	
Volume, V	1425 ✓	vph	1347 ✓	vph
Peak-hour factor, PHF	0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15	375		354	
Trucks and buses	2 ✓	%	2 ✓	%
Recreational vehicles	0	%	0	%
Terrain type	Rolling ✓		Rolling ✓	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2 ✓		2 ✓	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	2.5		2.5	
Recreational vehicles PCE, ER	2.0		2.0	
Heavy vehicle adjustment, fHV	0.971		0.971	
Flow rate, vp	772	pcphpl	730	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	772	pcphpl	730	pcphpl
Free-flow speed, FFS	57.8	mph	53.6	mph
Avg. passenger-car travel speed, S	57.8	mph	53.6	mph
Level of service, LOS	B		B	
Density, D	13.3	pc/mi/ln	13.6	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Analyst: KA Inter.:
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: AM ✓ Year : 2026 ✓
 Project ID: Knox Co., Prop. System, **Alt. 2**
 E/W St: SR 131 (Emory Road) N/S St: I-75 SB Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	0	2	0	0	0	0	0	1	0
LGConfig		TR			T						LTR	
Volume		517	704		869					119	1	102
Lane Width		12.0			12.0					16.0		
RTOR Vol			352									34

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A				Thru			
Right	A				Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.0				24.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c g/C		Lane Group Delay LOS	Approach Delay LOS
Eastbound						
TR	1469	3390	0.62	0.43	14.0 B	14.0 B
Westbound						
T	1564	3610	0.59	0.43	13.5 B	13.5 B
Northbound						
Southbound						
LTR	794	1985	0.25	0.40	12.2 B	12.2 B

Intersection Delay = 13.6 (sec/veh) Intersection LOS = B

Analyst: KA Inter.: I-75/SR 131 (Emory)
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: PM Year : 2026
 Project ID: Knox Co., Prop. System, **Alt. 2**
 E/W St: SR 131 (Emory Road) N/S St: I-75 SB Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	0	2	0	0	0	0	0	1	0
LGConfig		TR			T						LTR	
Volume		1175	250		1247					143	1	100
Lane Width		12.0			12.0					16.0		
RTOR Vol			125									33

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A				Thru			
Right	A				Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A				Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.0				22.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group Delay LOS		Approach Delay LOS	
			v/c	g/C				
Eastbound								
TR	1660	3558	0.82	0.47	17.4	B	17.4	B
Westbound								
T	1685	3610	0.78	0.47	15.8	B	15.8	B
Northbound								
Southbound								
LTR	731	1993	0.31	0.37	13.8	B	13.8	B
Intersection Delay = 16.4 (sec/veh) Intersection LOS = B								

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/Sr 131 (Emory Road)
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: AM Year : 2026
 Project ID: Knox Co., Prop: System, **Alt. 2**
 E/W St: SR 131 (Emory Road) N/S St: I-75 NB Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LG Config	L	T			TR		L		R			
Volume	177	559			2028	173	153		577			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol					58				192			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A			Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A			Thru			
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		7.0	55.0			15.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 92.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group			Approach	
			v/c	g/C	Delay	LOS	Delay	LOS	
Eastbound									
L	137	1805	0.59	0.08	47.8	D			
T	2629	3610	0.22	0.73	4.1	A	9.4	A	
Westbound									
TR	2141	3581	1.05	0.60	53.9	D	53.9	D	
Northbound									
L	294	1805	0.55	0.16	37.5	D			
R	463	2842	0.87	0.16	54.4	D	49.6	D	
Southbound									

Intersection Delay = 44.7 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: I-75/Sr 131 (Emory Road)
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: PM ✓ Year : 2026 ✓
 Project ID: Knox Co., Prop. System, **Alt. 2**
 E/W St: SR 131 (Emory Road) N/S St: I-75 NB Ramps

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	1	0	2	0	0	0
LGConfig	L	T			TR		L		R			
Volume	1159	1159			1372	267	1487		1249			
Lane Width	12.0	12.0			12.0		12.0		12.0			
RTOR Vol						89			625			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A	A		NB Left	A		
Thru		A	A		Thru			
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru			A		Thru			
Right			A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		7.0	41.0			28.0		
Yellow		3.0	3.0			3.0		
All Red		2.0	2.0			2.0		

Cycle Length: 91.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group	Approach	
			v/c	g/c		Delay LOS	Delay LOS
Eastbound							
L	263	1805	0.63	0.58	23.4 C		
T	2103	3610	0.58	0.58	12.4 B	13.7	B
Westbound							
TR	1599	3548	1.02	0.45	52.7 D	52.7	D
Northbound							
L	555	1805	0.92	0.31	51.9 D		
R	874	2842	0.75	0.31	32.1 C	40.8	D
Southbound							

Intersection Delay = 36.4 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1b

TRC INTERNATIONAL
 217 WARD CIRCLE
 BRENTWOOD, TN 37027

Phone: (615) 661-7979

Fax: (615) 661-0644

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA
 Agency: TRC International
 Date: 5/22/02
 Period: AM
 Project ID: Knox Co., Prop. System, **Alt. 2**
 E/W St: SR 131 (Emory Road) Inter.: SR 131/Primetime Road
 Area Type: All other areas
 Jurisd:
 Year : 2026
 N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LGConfig	L	TR		L	TR		L	TR			LT	R
Volume	123	954	59	14	1651	11	151	6	3	170	12	449
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			20			4			1			166

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A	A		Thru	A		
Right		A	A		Right	A		
Peds					Peds			
WB Left			A		SB Left		A	
Thru			A		Thru		A	
Right			A		Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		14.0	50.0			10.5	10.5	
Yellow		3.0	3.0			3.0	3.0	
All Red		2.0	2.0			2.0	2.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
L	241	1805	0.54	0.13	44.8	D		
TR	2358	3589	0.44	0.66	8.8	A	12.8	B
Westbound								
L	248	521	0.02	0.48	14.5	B		
TR	1718	3608	1.02	0.48	53.2	D	53.1	D
Northbound								
L	181	1805	0.30	0.10	44.8	D		
TR	183	1829	0.04	0.10	42.8	D	44.5	D
Southbound								
LT	182	1822	0.48	0.10	46.6	D	39.0	D
R	454	1615	0.66	0.28	36.7	D		
Intersection Delay = 37.3 (sec/veh)					Intersection LOS = D			

HCS2000: Signalized Intersections Release 4.1b

Analyst: KA Inter.: SR 131/Primetime Road
 Agency: TRC International Area Type: All other areas
 Date: 5/22/02 Jurisd:
 Period: PM Year : 2026 ✓
 Project ID: Knox Co., Prop. System, **Alt. 2**
 E/W St: SR 131 (Emory Road) N/S St: Primetime Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	1	1	0	0	1	1
LG Config	L	TR		L	TR		L	TR			LT	R
Volume	1317	1876	215	14	1281	99	163	44	15	118	30	195
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			72			33			5			65

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A	A						
Thru	A	A						
Right	A	A						
Peds								
WB Left			A					
Thru			A					
Right			A					
Peds								
NB Right								
SB Right		A						
Green	16.0	42.0	0.0	0.0		14.4	12.6	0.0
Yellow	3.0	3.0	0.0			3.0	3.0	0.0
All Red	2.0	2.0	0.0			2.0	2.0	0.0

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group	Approach	
			v/c	g/C		Delay LOS	Delay LOS
Eastbound							
L	381	1805	0.88	0.60	50.9 D		
TR	2143	3572	0.99	0.60	38.3 D	40.0 D	
Westbound							
L	72	181	0.06	0.40	19.7 B		
TR	1434	3584	0.99	0.40	52.1 D	52.1 D	
Northbound							
L	248	1805	0.69	0.14	51.3 D		
TR	253	1845	0.23	0.14	40.8 D	48.7 D	
Southbound							
LT	219	1827	0.71	0.12	54.8 D	41.7 D	
R	517	1615	0.26	0.32	26.8 C		
Intersection Delay = 44.5 (sec/veh) Intersection LOS = D							

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: AM
Highway: SR 131 (Emory Road)
From/To: Primetime Road/Bishop
Jurisdiction:
Analysis Year: 2026
Project ID: Knox Co., Prop. System, **Alt. 2**

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			10		10	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			2.5	mph	2.5	mph
Free-flow speed			56.6	mph	56.6	mph

VOLUME

	Direction		1		2	
Volume, V			1027	vph	1666	vph
Peak-hour factor, PHF			0.95		0.95	
Peak 15-minute volume, v15			270		438	
Trucks and buses			3	%	3	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling		Rolling	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2		2	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.957		0.957	
Flow rate, vp			564	pcphpl	916	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			564	pcphpl	916	pcphpl
Free-flow speed, FFS			56.6	mph	56.6	mph
Avg. passenger-car travel speed, S			56.6	mph	56.6	mph
Level of service, LOS			A		B	
Density, D			10.0	pc/mi/ln	16.2	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

TRC INTERNATIONAL
217 WARD CIRCLE
BRENTWOOD, TN 37027

Phone: (615) 661-7979
E-mail:

Fax: (615) 661-0644

OPERATIONAL ANALYSIS

Analyst: Ken Arnold
Agency/Co: TRC International
Date: 5/21/02
Analysis Period: PM
Highway: SR 131 (Emory Road)
From/To: Primetime Road/Bishop
Jurisdiction:
Analysis Year: 2026
Project ID: Knox Co., Prop. System, Alt. 2

FREE-FLOW SPEED

	Direction		1		2	
Lane width			12.0	ft	12.0	ft
Lateral clearance:						
Right edge			2.0	ft	2.0	ft
Left edge			6.0	ft	6.0	ft
Total lateral clearance			8.0	ft	8.0	ft
Access points per mile			10		10	
Median type			Divided		Divided	
Free-flow speed:			Base		Base	
FFS or BFFS			60.0	mph	60.0	mph
Lane width adjustment, FLW			0.0	mph	0.0	mph
Lateral clearance adjustment, FLC			0.9	mph	0.9	mph
Median type adjustment, FM			0.0	mph	0.0	mph
Access points adjustment, FA			2.5	mph	2.5	mph
Free-flow speed			56.6	mph	56.6	mph

VOLUME

	Direction		1		2	
Volume, V			2009 ✓	vph	1384 ✓	vph
Peak-hour factor, PHF			0.95 ✓		0.95 ✓	
Peak 15-minute volume, v15			529		364	
Trucks and buses			3 ✓	%	3 ✓	%
Recreational vehicles			0	%	0	%
Terrain type			Rolling ✓		Rolling ✓	
Grade			0.00	%	0.00	%
Segment length			0.00	mi	0.00	mi
Number of lanes			2 ✓		2 ✓	
Driver population adjustment, fP			1.00		1.00	
Trucks and buses PCE, ET			2.5		2.5	
Recreational vehicles PCE, ER			2.0		2.0	
Heavy vehicle adjustment, fHV			0.957		0.957	
Flow rate, vp			1104	pcphpl	761	pcphpl

RESULTS

	Direction		1		2	
Flow rate, vp			1104	pcphpl	761	pcphpl
Free-flow speed, FFS			56.6	mph	56.6	mph
Avg. passenger-car travel speed, S			56.6	mph	56.6	mph
Level of service, LOS			C		B	
Density, D			19.5	pc/mi/ln	13.4	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

APPENDIX B

INDEX OF SHEETS (CONST.)

SEE SHEET NO. 1A

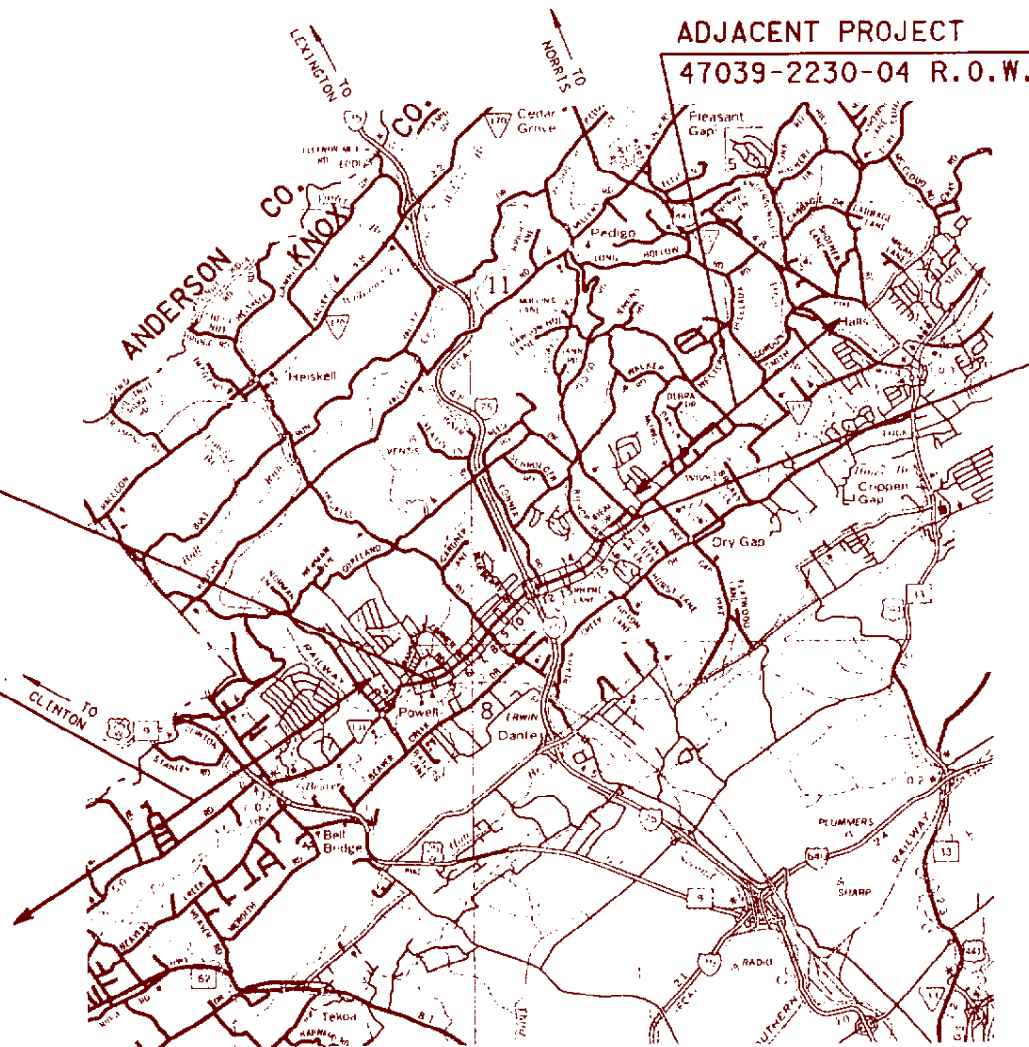
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING AND DEVELOPMENT

TENN.	YEAR	54
	2001	
FED. AID PROJ. NO.	HPP/STP-131(12)	
STATE PROJ. NO.	47039-3231-	

KNOX COUNTY

S.R. 131 (EMORY ROAD)
FROM: SOUTH OF GILL ROAD
TO: NORTH OF BISHOP ROAD
GRADE, DRAIN, & PAVE

STATE HIGHWAY NO. 131 F.A.H.S. NO. 131



NO EXCLUSIONS
NO EQUATIONS

47039-3231-14
BEGIN PROJ. HPP/STP-131(12) CONST.
SURVEY STA. 20+123.000
LOG MILE 14.17

ADJACENT PROJECT
47029-2225-04 R.O.W.

ADJACENT PROJECT
47039-2230-04 R.O.W.

47039-3231-14
END PROJ. NO. HPP/STP-131(12) (CONST.)
PAP. LOC. STA. 24+264.000
LOG MILE 16.71

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

TDOT ROAD SP. SV. 2 GARY HAWK
DESIGNER JOHN MOORE CHECKED BY RANDY DUKE

P.E. NO. 47039-1215-04

ROADWAY LENGTH	4.141	KILOMETERS
BRIDGE LENGTH	0.000	KILOMETERS
BOX BRIDGE LENGTH	0.000	KILOMETERS
PROJECT LENGTH	4.141	KILOMETERS

TRAFFIC DATA	
ADT (2001)	18660
ADT (2021)	27940
DHV (2021)	2794
D	60-40
T (ADT)	5 %
T (DHV)	3 %
V	60 km/h



APPROVED: JHC Jones DESIGN
DATE: _____
APPROVED: John Setts COMM

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATIVE DISTRICT OFFICE
KNOX COUNTY, TENNESSEE
APPROVED: _____
DIVISION ADMINISTRATOR

17-OCT-2002 08:53
D:\Knox\Knox\SR131\const\131



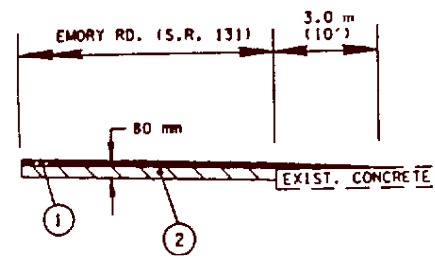
TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	2A
CONST.	2008	HPP/STP-131(12)	2D

REV. 5/28/99: ADJUSTED R.O.W. DIMENSIONS TO UPDATE PLANS

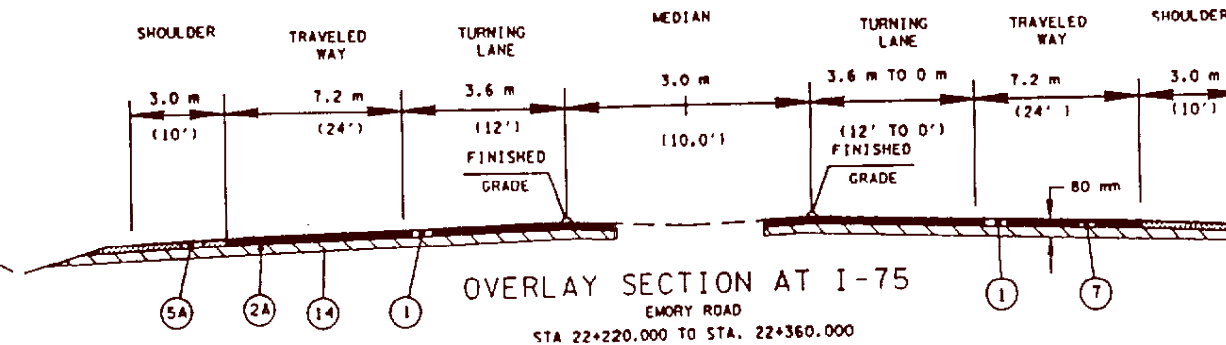
REV. 8/16/01: REVISED TYPICAL TANGENT SECTION FOR DETACHED CURB AND ADDED FOOTNOTE FOR OVERLAY SECTION AT I-75.

REV. 9/17/01: REVISED CODE NUMBERS & OVERLAY SECTION.

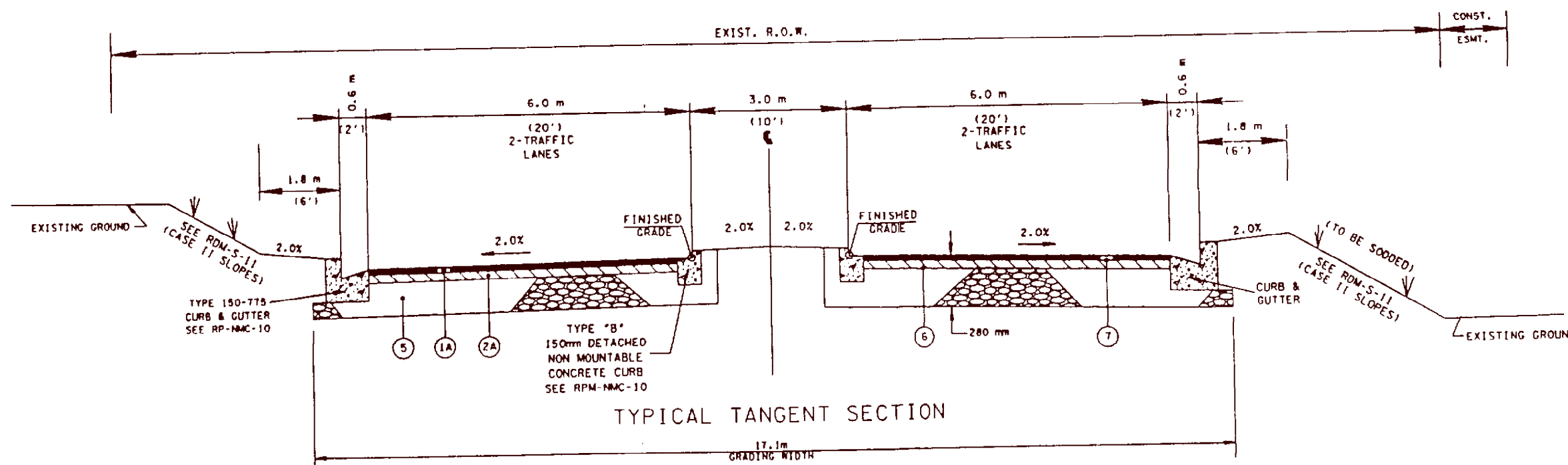
REV. 11/05/01: REVISED CODE NOS. & ADDED OVERALL PAVEMENT THICKNESS FOR ALL TYPICAL SECTIONS.



TYPICAL PAVING WEDGE
(AT I-75 RAMPS A, B, C & D)

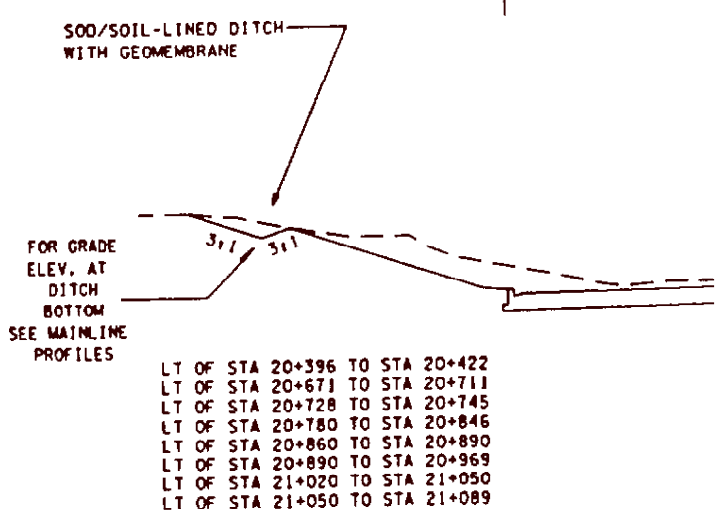


OVERLAY SECTION AT I-75
EMORY ROAD
STA 22+220.000 TO STA. 22+360.000



TYPICAL TANGENT SECTION
17.1m GRADING WIDTH

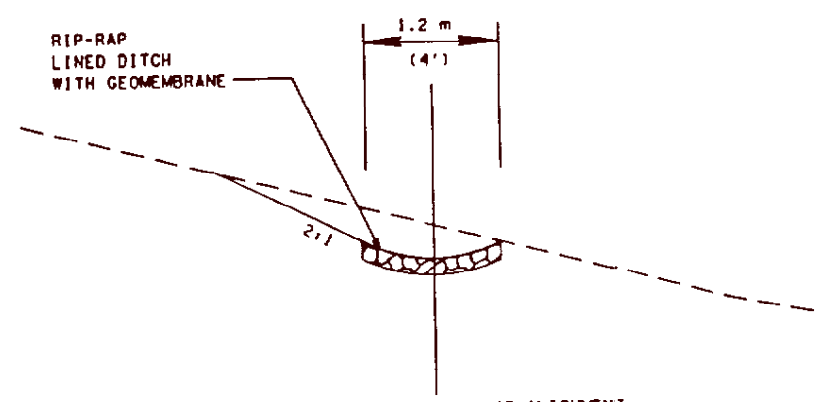
FOR DETAILS NOT SHOWN SEE DWG. RDM-TS-6A
WINDWOOD RD. - STA 20+463.03



SPECIAL DITCH DETAILS

TO BE PLACED AT TOP OF CUTS AND TOES OF FILLS (WHERE GROUND SLOPES TOWARD ROADWAY)

SEE SHEET NO. 61 FOR DETAILS



SPECIAL DITCH ALONG FUTURE ALIGNMENT AT BEGINNING OF PROJECT

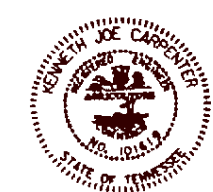
SEE SHEET NO. 61 FOR DETAILS



SPECIAL DITCH DETAILS

TO BE PLACED AT TOP OF CUTS AND TOES OF FILLS (WHERE GROUND SLOPES TOWARD ROADWAY)

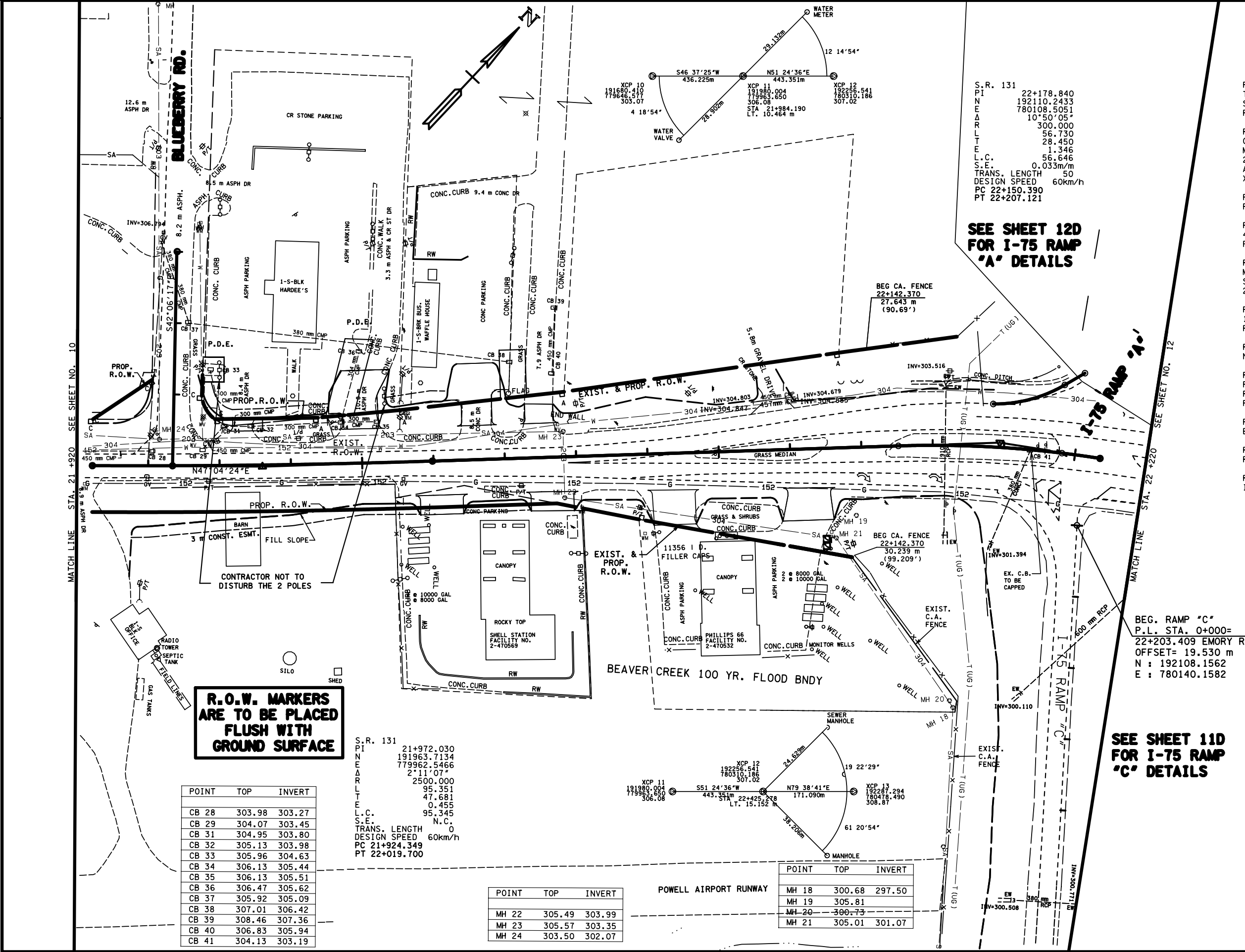
SEE SHEET NO. 61 FOR DETAILS



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT
TYPICAL SECTIONS

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

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	11
CONST.	2001	HPP/STP-131(12)	11



SEE SHEET 12D
FOR I-75 RAMP
"A" DETAILS

BEG. RAMP "C"
P.L. STA. 0+000=
22+203.409 EMORY RD.
OFFSET= 19.530 m
N : 192108.1562
E : 780140.1582

SEE SHEET 11D
FOR I-75 RAMP
"C" DETAILS

**R.O.W. MARKERS
ARE TO BE PLACED
FLUSH WITH
GROUND SURFACE**

POINT	TOP	INVERT
CB 28	303.98	303.27
CB 29	304.07	303.45
CB 31	304.95	303.80
CB 32	305.13	303.98
CB 33	305.96	304.63
CB 34	306.13	305.44
CB 35	306.13	305.51
CB 36	306.47	305.62
CB 37	305.92	305.09
CB 38	307.01	306.42
CB 39	308.46	307.36
CB 40	306.83	305.94
CB 41	304.13	303.19

S.R. 131
PI 21+972.030
N 191963.7134
E 779962.5466
Δ 2° 11' 07"
R 2500.000
L 95.351
T 47.681
E 0.455
L.C. 95.345
S.E. N.C.
TRANS. LENGTH 0
DESIGN SPEED 60km/h
PC 21+924.349
PT 22+019.700

POINT	TOP	INVERT
MH 18	300.68	297.50
MH 19	305.81	
MH 20	300.73	
MH 21	305.01	301.07

POINT	TOP	INVERT
MH 18	300.68	297.50
MH 19	305.81	
MH 20	300.73	
MH 21	305.01	301.07

S.R. 131
PI 22+178.840
N 192110.2433
E 780108.5051
Δ 10° 50' 05"
R 300.000
L 56.730
T 28.450
E 1.346
L.C. 56.646
S.E. 0.033m/m
TRANS. LENGTH 50
DESIGN SPEED 60km/h
PC 22+150.390
PT 22+207.121

- REV. 5/28/99: REVISED BUS ENTS ON TRACTS 30 & 45; REVISED PDE NEAR STA 22+000 LT AND CHANGED TRACT NO. FROM 41 TO 40
- REV. 6/30/99: REVISED PROPERTY OWNER OF TRACT 30; REMOVED R.O.W. MARKER RT OF MAINLINE STATION 22+008.887; REVISED R.O.W. MARKERS ALONG TRACT 43 AND ADDED REF POINT XCP 11.
- REV. 3/16/00: CORRECTED OWNER & REVISED R.O.W. LINES AT TRACT 42
- REV. 4/11/00: ADDED NOTE TO TRACT 43 CONCERNING POLES. CHANGED PROPERTY OWNER FOR TRACT 44.
- REV. 7/24/00: ADDED EXIST. R.O.W. MARKERS LT. OF BLUEBERRY RD. @ STA. 4+980. & RT. OF C.L. STA. 22+075.
- REV. 6/25/01: MOVED RAMP "A" TO 12D. ALSO REVISED 100 YR. FLOOD BOUNDARY.
- REV. 8/16/01: ADDED RAMP "C" DETAIL NOTE.
- REV. 11/05/01: ADDED BEARING FOR RAMP "A" & MAINLINE. DELETED OLD RAMP "C" C.L. REVISED EQUATION FOR RAMP "C".
- REV. 11/15/01: ADDED NOTE TO CAP EXISTING CATCH BASIN NO. 41.
- REV. 3/15/02: CORRECTED 100 YR. FLOOD BOUNDARY.
- REV. 4/15/02: REVISED FLAG FOR I-75 RAMP "A".



COORDINATE VALUES ARE NAD/83(1990) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TGRN.

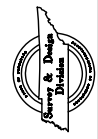
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PRESENT LAYOUT

STA. 21+920 TO STA. 22+220

SCALE: 1:500

12/11/02
f:\D:\offing\Jobs\Civil\0510\tdot\dot\files\KMill3.d



TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	11A
CONST.	2001	HPP/STP-131(12)	11A

REV. 5/28/99: ADDED EXIST R.O.W. DIST BETWEEN STAS 4+985.173 RT & 4+976 RT ON BLUEBERRY RD. AND BETWEEN MAINLINE STAS 21+987.865 LT & 22+010.819 LT; REVISED BUS. ENTS AT STAS 21+923 RT & 22+032 LT; CHANGED TRACT NO FROM 41 TO 40; REVISED PDE NEAR STA 22+000 LT AND IN PDE TABLE REVISED CODES D, E & F AND ADDED CODE L

REV. 6/30/99: REVISED PROPERTY OWNER OF TRACT 30.

REV. 7/23/99: CORRECTED OFFSET ON PDE TRACT NO.43 TO STA. 21+998 LT.

REV. 3/16/00: CORRECTED OWNER & REVISED R.O.W. LINES @ TRACT 42

REV. 4/11/00: ADDED NOTE TO TRACT 43 CONCERNING POLES. CHANGED PROPERTY OWNER FOR TRACT 44.

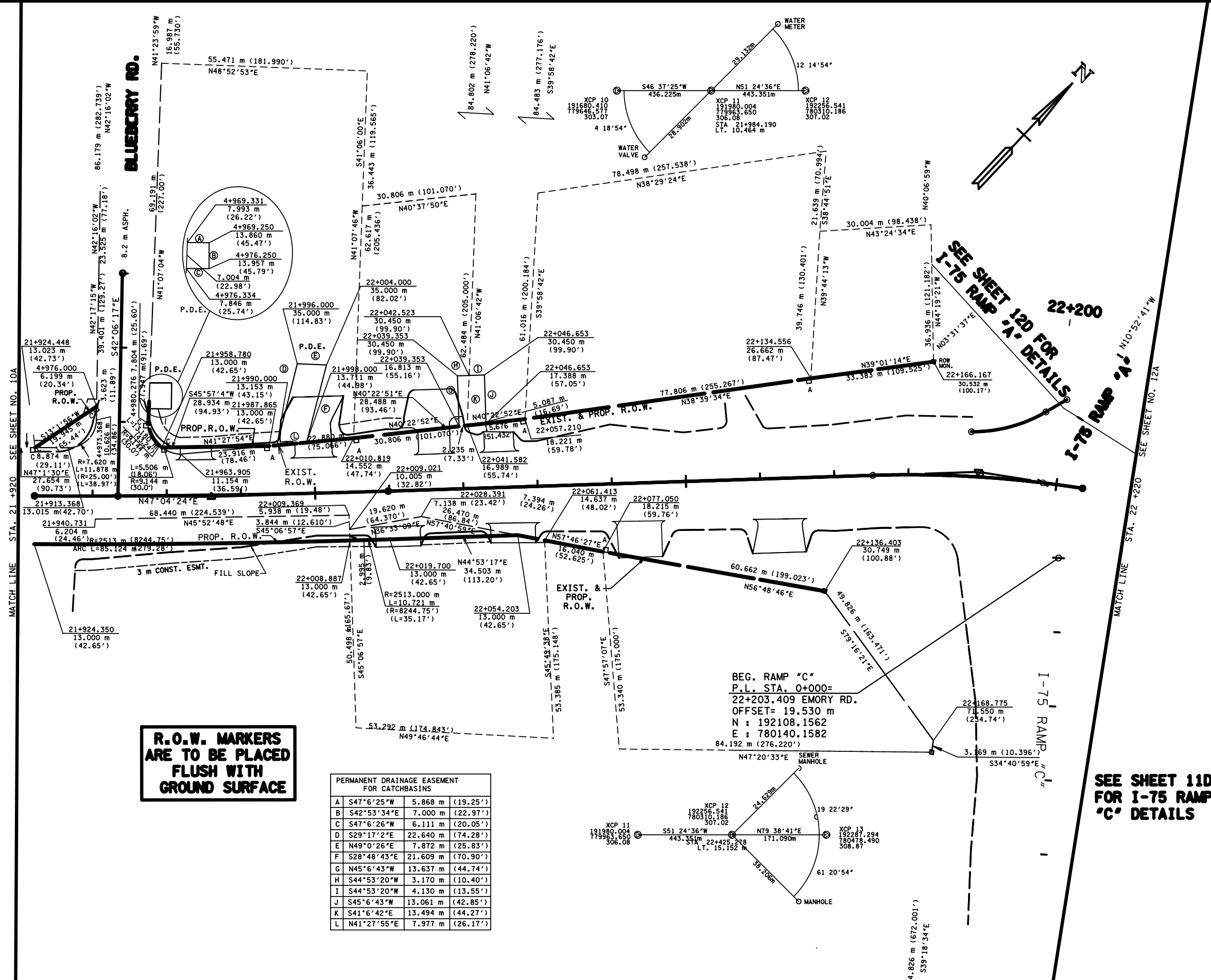
REV. 4/20/01: MOVED PROPERTY OWNERS NAME FOR TRACT NO. 44 & REVISED EXIST. R.O.W. SYMBOLOGY ALONG I-75.

REV. 6/25/01: MOVED RAMP "A" TO 120.

REV. 8/16/01: ADDED RAMP "C" DETAIL NOTE.

REV. 11/05/01: ADDED BEARING FOR RAMP "A" & MAINLINE. DELETED OLD RAMP "C" C.L. REVISED EQUATION FOR RAMP "C".

REV. 4/15/02: REVISED FLAG FOR I-75 RAMP "A".



R.O.W. MARKERS ARE TO BE PLACED FLUSH WITH GROUND SURFACE

PERMANENT DRAINAGE EASEMENT FOR CATCHBASINS		
A	S47°6'25"W	5.868 m (19.25')
B	S42°53'34"E	7.000 m (22.97')
C	S47°6'26"W	6.111 m (20.05')
D	S29°17'2"E	22.640 m (74.28')
E	N49°0'26"E	7.872 m (25.83')
F	S28°48'43"E	21.609 m (70.90')
G	N45°6'43"W	13.637 m (44.74')
H	S44°53'20"W	3.170 m (10.40')
I	S44°53'20"W	4.130 m (13.55')
J	S45°6'43"W	13.061 m (42.85')
K	S41°6'42"E	13.494 m (44.27')
L	N41°27'55"E	7.977 m (26.17')

BEG. RAMP "C"
P.L. STA. 0+000=
22+203.409 EMORY RD.
OFFSET= 19.530 m
N = 192108.1562
E = 780140.1582
84.192 m (276.220')

SEE SHEET 11D FOR I-75 RAMP "C" DETAILS



COORDINATE VALUES ARE NAD(83) (95) AND ARE DATUM ADJUSTED BY THE FACTOR 1.00 & TIED TO THE TRN.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT
RIGHT-OF-WAY DETAILS

STA. 21+920 TO STA. 22+220
SCALE: 1:500



TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	11E
CONST.	2001	HPP/STP-131(12)	11E

REV 5/28/99: REVISED BUS ENTS AT STAS 21+923.000 RT & 22+032.500 LT

REV. 4/11/00: ADDED NOTE TO LIGHT POLES.

REV:6/25/01 MOVED RAMP "A" TO 12D.

REV. 8/16/01: ADDED RAMP "C" DETAIL NOTE.

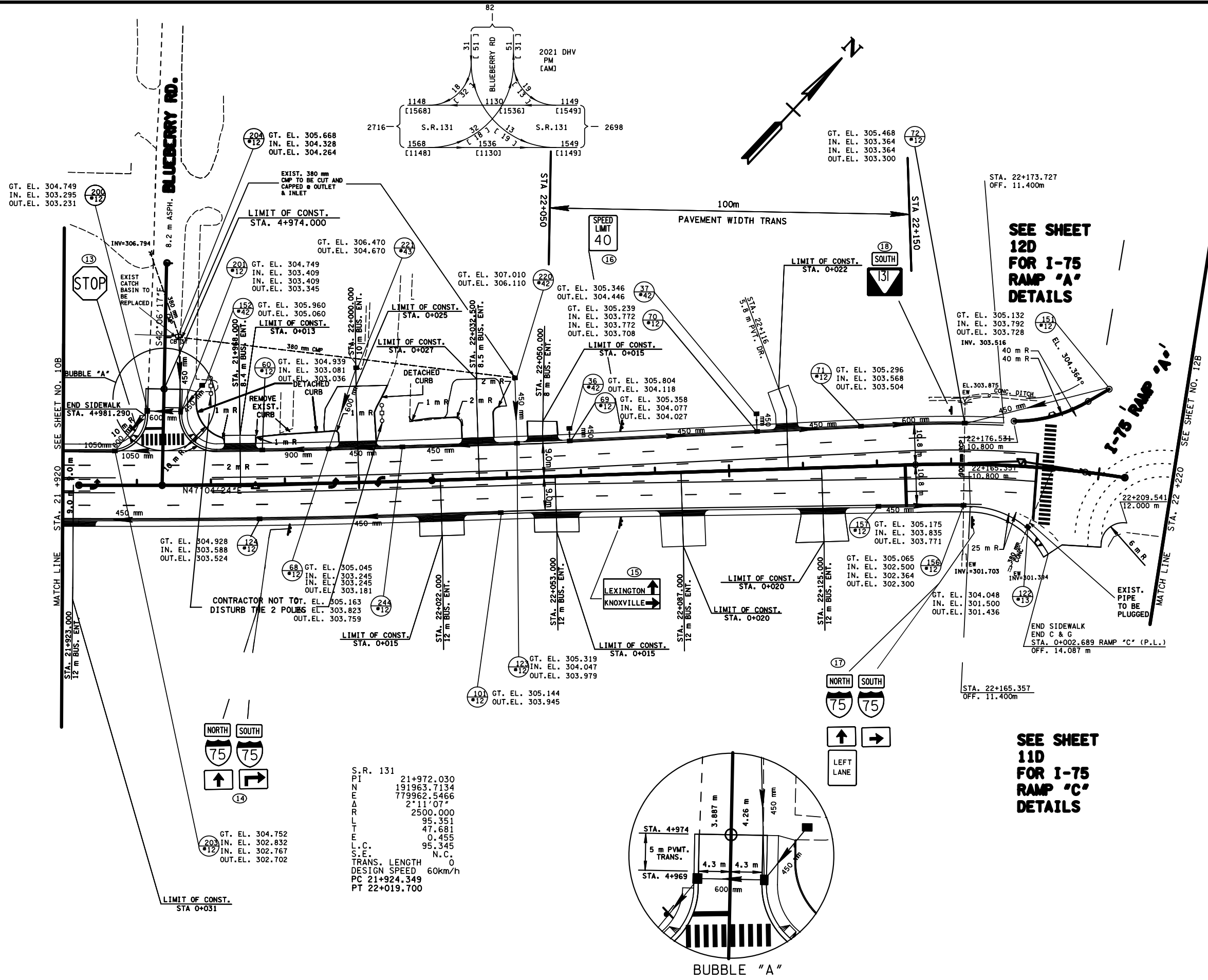
REV. 9/17/01: ADDED INLET ELEVATION TO CB 68 AND MOVED CB 203.

REV. 11/05/01: ADDED BEARING FOR RAMP "A" & MAINLINE. UPDATED M.L. WIDTH TRANSITIONS AND RADII AT INTERSECTIONS. ADDED BUBBLE "A" TO SHOW BLUEBERRY RD. TRANSITION. ADDED NOTE TO PLUG EXIST. PIPE. DELETED TEXT FOR EXIST. RADIUS ON RAMP "C".

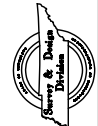
REV. 11/15/01: ADDED STATIONS & OFFSETS FOR CURB AND GUTTER @ BEGINNING OF RADIUS AND END OF CURB AND GUTTER.

REV. 3/15/02: REVISED INLET EL. AND OUTLET EL. FOR CODE 69.

REV. 4/15/02: REVISED FLAG FOR I-75 RAMP "A".



12/11/02
f:\Dr\atfing\Jobs\Civil\0510\1\dot\dm\files\KMLIB.3D



COORDINATE VALUES ARE NAD(83)/1990 AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TORN.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT

STA. 21+920 TO STA. 22+220

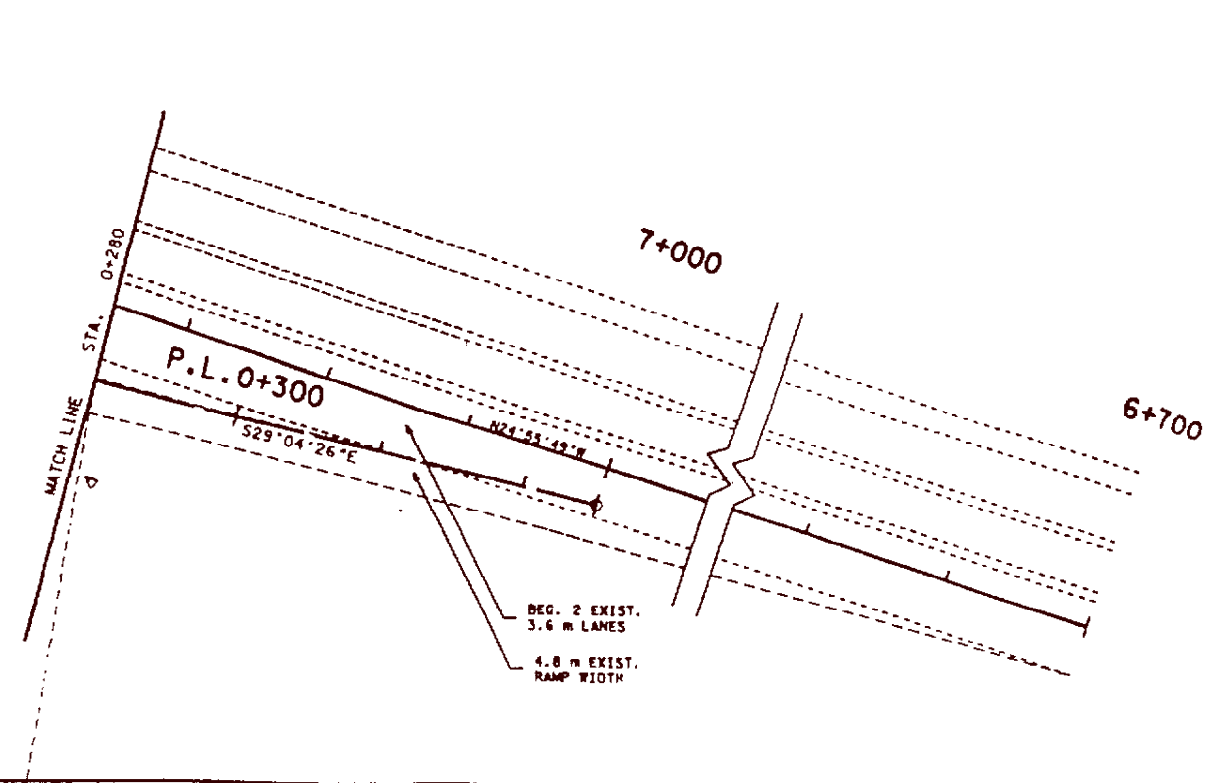
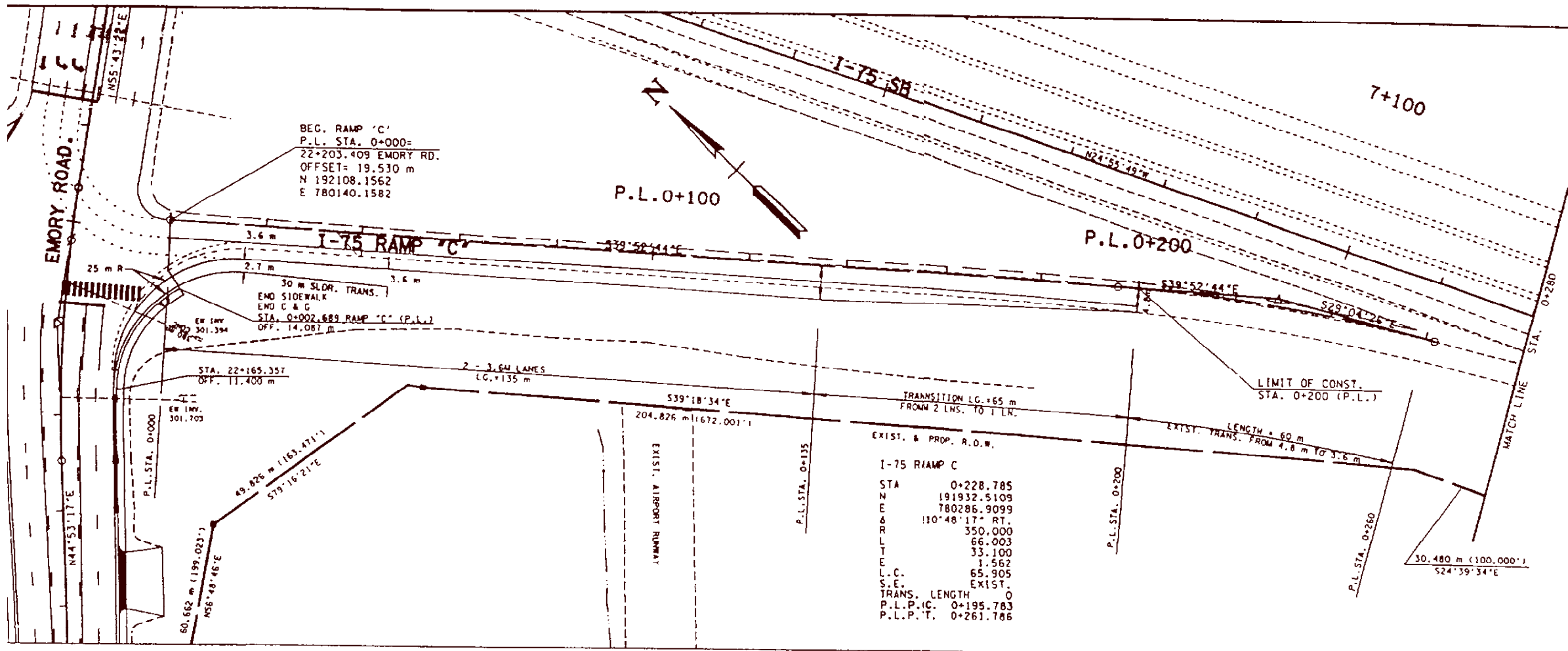
SCALE: 1:500

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	110
CONST.	2001	HPP/STP-131112	110

REV. 11/05/01: ADDED COORDINATES; UPDATED PVMT. & SHLD. TRANSITIONS & ADDED PROP RADII FOR RAMP 'C'. ADDED BEARINGS FOR I-75 SB & EMORY RD.

REV. 11/15/01: ADDED STATIONS & OFFSETS FOR CURB AND GUTTER @ BEGINNING OF RADIUS & END OF CURB AND GUTTER.

REV. 3/15/01: ADDED CURVE DATA FOR RAMP 'C'.



COORDINATE VALUES ARE NAD/83/1991 AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TGNL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PROPOSED LAYOUT RAMP 'C'
SCALE: 1:500

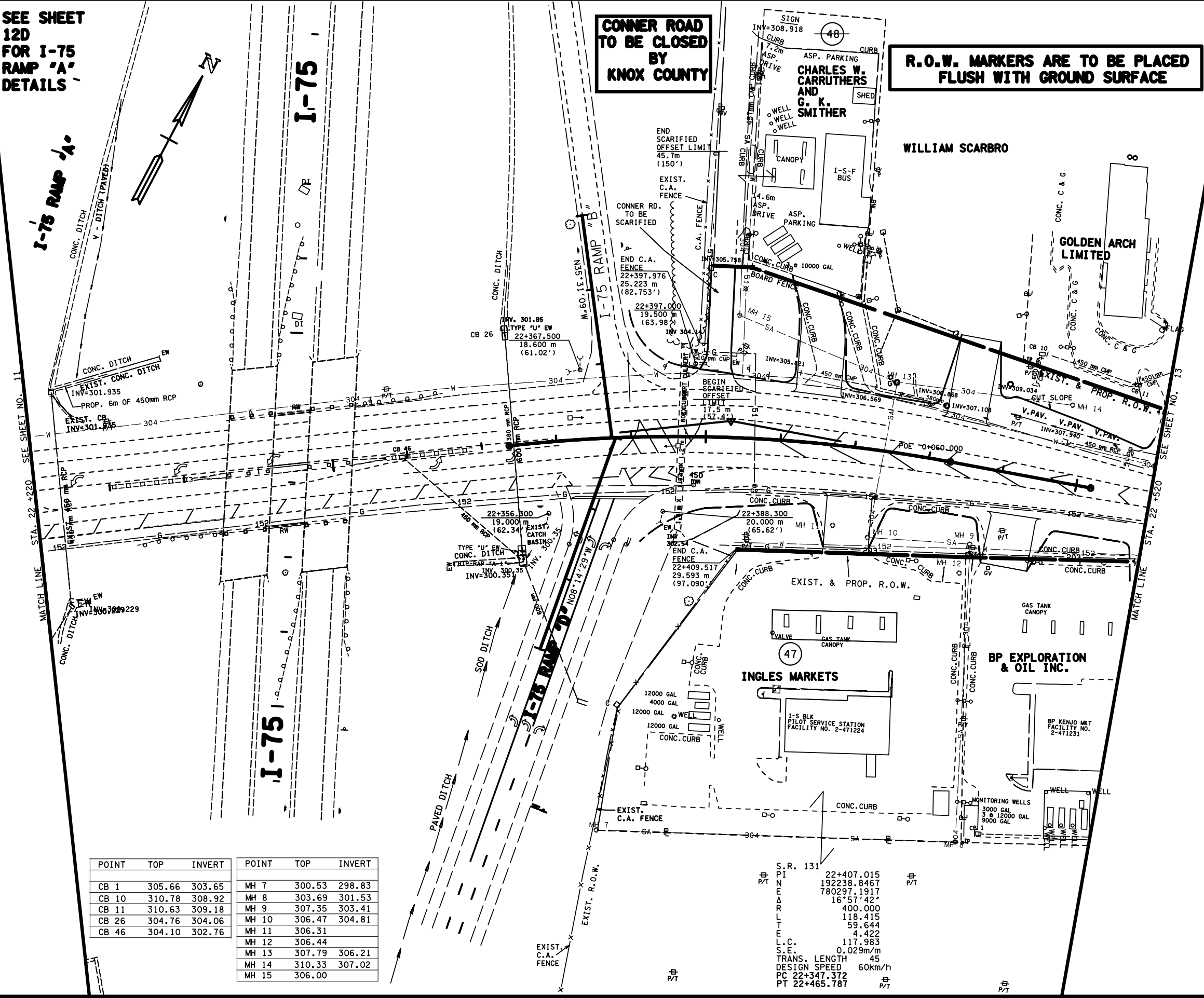
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

SEE SHEET 12D FOR I-75 RAMP 'A' DETAILS

I-75 RAMP 'A'

CONNER ROAD TO BE CLOSED BY KNOX COUNTY

R.O.W. MARKERS ARE TO BE PLACED FLUSH WITH GROUND SURFACE



POINT	TOP	INVERT	POINT	TOP	INVERT
CB 1	305.66	303.65	MH 7	300.53	298.83
CB 10	310.78	308.92	MH 8	303.69	301.53
CB 11	310.63	309.18	MH 9	307.35	303.41
CB 26	304.76	304.06	MH 10	306.47	304.81
CB 46	304.10	302.76	MH 11	306.31	
			MH 12	306.44	
			MH 13	307.79	306.21
			MH 14	310.33	307.02
			MH 15	306.00	

S.R. 131
PT 22+407.015
N 192238.8467
E 780297.1917
L 16°57'42"
T 400.000
L.C. 118.415
S.E. 59.644
TRANS. LENGTH 4.422
DESIGN SPEED 60km/h
PC 22+347.372
PT 22+465.787

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	12
CONST.	2001	HPP/STP-131(12)	12

REV. 6/30/99: CHANGED PROPERTY OWNER FROM ROBERT CORUM TO CHARLES W. CARRUTHERS & G.K. SMITHER ALSO REVISED BUS. ENT. TRACT BOUNDARY & EFFECTED R.O.W. LINES

REV. 7/23/99: ADDED EXIST SIGNALS & POLES AT NB OFF-RAMP.

REV. 7/24/00: ADDED BUSINESS & ASSOCIATED UTILITIES TO WILLIAM SCARBO TRACT, ADDED EXIST R.O.W. MARKER LT. OF C.L. @ STA. 22+409 & RT. OF C.L. @ STA. 22+475.

REV. 5/21/01: ADDED BUS. ENT. LEFT OF STA. 22+468.

REV. 6/25/01: MOVED RAMP "A" TO 12D. ALSO REVISED 100 YR. FLOOD BOUNDARY.

REV. 8/16/01: ADDED SCARIFICATION LIMITS FOR CONNER RD.

REV. 9/17/01: CHANGED TURN ARROWS FROM PROP. TO EXIST. ON RAMP "D".

REV. 11/05/01: ADDED BEARING FOR RAMP "A", "B", "D" & MAINLINE; ADDED LABELS FOR RAMP "B" & "D".

REV. 5/10/02: CORRECTED I-75 C.L.



COORDINATE VALUES ARE NAD/83(1990) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TGRN.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PRESENT LAYOUT

STA. 22+220 TO STA. 22+520

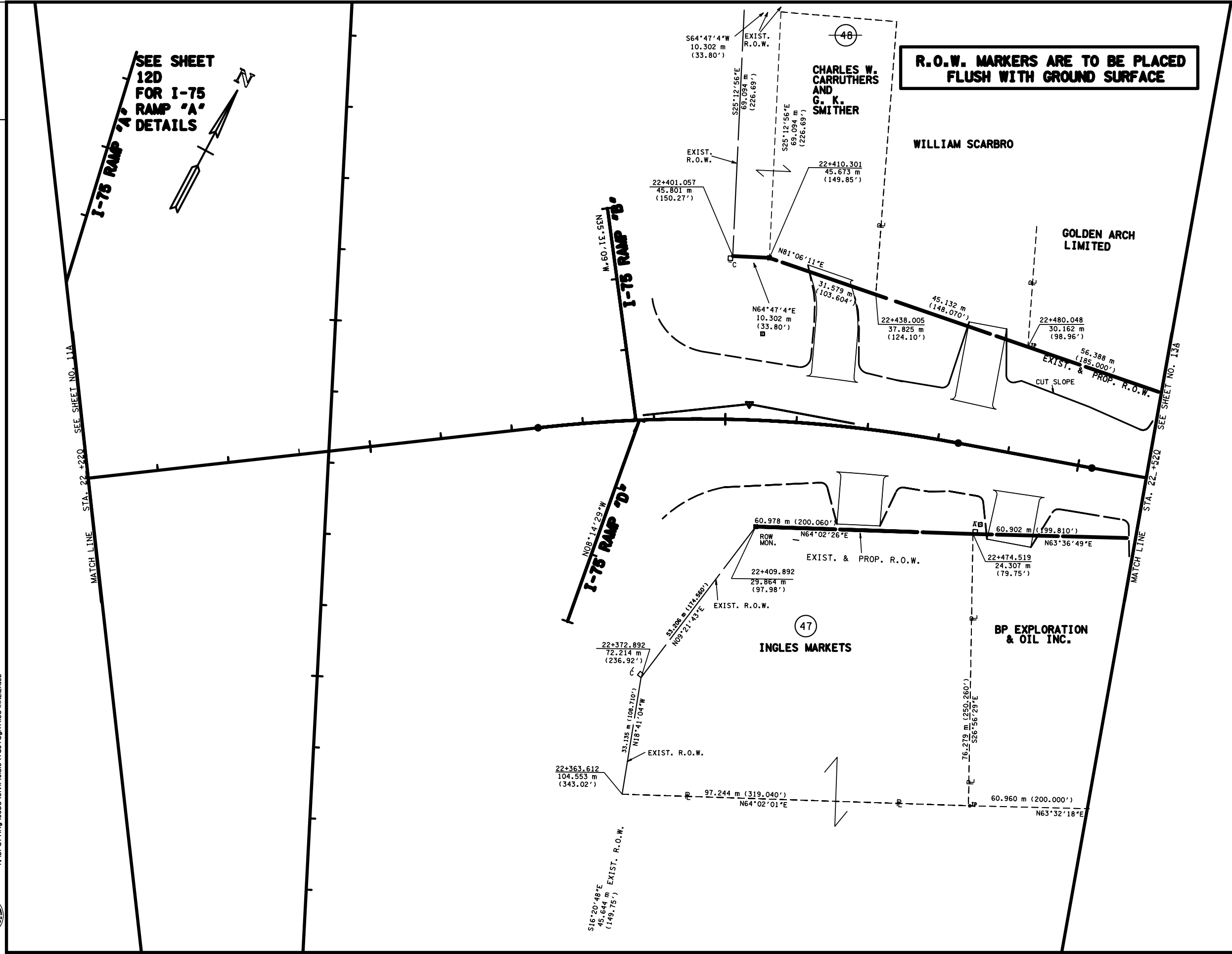
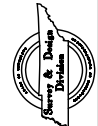
SCALE: 1:500

12/11/02
f:\Dr\atfing\Jobs\Civil\01510\1\dot\dmrfiles\VKL12.D



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

12/11/02
f:\Dr\atfing\Jobs\CIVIL\01510\1dot\dmfiles\KML12A.3D



TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	12A
CONST.	2001	HPP/SIP-131(12)	12A

REV. 6/30/99: CHANGED PROPERTY OWNER FROM ROBERT CORUM TO CHARLES W. CARRUTHERS & G.K. SMITHER ALSO REVISED BUS. ENT, TRACT BOUNDARY & EFFECTED R.O.W. LINES

REV. 4/20/01: REVISED EXIST. R.O.W. SYMBOLOGY ALONG I-75.

REV. 5/21/01: ADDED BUS. ENT. LEFT OF STA. 22+468.

REV. 6/25/01: MOVED RAMP "A" TO 12D.

REV. 8/16/01: MODIFIED RAMP "A" DETAIL NOTE.

REV. 11/05/01: ADDED BEARING FOR RAMP "A", "B", "D" & MAINLINE; ADDED LABELS FOR RAMP "B" & "D".

REV. 5/10/02: CORRECTED I-75 C.L.



COORDINATE VALUES ARE NAD/83(1995) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TORN.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**RIGHT-OF-WAY
---DETAILS---**

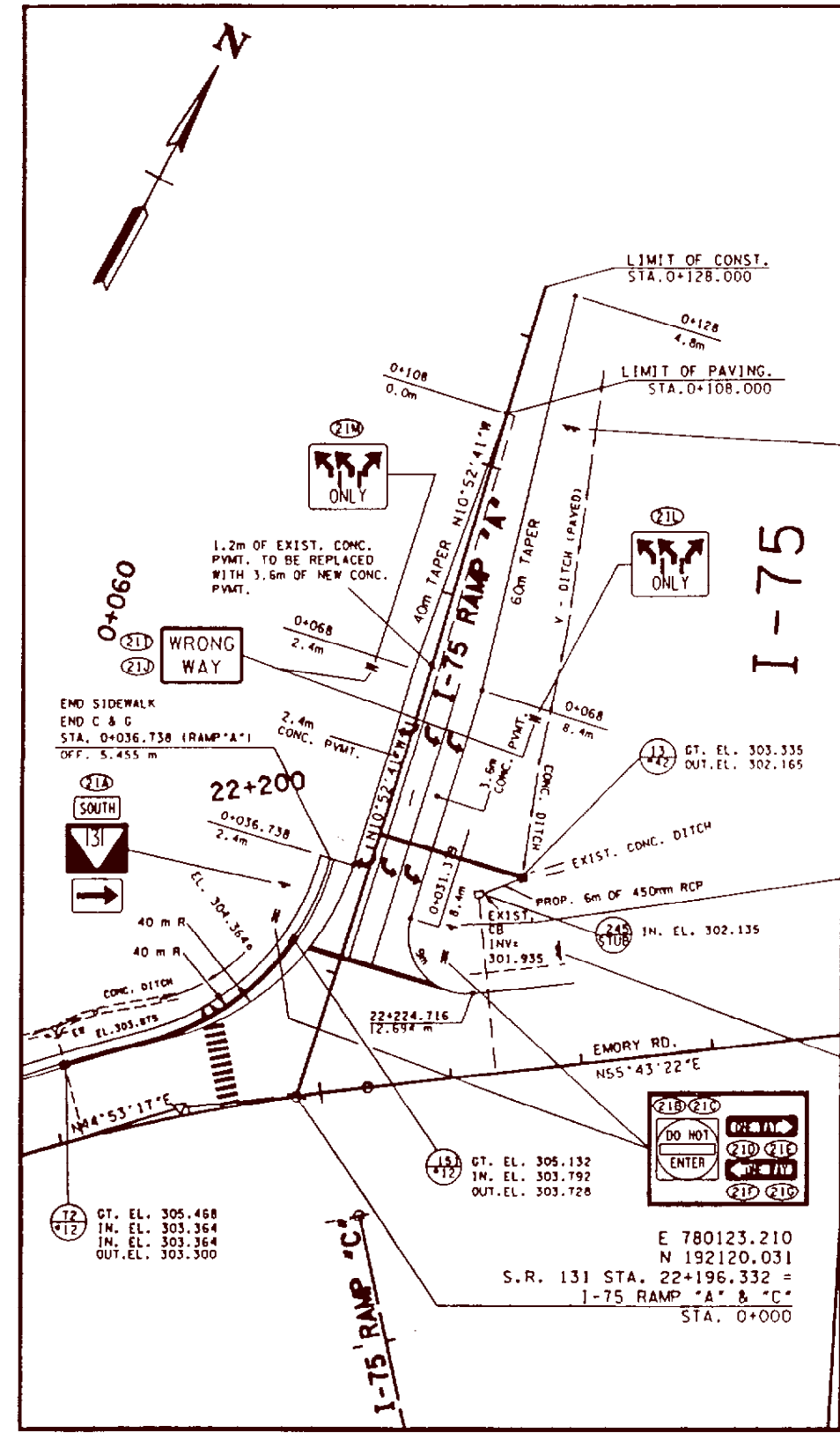
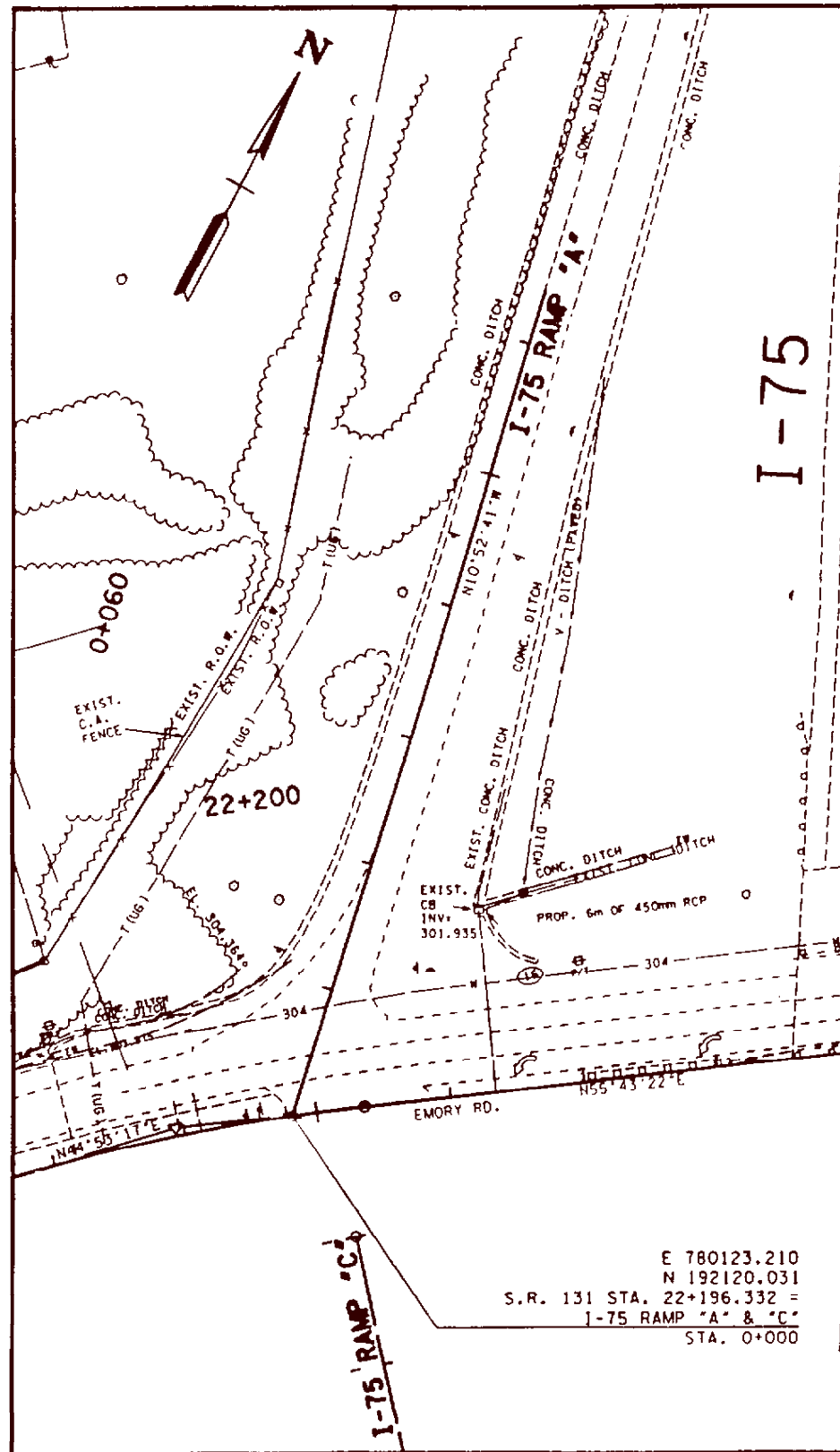
STA. 22+220 TO STA. 22+520
SCALE: 1:500

DES: JVISI

FILE NO.

PRESENT

PROPOSED



TYPE	YEAR	PROJECT NO.
R.O.W.	1998	47039-2224-04
CONST.	2001	HPP/STP-131(12)

REV. 6/25/01: ADDED SHEET 12D
 REV. 11/05/01: ADDED C.B. NOS. & 15L AND BEARING FOR RAMP 'A' MAINLINE, REVISED CURB RADIUS & ADDED PAVT. RADIUS.
 REV. 11/15/01: ADDED STATION AND OFFSET FOR FND SIDEWALK LEADER.

22-FEB-2002 15:00
 OR V.P.O.S. FOR K. N.M., LTD. 30



COORDINATE VALUES ARE NAD/83(19) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TCR

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PRESENT AND PROPOSED LAYOUT
 RAMP 'A'
 SCALE: 1:500

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	1
CONST.	2001	HPP/STP-1311(12)	1

REV. 5/28/99: REVISED BUS ENT AT STA 22+526.000 RT; ADDED SLOPE ESMT SHADING TO TRACTS 47, 51 & 52; ADDED PDE PATTERN ON TRACT 51 REVISED PROP & EXIST R.O.W. LINE & ADDED R.O.W. MARKERS AT TRACT 8 AND ADDED PROPERTY LINE LABELS TO ALL TRACTS

REV. 6/30/99: CORRECTED EXIST. & PROP R.O.W. LINE ALONG TRACT 83

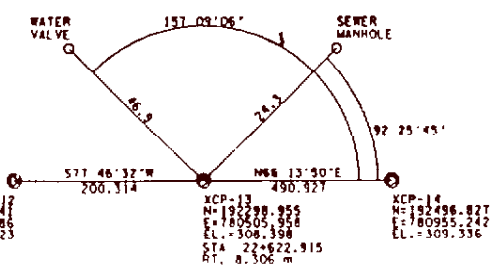
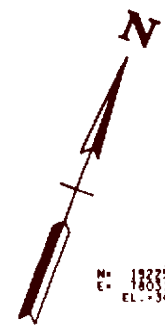
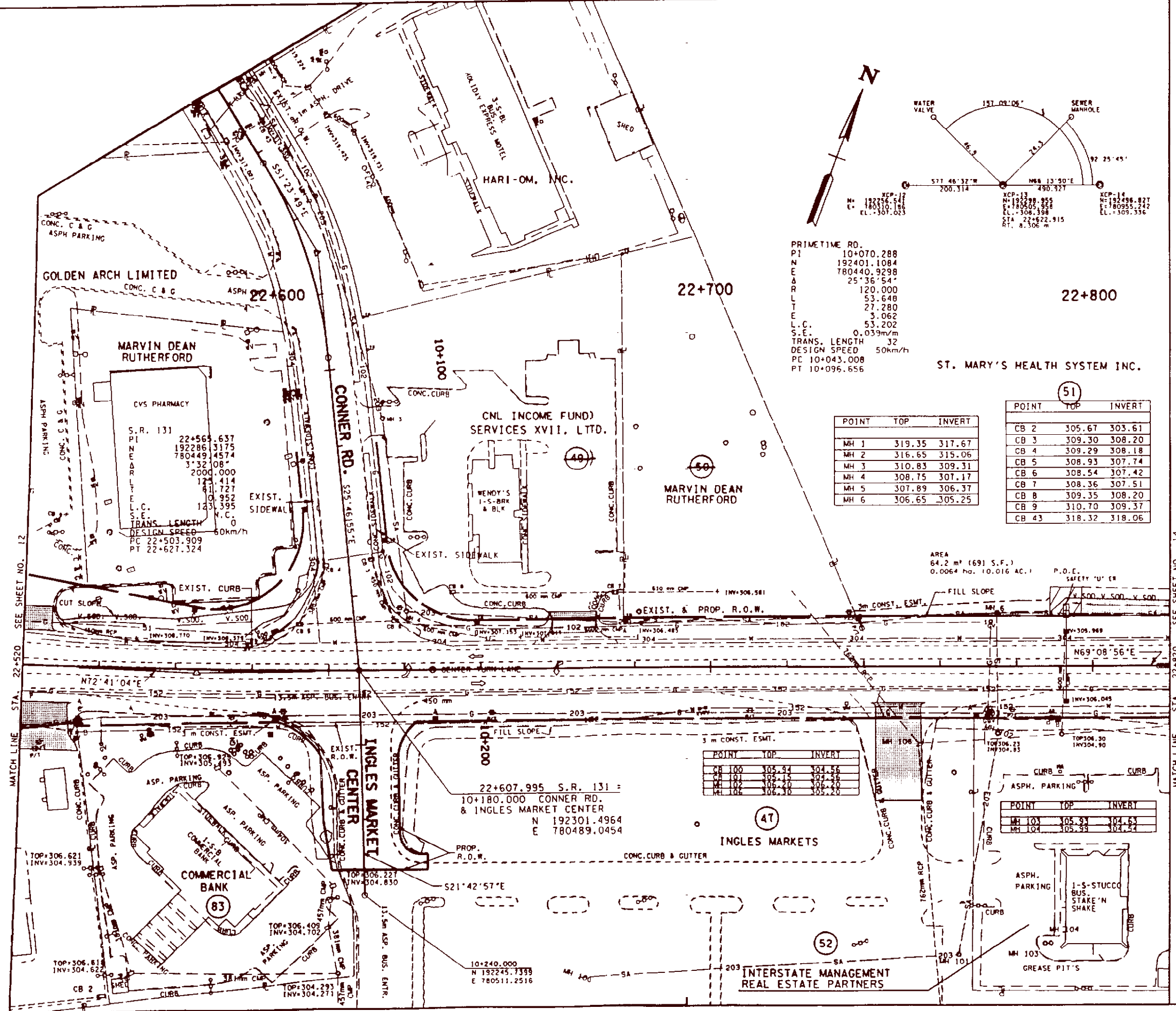
REV. 12/8/99: LINED THROUGH TRACT NO. 49.

REV. 2/29/00: REMOVED CONST. ESMT FROM TRACT 49; ADDED PROP. R.O.W. SLOPE & CONST. ESMT. AT INCL'S MKT. ENT. NEAR TRACT 83.

REV. 7/24/00: ADDED BUS. & ASSOCIATED TOPO TO MARVIN DEAN RUTHERFORD TRACT ON PRIME TIME RD.

REV. 6/6/01: DELETED CONST. ESMT. AND LINED THROUGH TRACT NO. FOR TRACT 50.

REV. 11/15/01: ADDED BEARINGS FOR CONNER RD. AND INGLES MARKET CENTER.



PRIME TIME RD.
 P1 10+070.288
 N 192401.1084
 E 780440.9298
 Δ 25°36'54"
 R 120.000
 L 53.648
 T 27.280
 E 3.062
 L.C. 53.202
 S.E. 0.039m/m
 TRANS. LENGTH 32
 DESIGN SPEED 50km/h
 PC 10+043.008
 PT 10+096.656

ST. MARY'S HEALTH SYSTEM INC.

POINT	TOP	INVERT
MH 1	319.35	317.67
MH 2	316.65	315.06
MH 3	310.83	309.31
MH 4	308.75	307.17
MH 5	307.89	306.37
MH 6	306.65	305.25

POINT	TOP	INVERT
CB 2	305.67	303.61
CB 3	309.30	308.20
CB 4	309.29	308.18
CB 5	308.93	307.74
CB 6	308.54	307.42
CB 7	308.36	307.51
CB 8	309.35	308.20
CB 9	310.70	309.37
CB 43	318.32	318.06

POINT	TOP	INVERT
CB 100	305.94	304.56
CB 101	305.15	304.58
MH 102	306.20	304.40
MH 106	306.30	305.20

POINT	TOP	INVERT
MH 103	305.93	304.63
MH 104	305.99	304.54

AREA 64.2 m² (691 S.F.)
 0.0064 ha. (0.016 AC.)



COORDINATE VALUES ARE NAD/83/98 AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TC

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PRESENT LAYOUT

STA. 22+520 TO STA. 22+820

SCALE: 1:500

01/19/04 RFP # 14013.30

DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	13A
CONST.	2001	HPP/STP-131(12)	13A

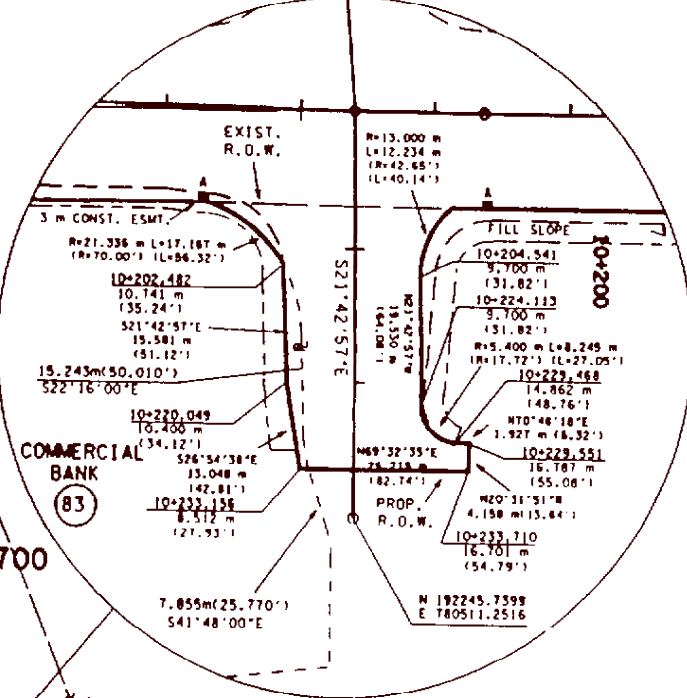
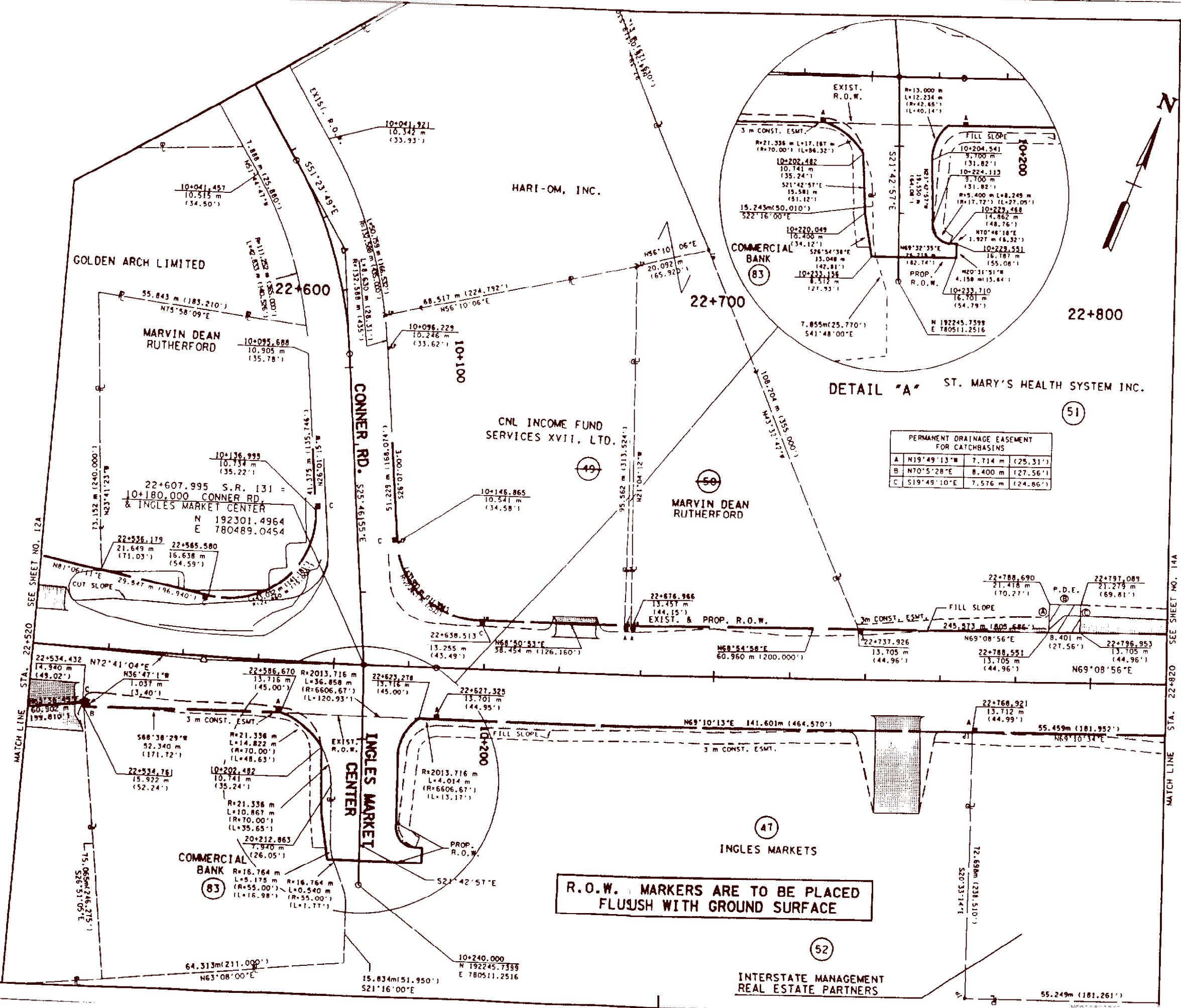
REV. 5/28/99: REVISED BUS ENT AT STA 22+526.000 RI; REVISED EXIST & PROP R.O.W. LINE & ADDED R.O.W. MARKERS AT TRACT 83.

REV. 12/8/99: LINED THROUGH TRACT NO. 49.

REV. 2/29/00: REMOVED CONST. ESMT FROM TRACT 49; ADDED PROP. R.O.W. SLOPE & CONST. EXIST. NEAR TRACT 83 & ADJUSTED EXIST. R.O.W.

REV. 6/6/01: DELETED CONST. ESMT. AND LINED THROUGH TRACT NO. FOR TRACT 50.

REV. 11/15/01: ADDED BEARINGS FOR CONNER RD. AND INGLES MARKET CENTER.



PERMANENT DRAINAGE EASEMENT FOR CATCHBASINS

Point	Bearing	Distance	Feet
A	N19°49'13"E	7.714 m	(25.31')
B	N70°5'28"E	8.400 m	(27.56')
C	S19°49'10"E	7.576 m	(24.86')

R.O.W. MARKERS ARE TO BE PLACED FLUSH WITH GROUND SURFACE



COORDINATE VALUES ARE NAD/83(1990) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TGM.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

RIGHT-OF-WAY
DETAILS

STA. 22+520 TO STA. 22+820

22-FEB-2002 15:02
ON: P:\PROJECTS\VENU\DA.D

TYPE	YEAR	PROJECT NO.	SHEET NO.
R.O.W.	1999	47039-2224-04	138
CONST.	2001	HPP/STP-131(12)	139

REV. 5/28/99: REVISED BUS ENT AT STA 22+526.000 RT.

REV. 7/23/99: CORRECTED GT. EL. OF CATCH BASIN NO. 303. ADDED PIPE IN. EL. TO CATCH BASIN NOS. 79 & 116. CHANGED CODE NO. 179 TO NO. 189. CHANGED PIPE SIZES AT CATCH BASIN NO. 116.

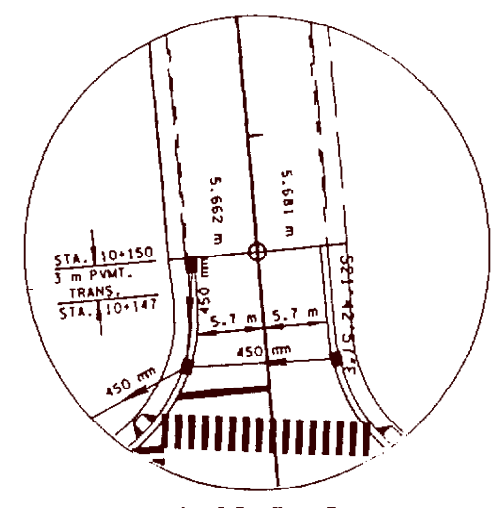
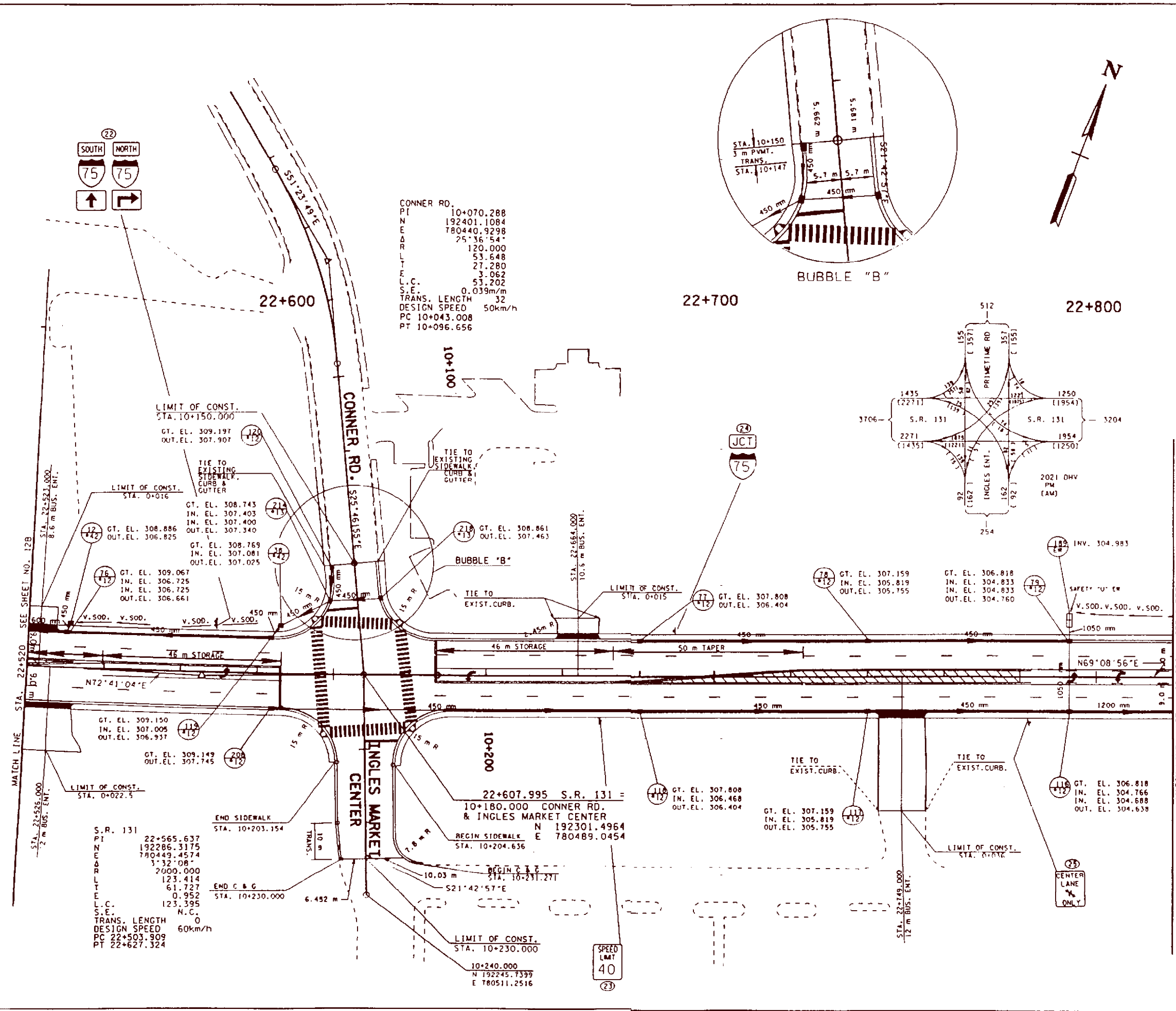
REV. 9/17/01: REVISED ELEVATION ON CATCH BASIN NOS. 38, 79, 116 & 119.

REV. 11/05/01: ADDED STORAGE LN. LT. OF INTERSECTION. CHANGED PRIMETIME RD. TO CONNER RD. ON CURVE DATA. ADDED BUBBLE "B" TO SHOW CONNER RD. TRANSITION. ADDED RADIUS FOR INGLES MARKET CENTER. LABELED CONNER RD. AND INGLES MARKET CENTER.

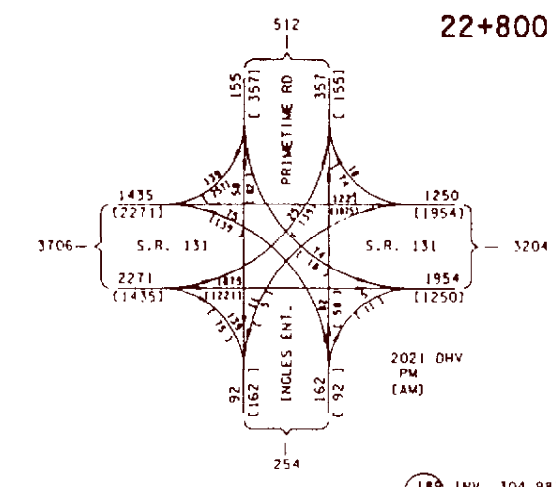
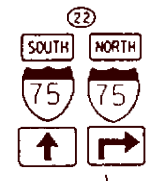
REV. 11/15/01: REVISED PIPE LABEL BETWEEN CODE NOS. 189 TO 79. ADDED ENDWALL DESCRIPTION TO CODE NO. 189. ADDED BEARINGS FOR CONNER RD. AND INGLES MARKET CENTER.

REV. 3/15/02: REVISED INLET & OUTLET EL. FOR CODE 116.

REV. 5/10/02: REMOVED INLET EL. FROM CODE NO. 208.



CONNER RD.
 P.I. 10+070.288
 N 192401.1084
 E 780440.9298
 Δ 25°36'54"
 R 120.000
 L 53.648
 T 27.280
 E 3.062
 L.C. 53.202
 S.E. 0.039m/m
 TRANS. LENGTH 32
 DESIGN SPEED 50km/h
 PC 10+043.008
 PT 10+096.656



S.R. 131
 P.I. 22+565.637
 N 192286.3175
 E 780449.4574
 Δ 3°32'08"
 R 2000.000
 L 123.414
 T 61.727
 E 0.952
 L.C. 123.395
 S.E. N.C.
 TRANS. LENGTH 0
 DESIGN SPEED 60km/h
 PC 22+503.909
 PT 22+627.324

LIMIT OF CONST.
 STA. 10+230.000
 10+240.000
 N 192245.7399
 E 780511.2516

SPEED
 LIMIT
 40



COORDINATE VALUES ARE NAD/83(1983) AND ARE DATUM ADJUSTED BY THE FACTOR 1.0001 & TIED TO THE TORN.

STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED
 LAYOUT

STA. 22+520 TO STA. 22+820
 SCALE: 1:500

Index of Sheets

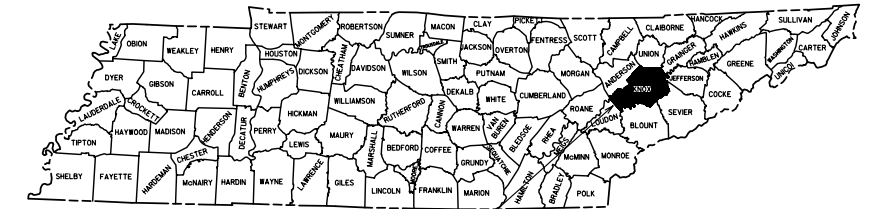
SHEET NO.	DESCRIPTION
1 TITLE SHEET
2 TYPICAL SECTION SHEET
3 through 7 FUNCTIONAL LAYOUTS

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION BUREAU OF PLANNING AND DEVELOPMENT

TENN.	YEAR	SHEET NO.
	2001	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

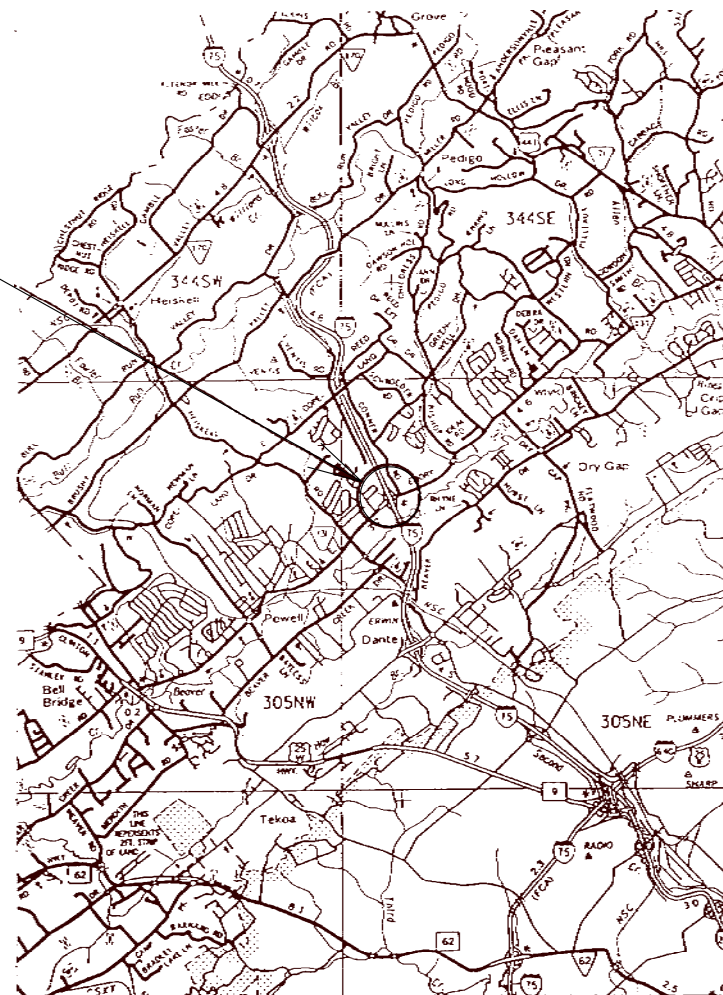
Knox County

INTERCHANGE MODIFICATION
S.R. 131 (EMORY ROAD) AT I-75



PROJECT LOCATION

PROJECT LOCATION



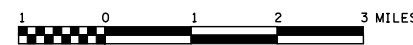
SPECIAL NOTES

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

DESIGNED BY TRC INTERNATIONAL, LTD. CHECKED BY _____

P.E. NO. _____



TRAFFIC DATA	
ADT (2006)	46,050
ADT (2026)	59,860
DHV (2026)	5,986
D	60-40
T (ADT)	23%
T (DHV)	15%
V	45 MPH

APPROVED: _____
DESIGN DIVISION

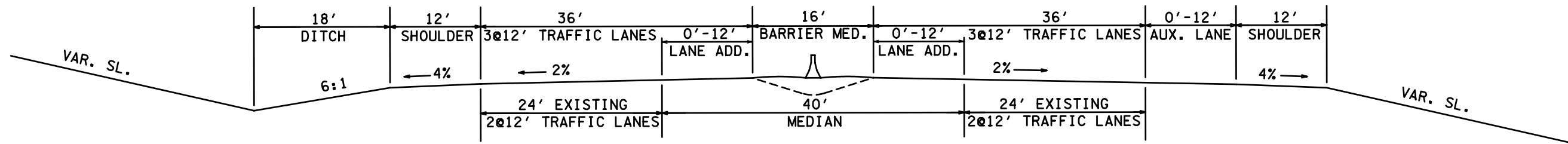
DATE: _____

APPROVED: _____
COMMISSIONER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

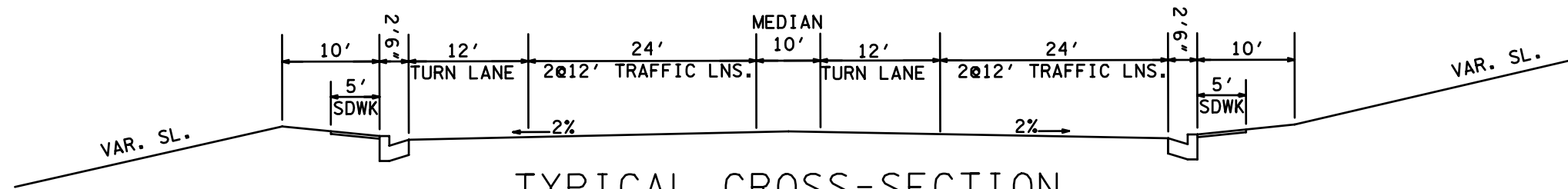
APPROVED: _____
DIVISION ADMINISTRATOR DATE

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2002		2



TYPICAL CROSS-SECTION
INTERSTATE ROUTE 75

NOTE: FOR LOCATION OF LANE ADDITIONS,
AUXILIARY LANES, AND OTHER DETAILS
NOT SHOWN, SEE FUNCTIONAL PLANS



TYPICAL CROSS-SECTION
STATE ROUTE 131 (EMORY ROAD)
(THROUGH INTERCHANGE)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

TYPICAL
SECTIONS

NOT TO SCALE

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		3

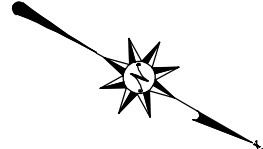


MATCH TO

SHEET 4

1500' AUXILIARY LANE
+ 300' TAPER

BEAVER CREEK



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATIVE 1
KNOXVILLE, TN

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		4

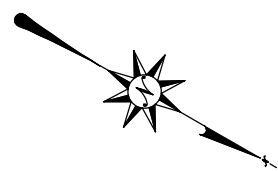


SHEET 3

MATCH TO

MATCH TO

SHEET 5



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATIVE 1
KNOXVILLE, TN

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		5

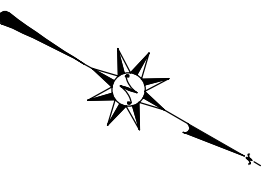


CONTINUE ADDITIONAL
S.B. LANE IN MEDIAN
FOR 1500' + 300' TAPER

CONTINUE ADDITIONAL
N.B. LANE IN MEDIAN
FOR 1200' + 600' TAPER

SHEET 5

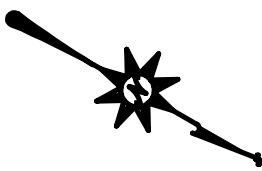
MATCH TO



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATIVE 1
KNOXVILLE, TN

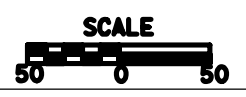
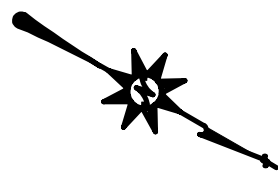
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		6



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATIVE 2
KNOXVILLE, TN**

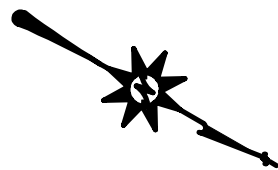
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		7



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**INTERCHANGE
MODIFICATION**
I-75@S.R. 131
ALTERNATIVE 2
KNOXVILLE, TN

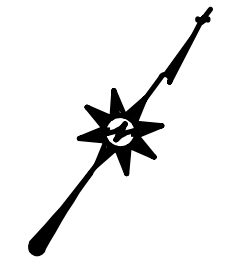
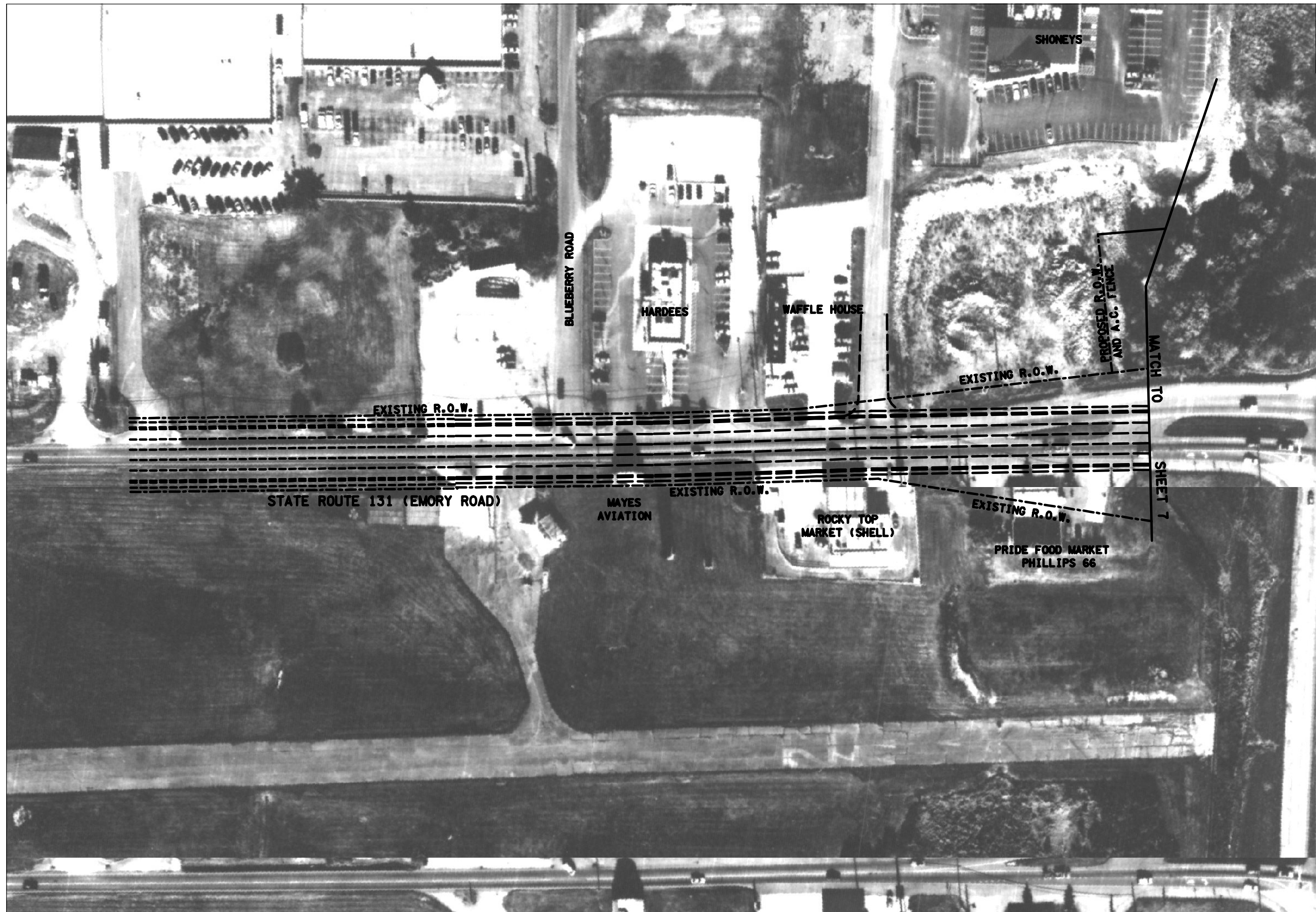
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		8



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATE 2
KNOXVILLE, TN**

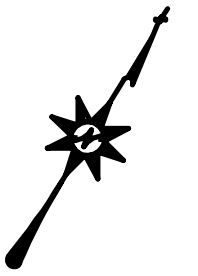
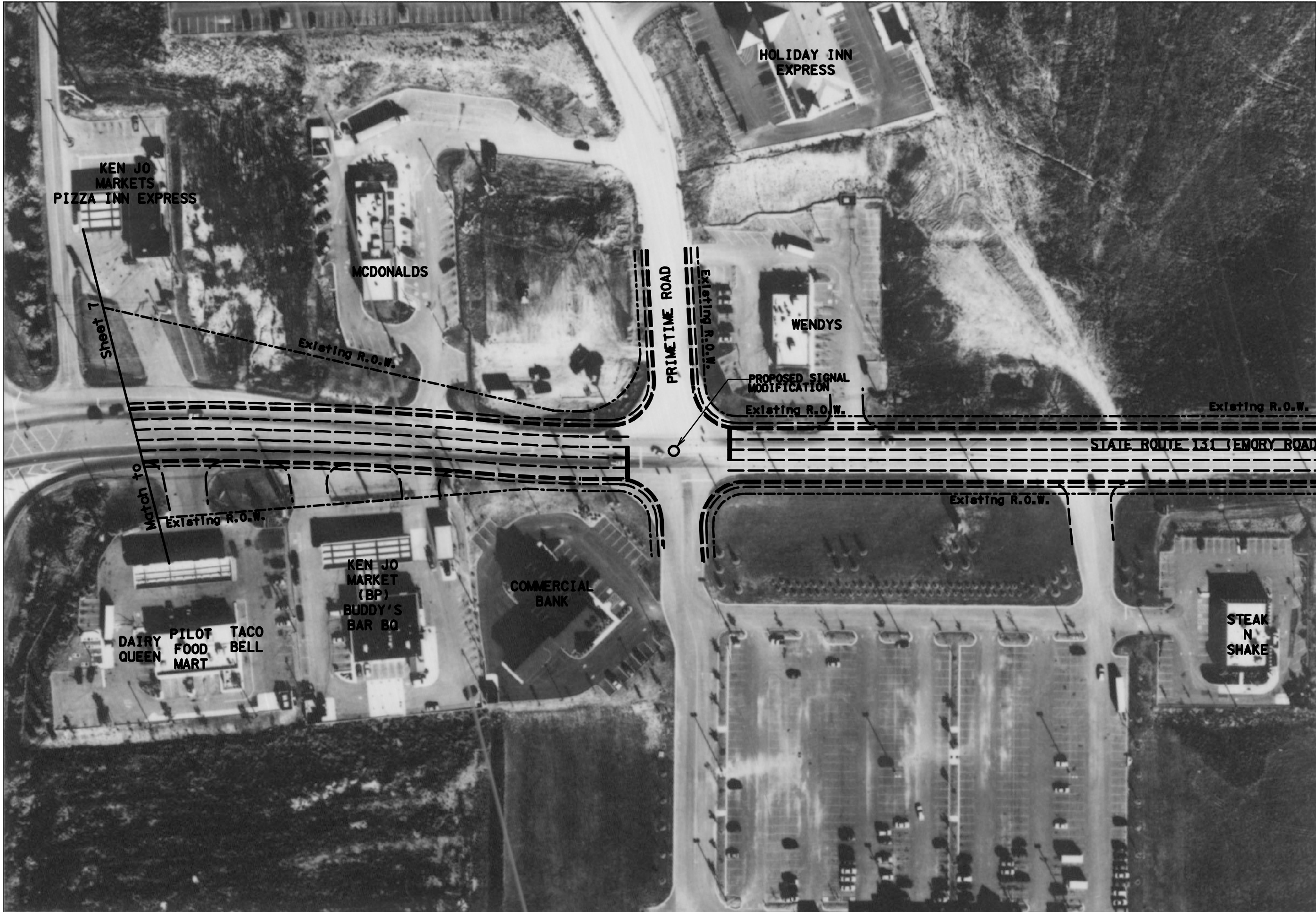
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		9



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATE 2
KNOXVILLE, TN**

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	02		10



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**INTERCHANGE
MODIFICATION
I-75@S.R. 131
ALTERNATE 2
KNOXVILLE, TN**