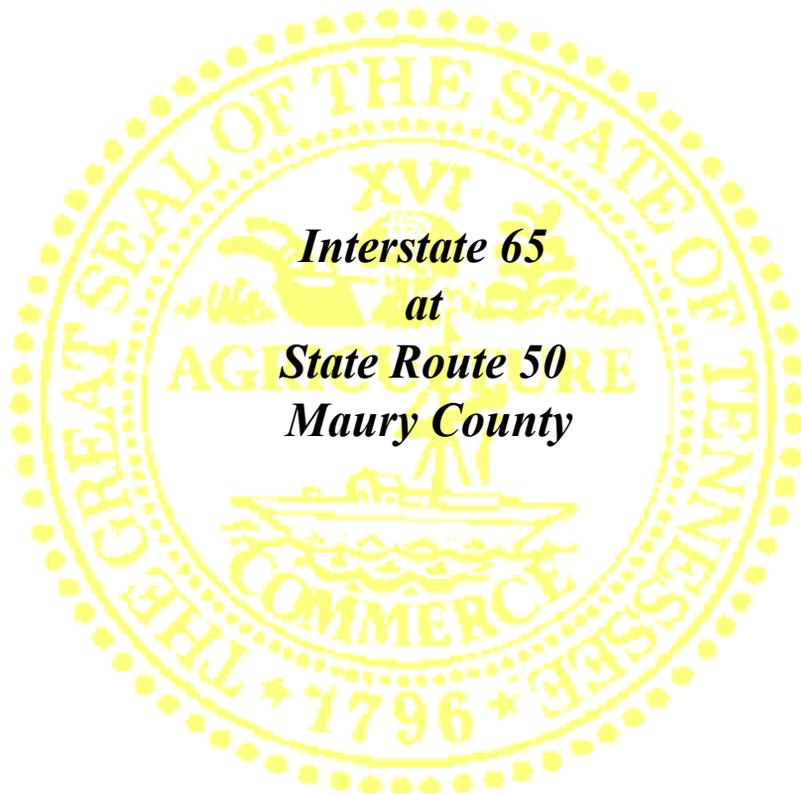


INTERCHANGE MODIFICATION STUDY



***Interstate 65
at
State Route 50
Maury County***

***PREPARED BY
SAIN ASSOCIATES, INC.***

***FOR
THE TENNESSEE DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION***

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Chapter 1

INTRODUCTION

Chapter 1. INTRODUCTION

A. Study Purpose and Scope

The purpose of this study is to provide a detailed evaluation to support a request for modifications to the existing interchange at Interstate 65 and State Route 50 in Maury County. The subject interchange is a modified diamond with loop ramps in the southeast and northwest quadrants. State Route 50 is a two-lane rural minor arterial that provides access to the southern portion of the City of Columbia and the City of Lewisburg.

The proposed modifications include an interim (short-term) improvement and an ultimate improvement. The proposed interim improvement includes the following items:

- addition of a left-turn lane on eastbound State Route 50,
- a traffic signal at the intersection of State Route 50 and the southbound ramps,
- widening of the southbound exit ramp from I-65 to provide separate left- and right-turn lanes, and
- lengthening of the northbound and southbound acceleration lanes on I-65 at each entrance ramp.

The ultimate improvement plan proposes to re-configure the interchange into a standard diamond with no loop ramps. It also includes widening of State Route 50 to a five-lane cross section through the interchange area and a new bridge across I-65.

The factors considered in the modification study for this interchange are traffic operations, right-of-way requirements, construction cost, land use impacts and possible environmental concerns.

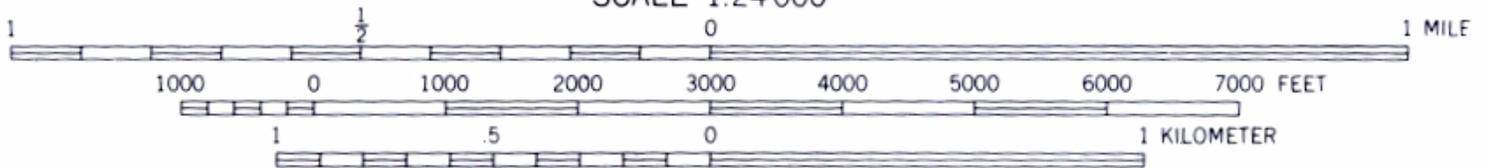
This study was initiated at the request of Representative Bobby Sands based upon operational and safety concerns. A field review of the interchange revealed: sight distance constraints at each of the ramp terminal intersections caused by the bridge structure, inadequate shoulders on the bridge cross section, poor geometry on the loop ramps, and insufficient acceleration lanes for the entrance ramps to I-65. A review of the accident history at this interchange revealed higher than average accident rates at both ramp terminal intersections and on mainline I-65. The table below summarizes the calculated rates for the three year period from 1998 through 2000. An explanation of the different rate calculations follows the summary table.

**Traffic Accident Rates
1998-2000**

Location	Statewide Average	Accident Rates			
		Actual Rate	Critical Rate	Actual/Critical Rate	Severity Index
SR 50 @ southbound I-65 ramps	0.17	1.02	0.52	1.96	0.7
SR 50 between ramp intersections	0.53	0.58	1.17	0.5	0.2
SR 50 @ northbound I-65 ramps	0.17	0.96	0.52	1.85	0.4
I-65 @ SR 50 Interchange	0.45	1.15	0.93	1.24	0.4



SCALE 1:24 000



North

PROJECT LOCATION MAP

I-65 at State Route 50
Maury County

Glendale, Tennessee (35086-E8-TF-024)

The actual traffic accident rate is determined by dividing the number of accidents that occur at a given location in a specified time period by the amount of vehicular exposure at that location. Exposure is measured in number of vehicle-miles of travel or in number of entering vehicles. Statewide averages for accident rates on comparable roadway segments are provided in the table for comparison. The critical accident rate reflects a statistical control that provides a means of evaluating actual accident rates. If an actual accident rate is higher than the critical accident rate, one can conclude that the accident pattern is most likely not due to chance but to some unfavorable characteristic of the local conditions. The severity index is an expression of the ratio of fatal and injury accidents to the total number of accidents at a given location. The higher the severity index, the more hazardous the location.

B. Description of the Area

The I-65 and State Route 50 interchange is located on the eastern edge of Maury County, approximately 2 miles from the Marshall County line. The populations for Maury and Marshall Counties, as well as for the Cities of Columbia and Lewisburg are shown in the table below. Both Maury and Marshall Counties experienced population growth in excess of 24% in the last decade.

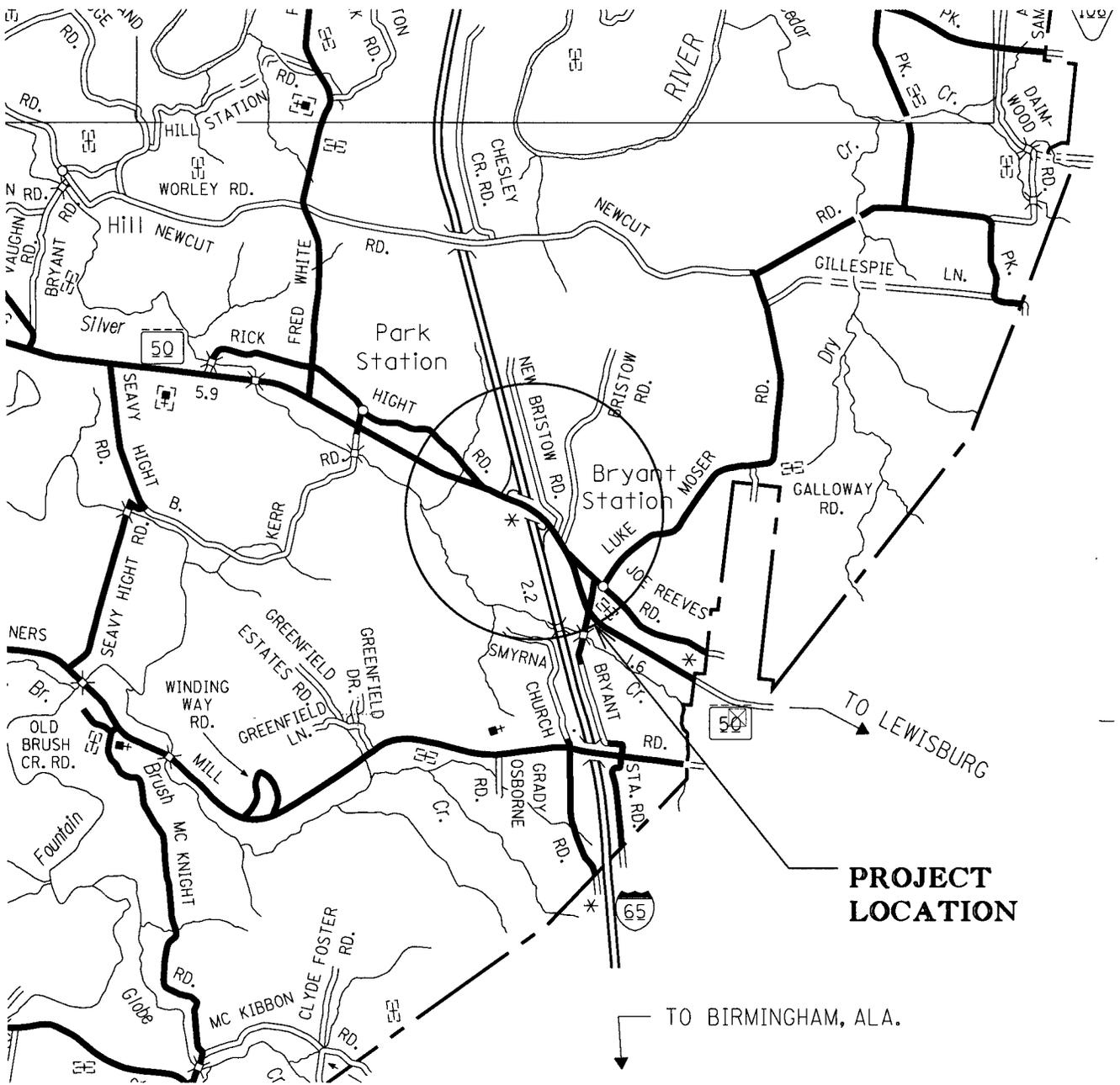
Geographic Area	Population		% Change
	Year 2000	Year 1990	
Maury County	69,498	54,812	26.8
City of Columbia	33,055	28,583	15.6
Marshall County	26,767	21,539	24.3
City of Lewisburg	10,413	9,879	5.4

Although the State Route 50 and I-65 interchange is rural in character, traffic volumes at the interchange are beginning to exceed the capacity of its present design. The heaviest traffic flows at the interchange are from traffic traveling between the east (City of Lewisburg) and the north.

Land uses immediately adjacent to the I-65 and State Route 50 interchange include a gas station, a truck service business, some residential property, and a cellular phone tower. The closest interchanges to the north and south on I-65 are located at U.S. 412 (State Route 99) which is 8.7 miles to the north, and at State Route 373 which is 4.8 miles to the south.

C. Relationship to Other Highway Improvement Plans and Programs

There are no highway improvements currently planned for I-65 or State Route 50 in the vicinity of this interchange.



Scale: 1" = 1 Mile



NORTH

PROJECT AREA MAP

**I-65 at State Route 50
Maury County**

Chapter 2

PRELIMINARY PLANNING DATA

Chapter 2. PRELIMINARY PLANNING DATA

A. Land Use

The existing land use in the study area is primarily agricultural, commercial, and residential. There is a gas station in the northwest quadrant of the intersection and a truck service business in the northeast quadrant.

B. Traffic Served

Interstate 65 is presently (2003) a four-lane freeway with an anticipated year 2008 average daily traffic volume of 28,550 vehicles north of State Route 50 with 37% trucks and 25,530 vehicles south of State Route 50 with 37% trucks. By the design year 2028 these volumes are expected to increase to approximately 45,680 north of State Route 50 and 40,850 south of State Route 50. Design hour (2028) traffic on I-65 is expected to reach approximately 4,664 vehicles north of State Route 50 and 4,085 vehicles south of State Route 50.

State Route 50 is a two-lane rural minor arterial roadway with an anticipated year 2008 average daily traffic volume of approximately 10,010 vehicles with 6% being trucks. The average daily traffic volume on State Route 50 is expected to increase to approximately 16,030 by the design year 2028. Design hour traffic is estimated to be almost 1,924 vehicles by 2028 with 4% trucks.

Present and projected average daily traffic volumes and design hour volumes (DHV) are shown in the Appendix.

Peak direction levels of service on I-65, north of State Route 50 are "C" / "C" (northbound a.m. / southbound p.m.) for year 2008 design hour volumes and "D" / "E" (northbound a.m. / southbound p.m.) for year 2028 volumes. On I-65 south of State Route 50, the levels of service for peak direction design hour volumes are "B" / "C" (northbound a.m. / southbound p.m.) for the year 2008 and "C" / "D" (northbound a.m. / southbound p.m.) for 2028.

Levels of service for side-street movements at the ramp terminal intersections with State Route 50 are poor with present-day geometry and year 2008 traffic volumes. Specifically, the northbound exit ramp operates at level of service "F" / "F" (a.m./p.m.) while the southbound exit ramp intersection operates at a level of service "E" / "F" (a.m./p.m.). Analysis of the ramp terminal intersections with an interim improvement that includes a turn lane on State Route 50 and signalization at the southbound ramp improves the level of service at the southbound ramp to "C" for 2008 design hour volumes. There is no change in level of service at the northbound ramp intersection with interim improvements; a left-turn lane is already in place on State Route 50 at the northbound ramp intersection.

There are deficiencies on the entrance ramps at this interchange due to inadequate acceleration lengths. By improving these acceleration lanes with an interim improvement, the 2008 levels of service improve slightly and safety on I-65 at the merge points will be improved.

The ultimate proposed modification to the interchange would eliminate the existing loop ramps by converting to a standard diamond configuration with traffic signals at each ramp terminal. Modification of the interchange configuration improves sight distance, access control, and geometry. The ultimate improvement would also add capacity to State Route 50 through provision of two additional through lanes. With the proposed ultimate interchange modification, levels of service at the ramp terminal intersections on State Route 50 improve to “C” or better for all time frames with design year 2028 traffic volumes. Levels of service on the entrance and exit ramps remain at level of service “D” or better.

Printouts of all capacity analyses and levels of service are included in the Appendix. Summary tables are shown on the following pages.

Capacity Analysis Results with Existing Geometry
Interchange Modification Study
I-65 @ State Route 50

Freeway Segment	2008		2028	
	AM DHV	PM DHV	AM DHV	PM DHV
I-65 Northbound – south of SR 50	B	B	C	B
I-65 Northbound – north of SR 50	C	B	D	C
I-65 Southbound – north of SR 50	B	C	C	E ¹
I-65 Southbound – south of SR 50	B	C	C	D

¹Max volume for LOS “D” is reached by year 2027.

Ramp Diverge	2008		2028	
	AM DHV	PM DHV	AM DHV	PM DHV
I-65 @ Northbound Exit Ramp	B	A	C	B
I-65 @ Southbound Exit Ramp	B	B	C	D
Ramp Merge				
I-65 @ Northbound Entrance Ramp	B	B	D	C
I-65 @ Southbound Entrance Ramp	B	B	B	D

Ramp Intersection (stop sign control)	Approach & Movement	2008		2028	
		AM DHV	PM DHV	AM DHV	PM DHV
SR 50 @ I-65 NB Ramps	Westbound left	B	B	C	D
	Northbound left/right	F	F	F	F
SR 50 @ I-65 SB Ramps	Eastbound left	A	B	B	B
	Southbound left/right	E	F	F	F

Capacity Analysis Results with Interim Geometry
 Interchange Modification Study
 I-65 @ State Route 50

Ramp Diverge	2008		2028	
	AM DHV	PM DHV	AM DHV	PM DHV
I-65 @ Northbound Exit Ramp	No changes proposed.			
I-65 @ Southbound Exit Ramp	No changes proposed.			
Ramp Merge				
I-65 @ Northbound Entrance Ramp	B	A	C	B
I-65 @ Southbound Entrance Ramp	A	B	B	C

Ramp Intersection (stop sign control)	Approach & Movement	2008		2028	
		AM DHV	PM DHV	AM DHV	PM DHV
SR 50 @ I-65 NB Ramps	Westbound left	B	B	C	D
	Northbound left/right	F	F	F	F

Ramp Intersection (signal control)	Approach & Movement	2008		2028	
		AM DHV	PM DHV	AM DHV	PM DHV
SR 50 @ I-65 SB Ramps	Eastbound	A	B	A	E
	Westbound	C	C	E	F
	Southbound	C	C	E	E
	Intersection Average	C	C	D	F

Capacity Analysis Results with Ultimate Geometry
 Interchange Modification Study
 I-65 @ State Route 50

Ramp Diverge	2028	
	AM DHV	PM DHV
I-65 @ Northbound Exit Ramp	C	B
I-65 @ Southbound Exit Ramp	C	D
Ramp Merge		
I-65 @ Northbound Entrance Ramp	C	B
I-65 @ Southbound Entrance Ramp	B	C

Ramp Intersection (signal control)	Approach & Movement	2028	
		AM DHV	PM DHV
SR 50 @ I-65 NB Ramps	Eastbound	B	B
	Westbound	B	B
	Northbound	C	C
	Intersection Average	B	B
SR 50 @ I-65 SB Ramps	Eastbound	C	C
	Westbound	B	B
	Southbound	C	C
	Intersection Average	B	C

C. Proposed Improvements

The scope of work for the proposed modification consists of the following:

Interim Improvement

- Item 1: Lengthen the existing left-turn lane on westbound State Route 50 at its intersection with the northbound ramps.
- Item 2: Construct a new left-turn lane on eastbound State Route 50 at its intersection with the southbound ramps.
- Item 3: Install a traffic signal at the intersection of State Route 50 and the southbound ramps. It should be noted that since TDOT does not maintain any traffic signals, it is assumed that the City of Columbia or Maury County would be responsible for maintaining the traffic signal equipment. This interchange is not presently within the City limits of Columbia.
- Item 4: Widen the southbound exit ramp from I-65 to provide separate left- and right-turn lanes. This lane improvement is needed to provide additional capacity for the heavy left turn volume.
- Item 5: Lengthen the northbound and southbound acceleration lanes on I-65 at each entrance ramp to comply with current American Association of State Highway and Transportation Officials (AASHTO) standards. Acceleration distances were calculated to account for existing grades on I-65.

Ultimate Improvement

- Item 1: Remove the existing loop ramps in the southeast and northwest quadrants and convert the interchange to a standard diamond-type configuration.
- Item 2: Widen State Route 50 to a five-lane cross section through the interchange area. The two additional travel lanes will address capacity needs of State Route 50 through the design year (2028) and beyond.
- Item 3: Construct a new interstate bridge over I-65 to accommodate the wider cross section of State Route 50. Stage construction is proposed for the bridge.
- Item 4: Install traffic signals at both ramp terminal intersections on State Route 50. As noted in the Interim Improvements list, maintenance of the signal equipment is an issue that must be resolved with local officials.
- Item 5: Re-align New Bristow Road to connect it with Bristow Road.

D. Discussion of Alternatives

The first alternative considered in the evaluation of this interchange is to make no changes to existing conditions. The existing interchange geometry is deficient in terms of intersection sight distance, acceleration lanes, and loop ramp geometry. With no improvements, the ramp terminal intersections will exceed capacity by the year 2008 and the higher than average accident rates will continue. Increasing delays at this interchange will result in increased vehicle emissions, on-going safety concerns, and costs from lost productivity.

The second alternative considered was to construct only the interim improvement plan. As shown in the capacity analysis, the interim plan will address most of the short term capacity needs through the year 2008 as well as the safety concerns caused by inadequate acceleration lanes on I-65. The interim plan does not, however, address sight distance from the northbound ramp intersection, the poor geometry of the loop ramps, or long-term capacity demands at the ramp terminal intersections.

Additional consideration was given to maintaining State Route 50 as a two-lane facility with only turn lane improvements at the ramp terminals. It was decided, however that the design year traffic volumes justify widening of the route and since the bridge over I-65 would need to be replaced in any case to meet sight distance and cross section standards, the cost of widening to five lanes was justified by the potential benefit. Furthermore, it is likely that State Route 50 will be studied for possible widening into the City of Lewisburg in the near future, and widening through the interchange would be consistent with such a plan.

E. Environmental Concerns

The recommended interchange modification has been routed to minimize impacts to environmentally sensitive areas associated with the gas station located in the northwest quadrant. Environmental technical studies will be completed at a later date.

CHAPTER 3

ENGINEERING INVESTIGATION

Chapter 3. ENGINEERING INVESTIGATIONS

A. Traffic Operations

Analyses were made to determine what impacts the proposed modifications to the existing interchange would have on the interstate system. The traffic operation analyses contained in the appendices include basic freeway segments, ramp analyses, and intersection analyses.

According to the analyses, there are deficiencies on the State Route 50 entrance ramps due to inadequate acceleration and deceleration lengths. Levels of service at the ramp terminal intersections with State Route 50 are poor with present-day geometry and year 2008 traffic volumes. Traffic accident rates were calculated for the ramp intersections and merge / diverge points using accident records from 1998 through 2000. In the case of each ramp intersection and along mainline I-65, the accident rates at this interchange are higher than statewide averages.

The proposed modifications to the interchange will improve overall operations and will provide acceptable levels of service during the peak hours through the year 2028. Levels of service at the ramp terminal intersections will be improved to "C" or better for both a.m. and p.m. design hour (2028) volumes. All ramps are expected to operate at acceptable ("D" or better) levels of service through the design year.

The proposed interim and ultimate improvement recommendations are expected to improve the safety of the I-65 and State Route 50 interchange, thereby reducing traffic accident rates.

B. Access Analysis

This study was undertaken in accordance with the Federal Highway Administration's (FHWA) policy regarding requests for additional or revised access points to the Interstate System. The FHWA policy is described in the Federal Register Notice, Volume 63, No. 28, dated February 11, 1998. This analysis was conducted to demonstrate the impacts of revisions to the studied interchange. The FHWA requirements are provided in bold type with the response to those requirements immediately following.

The FHWA policy statement reads: "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. It is demonstrated that 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 50 is a rural minor arterial that provides access to the Cities of Columbia and Lewisburg from I-65. Adjacent interchanges are approximately 9 and 5 miles away in the north and south directions, respectively. Increases in population in Maury County and Marshall County have resulted in higher traffic volumes routed through the State Route 50 interchange. The capacity deficiencies projected for the interchange cannot be accommodated by local roads or other interchanges nor will they be accommodated by the current configuration.

- 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.**

The proposed interchange modification is necessary to improve access to the area, provide congestion relief to the surface system it serves, and improve safety through geometric improvements. Safety problems related to the existing interchange cannot be addressed through transportation demand management (TDM) strategies. There is no mass transit service in the area of the interchange and there are no current plans to extend HOV facilities into Maury County.

- 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 urbanized areas include an analysis of sections of interstate to and including at least the first adjacent existing 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 new or revised access points.**

An operational analysis of current and future traffic was made for sections of the interstate and all ramps and ramp termini within the limits of the interchange area. The existing adjacent interchanges in relation to the location of the subject interchange are outside the influence of weaving. The subject interchange at State Route 50 is approximately 9 miles south of the US 412 (SR 99) interchange and approximately 5 miles north of the State Route 373 interchange. Considering these observations and the results of the capacity analysis, no adverse impacts are expected from the proposed modification.

- 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.

This proposal is a modification to the existing interchange at I-65 and State Route 50. A diamond-type design will provide for all traffic movements. The proposed interchange design will meet all American Association of State Highway and Transportation Officials (AASHTO) criteria.

- 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 95.**

The study was coordinated with the appropriate state and local officials and is consistent with the land use and transportation plans for Maury County.

- 6. In areas where the potential exists for future multiple interchange additions, all requests for 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.**

Multiple interchange additions are not foreseen for the project study area.

- 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 modifications to the I-65 and State Route 50 interchange are to improve access to the corridor, reduce congestion, and improve safety at the interchange. The improvement request was not generated by new or expanded development, rather by concerns over traffic safety and efficiency.

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

This report documents the expected benefits from modifying the existing State Route 50 and I-65 interchange. With the proposed modification, traffic operations at the interchange can be adequately accommodated through the year 2028. The recommended improvement has been designed to minimize impacts to environmentally sensitive areas. Detailed environmental technical studies will be conducted at a later date.

CHAPTER 4

SUMMARY AND CONCLUSIONS

Chapter 4. SUMMARY AND CONCLUSIONS

The preceding study was conducted to evaluate the current operation of the existing Interstate 65 and State Route 50 interchange and the effects of the proposed modification. The analyses revealed that the existing interchange with base condition (2008) traffic is operating with poor levels of service (“E” and “F”) at the ramp terminal intersections during peak hours. There are deficiencies on the entrance ramps due to inadequate acceleration lanes and sight distance restrictions at the ramp terminal intersections. The geometry of the loop ramps is also deficient. Traffic accident rates at each ramp intersection and along mainline I-65 are higher than statewide averages.

With the proposed modifications to the interchange we can substantially improve levels of service to “D” or better through the year 2028. The recommended improvements will reduce congestion on State Route 50, lower travel time and emissions, and improve safety for motorists. With the proposed modification, the service life of the interchange can be extended beyond the year 2028 and safety can be improved for the traveling public.

Interchange Modification Study for I-65 @ State Route 50

APPENDIX

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

(REV. 2/7/02)

PROJECT NO.: _____ ROUTE: I-65 @ S.R. 99 & S.R. 50
 COUNTY: MAURY CITY: COLUMBIA
 PROJECT DESCRIPTION: INTERCHANGE MODIFICATION @ [1] I-65 & S.R. 99 AND [2] I-65 & S.R. 50.

DIVISION REQUESTING:

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

TRAFFIC ASSIGNMENT:

	BASE YEAR		DESIGN YEAR					DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
	ADT	YEAR	ADT	DHV	%	YEAR	DIR.DIST.	DHV	ADT	FLEX	RIGID
[1]	10,570	2008	19,020	1,902	10	2028	55-45	3	5		
[2]	10,010	2008	16,030	1,924	12	2028	60-40	4	6		

REQUESTED BY: NAME MATT ASHBY DATE 12/9/02
 DIVISION PLANNING
 ADDRESS 900 J. K. POLK BUILDING
NASHVILLE TN. 37243

REVIEWED BY: TONY ARMSTRONG *Tony Armstrong* DATE 12-17-02
 TRANSPORTATION MANAGER 1
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: STEVE ALLEN *Steve Allen* DATE 12-17-02
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

FIND ENCLOSED 4-8 HOUR [NOV. 2002] TURNING MOVEMENT COUNTS DONE BY SAIN ASSOCIATES FOR YOUR USE IN DEVELOPING TRAFFIC DATA.

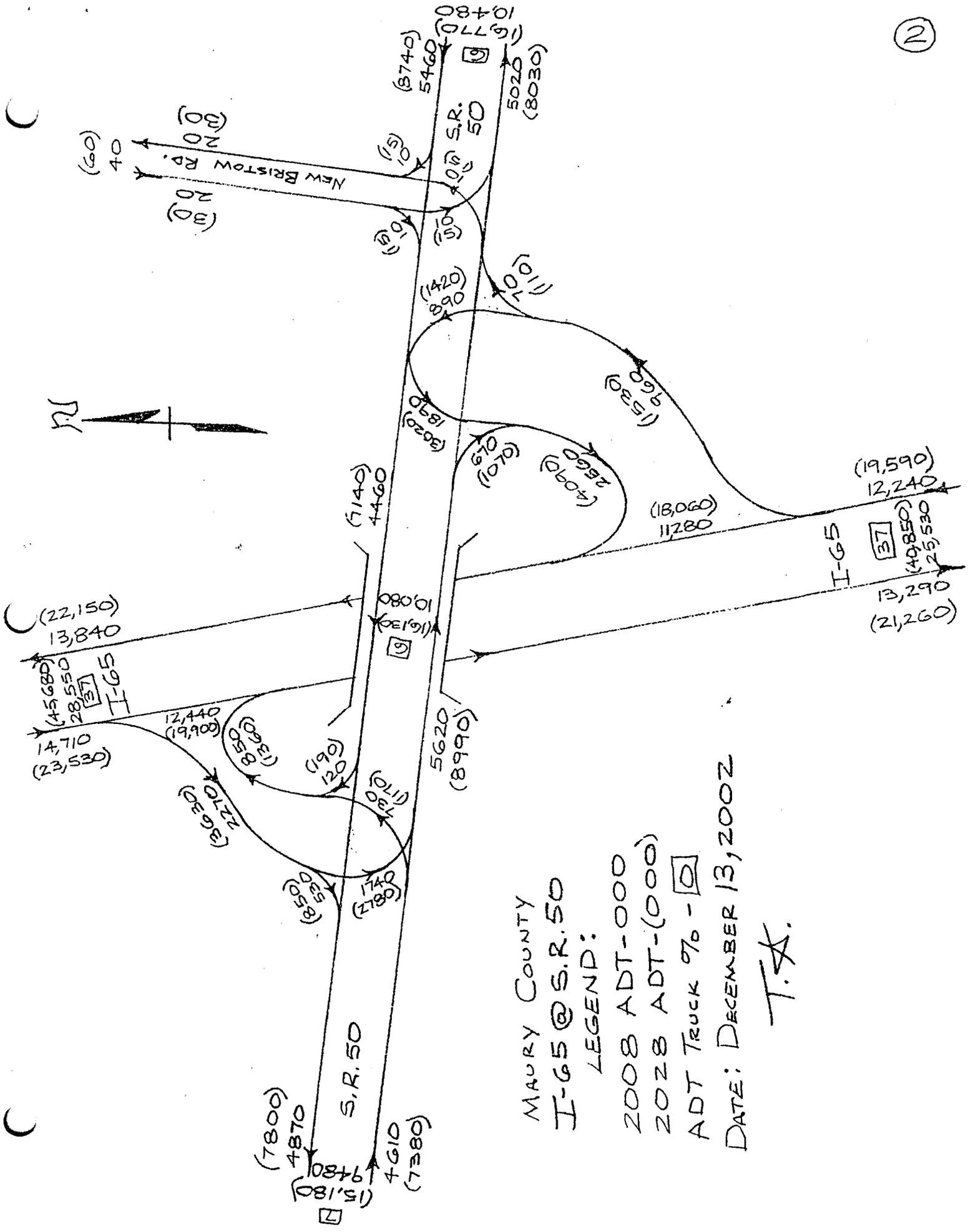
[1] S.R. 99 TRAFFIC DATA.

[2] S.R. 50 TRAFFIC DATA.

THIS TRAFFIC BASED ON 2002 CYCLE COUNTS AND THE TURNING MOVEMENTS FURNISHED WITH THIS REQUEST. THE FUTURE TRAFFIC IS BASED ON GROWTH TRENDS FROM THE ADAM COMPUTER PROGRAM.

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

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



MAURY COUNTY
 I-65 @ S.R. 50

LEGEND:

- 2008 ADT-000
- 2028 ADT-(000)
- ADT Truck 9% - [0]

DATE: DECEMBER 13, 2002

T.S.A.

COST ESTIMATE WORKSHEETS

COST ESTIMATE

PROJECT NUMBER	SECTION #	ALT. NAME	SECTION LENGTH (FT)
01-184-7	Interim		5900

CLEARING & GRUBBING

COST (\$)

TOTAL (\$)	=	5000	
ROUNDED TOTAL (\$)	=		\$5,000

EARTHWORK

TOTAL (\$)	=	30000	
ROUNDED TOTAL (\$)	=		\$30,000

PAVEMENT REMOVAL

<i>Length (ft) - Mainline</i>	=	2600	
<i># of lanes</i>	=	2	
<i>Cost / l.f.</i>	=	5.00	
TOTAL (\$)	=	26000	
ROUNDED TOTAL (\$)	=		\$30,000

DRAINAGE

Shoulder & ditch	<i>length (ft)</i>	<i>cost / l.f. (\$)</i>	<i>total (\$)</i>	
Paved ditches	2065	15	30975	
TOTAL (\$)	=		30975	
ROUNDED TOTAL (\$)	=			\$35,000

STRUCTURES

Description:	<i>length (ft)</i>	<i>width (ft)</i>	<i>cost / s.f. (\$)</i>	<i>total (\$)</i>	
8'x6' RCBC Extension	25	8	65.00	13000	
TOTAL (\$)	=			13000	
ROUNDED TOTAL (\$)	=				\$15,000

PAVING

DESCRIPTION:	<i>Length (ft)</i>	<i>Cost / l.f. (\$)</i>	<i>Total (\$)</i>	
3 lane w/ shoulder	2600	115	299000	
1 lane ramp interstate	2500	79	197500	
2 lane ramp interstate	800	105	84000	
TOTAL (\$)	=		580500	
ROUNDED TOTAL (\$)	=			\$585,000

RETAINING WALLS (N/A)

<i>Length (ft)</i>	=	0	
<i>Height (ft)</i>	=	0	
<i>Cost / s.f. (\$)</i>	=	35.00	
TOTAL (\$)	=	0	
ROUNDED TOTAL (\$)	=		\$0

MAINT. OF TRAFFIC

<i>Length (ft)</i>	=	5900	
<i>Cost / mile (\$)</i>	=	50000	
TOTAL (\$)	=	55871	
ROUNDED TOTAL (\$)	=		\$60,000

TOPSOIL

Length (ft.) = 9300
Width (ft.) = 20
Depth (ft.) = 0.5
Volume (cu. yd.) = 3444
Cost / cu. yd = 3.00
TOTAL (\$) = 10333
ROUNDED TOTAL (\$) = \$15,000

SEEDING

1/2 TOPSOIL 5167
ROUNDED TOTAL (\$) = \$10,000

SODDING (N/A)

Length (ft.) = 0
Width (ft.) = 0 0
Area (sq. yd.) = 0
Cost / sq. yd = 3.00
TOTAL (\$) = 0
ROUNDED TOTAL (\$) = \$0

SIGNING

Length (ft) = 5900
Cost / mile (\$) = 2000
TOTAL (\$) = 2235
ROUNDED TOTAL (\$) = \$5,000

SIGNALIZATION

DESCRIPTION:	<u>number</u>	<u>Cost / ea. (\$)</u>	<u>Total (\$)</u>
T-Intersection	1	50000	<u>50000</u>
TOTAL (\$)			50000

ROUNDED TOTAL (\$) = \$50,000

C.A. FENCE (N/A)

Length (ft) = 0
Cost / ft. (\$) = 4.00
TOTAL (\$) = 0
ROUNDED TOTAL (\$) = \$0

GUARDRAIL

Length (ft) = 750
Cost / l.f. (\$) = 12.00
Subtotal = 9000

End Treatments (#) = 8
Cost (each) (\$) = 2000
Subtotal = 16000
TOTAL (\$) = 25000
ROUNDED TOTAL (\$) = \$25,000

RIP-RAP

No. of Bridges = 2
Cost / bridge (\$) = 20000
TOTAL (\$) = 40000
ROUNDED TOTAL (\$) = \$40,000

SUBTOTAL	=		\$905,000
OTHER CONST. ITEMS (8.5%)	=	\$81,175	\$85,000
MOBILIZATION (5.0% of total contract amount)	=	\$45,250	\$50,000
EROSION CONTROL (3.5% of Construction Cost Excluding Structures)	=	\$35,875	\$40,000
SUBTOTAL CONST. COST	=		\$1,080,000
10% ENG. & CONT.	=	108000	\$110,000
<hr/>			
TOTAL CONST. COST	=		\$1,190,000
PRELIMINARY ENG. (10%)	=		\$110,000
<i>R.O.W. ACQUISITION COST</i>	=		\$0
<i>REIMBURSABLE UTILITY COST</i>	=		\$0
<i>NON-REIMBURSABLE UTILITY COST</i>	=		\$10,000
TOTAL SECTION COST	=		\$1,310,000

STATE OF TENNESSEE - DEPARTMENT OF TRANSPORTATION

UTILITY REPORT FOR LOCATION STUDY

ROUTE NO. SR-50 @ I-65 ALTERNATE INTERIM IMPROVEMENT

PROJECT NO. _____ COUNTY MAURY

FROM _____

TO _____

<u>UTILITY</u>	<u>TOTAL COST OF ADJUSTMENTS</u>	<u>REIMBURSABLE BY STATE</u>
<u>ELECTRIC</u>	<u>\$1,610</u>	<u>\$0</u>
<u>TELEPHONE</u>	<u>\$690</u>	<u>\$0</u>
<u>WATER</u>	<u>\$6,045</u>	<u>\$0</u>
<u>NATURAL GAS</u>	<u>\$0</u>	<u>\$0</u>
<u>SANITARY SEWER</u>	<u>\$0</u>	<u>\$0</u>
<u>TOTAL</u>	<u>\$8,345</u>	<u>\$0</u>
<u>ROUNDED TOTAL FOR ESTIMATE</u>	<u>\$10,000</u>	<u>\$0</u>
_____	_____	_____
_____	_____	_____

REMARKS: _____

RAILROAD YES [] NO [X] _____

PREPARED BY: SAIN ASSOCIATES, INC.

DATE: 3/21/2003

SA# 01-184-7

INTERIM

NON-REIMBURSABLE UTILITY RELOCATION COST

ELECTRIC

<u>DESCRIPTION</u>	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
TWO-PHASE LINE	1	1610.00	1610

SUBTOTAL 1610

TELEPHONE

<u>DESCRIPTION</u>	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
JOINT USE POLE	1	690.00	690

SUBTOTAL 690

WATER

<u>DESCRIPTION</u>	<u>LENGTH (FT.)</u>	<u>COST/L.F.</u>	<u>COST</u>
8" DUCTILE IRON	200	17.00	3400

	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
8" VALVE & BOX	2	805.00	1610

	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
FIRE HYDRANT	1	1035.00	1035

SUBTOTAL 6045

TOTAL

ROUNDED TOTAL 8345 \$10,000

COST ESTIMATE

PROJECT NUMBER	SECTION #	ALT. NAME	SECTION LENGTH (FT)
01-184-7	Ultimate		

CLEARING & GRUBBING

COST (\$)

TOTAL (\$) =	15000	
ROUNDED TOTAL (\$) =		\$15,000

EARTHWORK

TOTAL (\$) =	400000	
ROUNDED TOTAL (\$) =		\$400,000

PAVEMENT REMOVAL

Length (ft) - S.R. 50 =	3600	
# of lanes =	2	
Length (ft) - Old Ramps =	5000	
# of lanes =	1	
Cost / l.f. =	5.00	
TOTAL (\$) =	61000	
ROUNDED TOTAL (\$) =		\$65,000

DRAINAGE

Closed System

Storm Sewer Pipe	<u>pipe size</u>	<u>length (ft)</u>	<u>cost / l.f. (\$)</u>	<u>total (\$)</u>
	18	1350	30	40500
	24	675	35	23625
	30	675	40	27000

Inlets	<u>number</u>	<u>cost / ea. (\$)</u>	<u>total (\$)</u>
	20	2000	40000

Subtotal 131125

Other Drainage 13113

TOTAL (Closed System) 144238

Open System

Paved ditches	<u>length (ft)</u>	<u>cost / l.f. (\$)</u>	<u>total (\$)</u>
	3430	15	51450

Cross Drains	<u>pipe size</u>	<u>length (ft)</u>	<u>cost / l.f. (\$)</u>	<u>total (\$)</u>
	18	100	30	3000

Sidedrains (price includes 24" pipe and headwalls)	<u>number</u>	<u>cost / ea. (\$)</u>	<u>total (\$)</u>
Driveways	0	2000	0
Side roads	8	2500	<u>20000</u>
			20000

TOTAL (Closed System) 74450

TOTAL (\$) =	218688	
ROUNDED TOTAL (\$) =		\$220,000

STRUCTURES

Description:	<u>length (ft)</u>	<u>width (ft)</u>	<u>cost /s.f. (\$)</u>	<u>total (\$)</u>
8'x6' RCBC Extension	85	8	65.00	44200
S.R. 50 Bridge	460	80	65.00	<u>2392000</u>
TOTAL (\$) =				2436200
ROUNDED TOTAL (\$) =				\$2,440,000

PAVING

DESCRIPTION:	<u>Length (ft)</u>	<u>Cost / l.f. (\$)</u>	<u>Total (\$)</u>
5 lane c&g w/ shoulder	3600	215	774000
1 lane ramp interstate	7300	79	576700
2 lane ramp interstate	1200	105	126000
2 lane local road	1300	40	<u>52000</u>
TOTAL (\$) =			1528700
ROUNDED TOTAL (\$) =			\$1,530,000

RETAINING WALLS (N/A)

Length (ft) =	0
Height (ft) =	0
Cost / s.f. (\$) =	35.00
TOTAL (\$) =	0
ROUNDED TOTAL (\$) =	\$0

MAINT. OF TRAFFIC

Length (ft) =	13400
Cost / mile (\$) =	100000
TOTAL (\$) =	253788
ROUNDED TOTAL (\$) =	\$255,000

TOPSOIL

Area (sq. ft.)	1033000
Depth (ft.) =	0.5
Volume (cu. yd.) =	19130
Cost / cu. yd =	3.00
TOTAL (\$) =	57389
ROUNDED TOTAL (\$) =	\$60,000

SEEDING

1/2 TOPSOIL	28694
ROUNDED TOTAL (\$) =	\$30,000

SODDING

Length (ft.) =	3600
Width (ft.) =	40
Area (sq. yd.) =	16000
Cost / sq. yd =	3.00
TOTAL (\$) =	48000
ROUNDED TOTAL (\$) =	\$50,000

SIGNING

Length (ft) =	13400
Cost / mile (\$) =	7000
TOTAL (\$) =	17765
ROUNDED TOTAL (\$) =	\$20,000

SIGNALIZATION

DESCRIPTION:	<u>number</u>	<u>Cost / ea. (\$)</u>	<u>Total (\$)</u>
4-way intersection	2	50000	100000
TOTAL (\$)	=		100000
ROUNDED TOTAL (\$)	=		\$100,000

C.A. FENCE

Length (ft)	=	2700	
Cost / ft. (\$)	=	4.00	
TOTAL (\$)	=	10800	
ROUNDED TOTAL (\$)	=		\$15,000

GUARDRAIL

Length (ft)	=	1100	
Cost / l.f. (\$)	=	12.00	
Subtotal	=	13200	
End Treatments (#)	=	8	
Cost (each) (\$)	=	2000	
Subtotal	=	16000	
TOTAL (\$)	=	29200	
ROUNDED TOTAL (\$)	=		\$30,000

RIP-RAP

No. of Bridges	=	4	
Cost / bridge (\$)	=	20000	
TOTAL (\$)	=	80000	
ROUNDED TOTAL (\$)	=		\$80,000

SUBTOTAL	=		\$5,310,000
OTHER CONST. ITEMS (8.5%)	=	\$472,175	\$475,000
MOBILIZATION (\$230,000 plus 4.0% of total contract amount over \$5,000,000)	=	\$242,400	\$245,000
EROSION CONTROL (3.5% of Construction Cost Excluding Structures)	=	\$125,650	\$130,000
SUBTOTAL CONST. COST	=		\$6,160,000
10% ENG. & CONT.	=	616000	\$620,000

TOTAL CONST. COST	=	\$6,780,000
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PRELIMINARY ENG. (10%)	=	\$620,000
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R.O.W. ACQUISITION COST	=	\$410,000
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REIMBURSABLE UTILITY COST	=	\$0
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NON-REIMBURSABLE UTILITY COST	=	\$35,000
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TOTAL SECTION COST	=	\$7,845,000
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RIGHT-OF-WAY REPORT FOR LOCATION STUDY

STATE PROJ. SR-50 @ I-65 COUNTY MAURY

FEDERAL PROJ. _____ PROJ. DESC. _____

ESTIMATED RIGHT-OF-WAY COSTS

	INTERIM	ULTIMATE	SECTION	SECTION	SECTION
	IMPROVEMENT	IMPROVEMENT	ALT.	ALT.	ALT.
COST ITEMS	EST. COST	EST. COST	EST. COST	EST. COST	EST. COST
LAND REQUIRED	\$0	\$285,000			
ACRES	0	8.7			
IMPROVEMENTS	\$0	\$70,000			
NUMBER	0	2			
DAMAGES	\$0	\$0			
INCIDENTALS	\$0	\$15,000			
RESIDENTIAL REL.	\$0	\$0			
NUMBER	0	0			
BUS. & FARM REL.	\$0	\$40,000			
NUMBER	0	2			
TOTAL EST. COST OF ROW	\$0	\$410,000	\$0	\$0	\$0

REMARKS: _____

PREPARED BY SAIN ASSOCIATES, INC. 3/21/2003
 NAME DATE

RECOMMENDED _____
 NAME DATE

APPROVED _____
 NAME DATE

Improvement, Land, and Damage Figures

Land:	<u>Acres</u>	<u>Cost/Acre</u>	<u>Total Cost</u>	<u>Rounded Total</u>
	8.7	20000	174000	\$175,000
Improvements:			<u>Total Cost</u>	<u>Rounded Total</u>
			70000	\$70,000
Subtotal				\$245,000

Moving Cost Expenses

<u>Description</u>	<u>Number</u>	<u>Cost/Ea.</u>	<u>Total Cost</u>	<u>Rounded Total</u>
Business	2	20000	40000	\$40,000

Replacement Housing Cost

<u>Description</u>	<u>Number</u>	<u>Cost/Ea.</u>	<u>Total Cost</u>	<u>Rounded Total</u>
Owner Occupant	0	10000	0	\$0

Incidental Expenses per Tract

	<u>Number</u>	<u>Cost/Ea.</u>	<u>Total Cost</u>	<u>Rounded Total</u>
	6	2500	15000	\$15,000

Contingencies, including condemnation and time adjustment

\$90,000 X 0.43 = 105350
 Rounded for Estimate \$110,000

Total R.O.W. Estimate = **\$410,000**

STATE OF TENNESSEE - DEPARTMENT OF TRANSPORTATION

UTILITY REPORT FOR LOCATION STUDY

ROUTE NO. SR-50 @ I-65 ALTERNATE ULTIMATE IMPROVEMENT

PROJECT NO. _____ COUNTY MAURY

FROM _____

TO _____

<u>UTILITY</u>	<u>TOTAL COST OF ADJUSTMENTS</u>	<u>REIMBURSABLE BY STATE</u>
<u>ELECTRIC</u>	<u>\$1,610</u>	<u>\$0</u>
<u>TELEPHONE</u>	<u>\$690</u>	<u>\$0</u>
<u>WATER</u>	<u>\$28,145</u>	<u>\$0</u>
<u>NATURAL GAS</u>	<u>\$0</u>	<u>\$0</u>
<u>SANITARY SEWER</u>	<u>\$0</u>	<u>\$0</u>
<u>TOTAL</u>	<u>\$30,445</u>	<u>\$0</u>
<u>ROUNDED TOTAL FOR ESTIMATE</u>	<u>\$35,000</u>	<u>\$0</u>
_____	_____	_____
_____	_____	_____

REMARKS: _____

RAILROAD YES [] NO [X]

PREPARED BY: SAIN ASSOCIATES, INC.

DATE: 3/21/2003

SA# 01-184-7

ULTIMATE

NON-REIMBURSABLE UTILITY RELOCATION COST

ELECTRIC

<u>DESCRIPTION</u>	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
TWO-PHASE LINE	1	1610.00	1610

SUBTOTAL 1610

TELEPHONE

<u>DESCRIPTION</u>	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
JOINT USE POLE	1	690.00	690

SUBTOTAL 690

WATER

<u>DESCRIPTION</u>	<u>LENGTH (FT.)</u>	<u>COST/L.F.</u>	<u>COST</u>
8" DUCTILE IRON	1500	17.00	25500

	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
8" VALVE & BOX	2	805.00	1610

	<u>NUMBER</u>	<u>COST/EA.</u>	<u>COST</u>
FIRE HYDRANT	1	1035.00	1035

SUBTOTAL 28145

TOTAL 30445

ROUNDED TOTAL **\$35,000**

Index Of Sheets

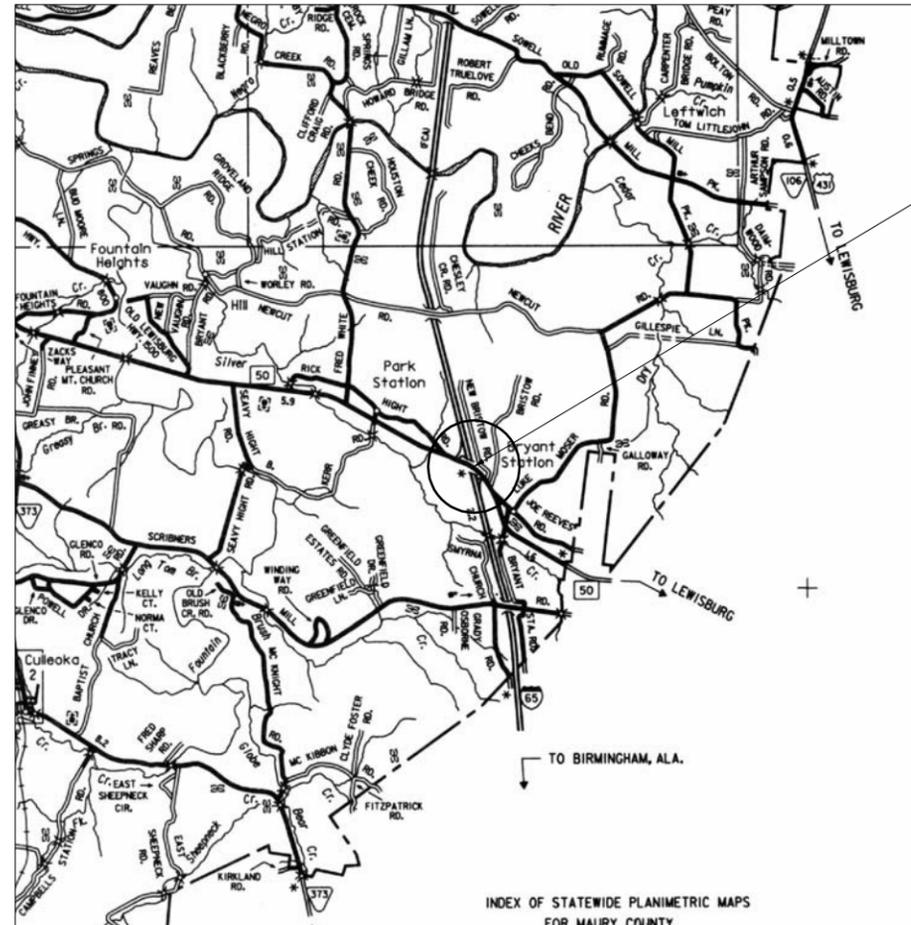
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-2A	TYPICAL SECTIONS
3-5	LAYOUT SHEETS (INTERIM)
3A-5A	LAYOUT SHEETS (ULTIMATE)

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION PLANNING DIVISION MAURY COUNTY

INTERCHANGE MODIFICATION STUDY
INTERSTATE 65 @ STATE ROUTE 50,
MAURY COUNTY

STATE HIGHWAY NO. 50 F.A.H.S. NO.

TENN.	YEAR	SHEET NO.
	2003	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		



SCALE: 1" = 1 MILE

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 _____
DESIGNER SAIN ASSOCIATES, INC CHECKED BY _____
P.E. NO. _____

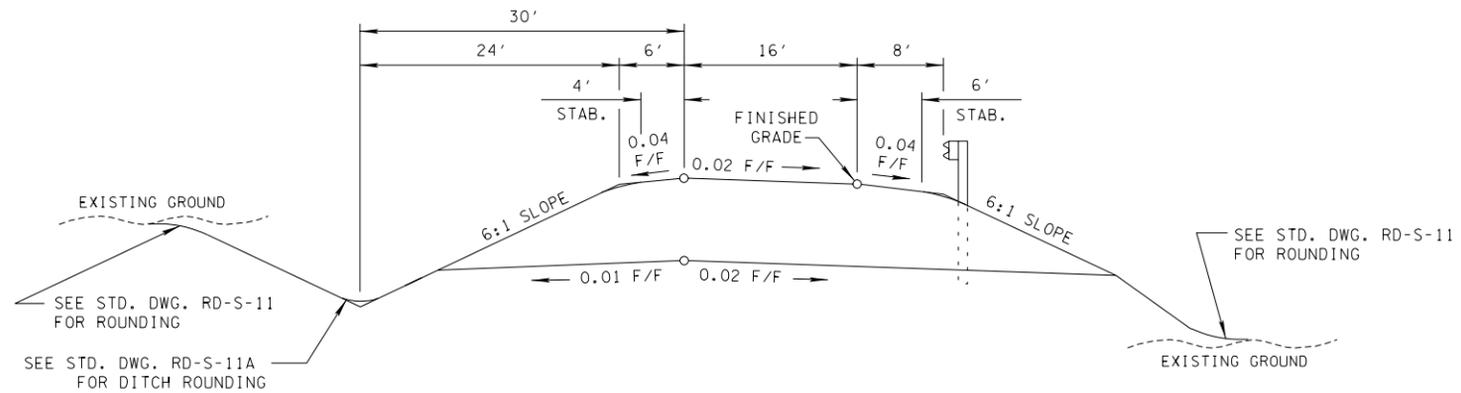
APPROVED: _____
DIRECTOR, DESIGN DIVISION
DATE: _____
APPROVED: _____
COMMISSIONER

TRAFFIC DATA	
ADT (2008)	10,010
ADT (2028)	16,030
DHV (2028)	1,924
D	60 - 40
T (ADT)	6 %
T (DHV)	4 %
V (INTERIM)	50 MPH
V (ULTIMATE)	50 MPH

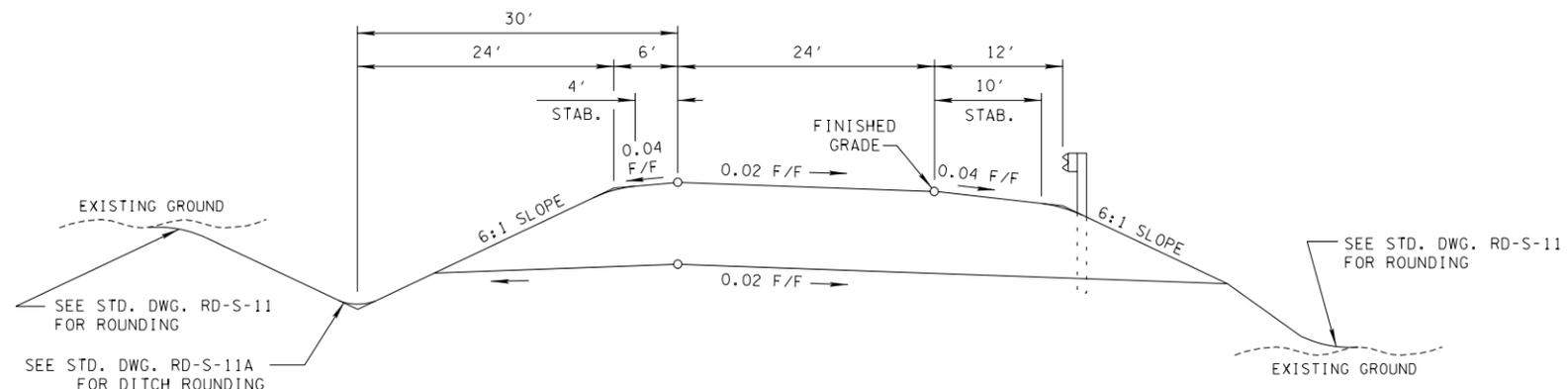
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED: _____
DIVISION ADMINISTRATOR DATE



TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		2



TYPICAL SECTION
 (BASED ON STD. DWG. RD-TS-4)

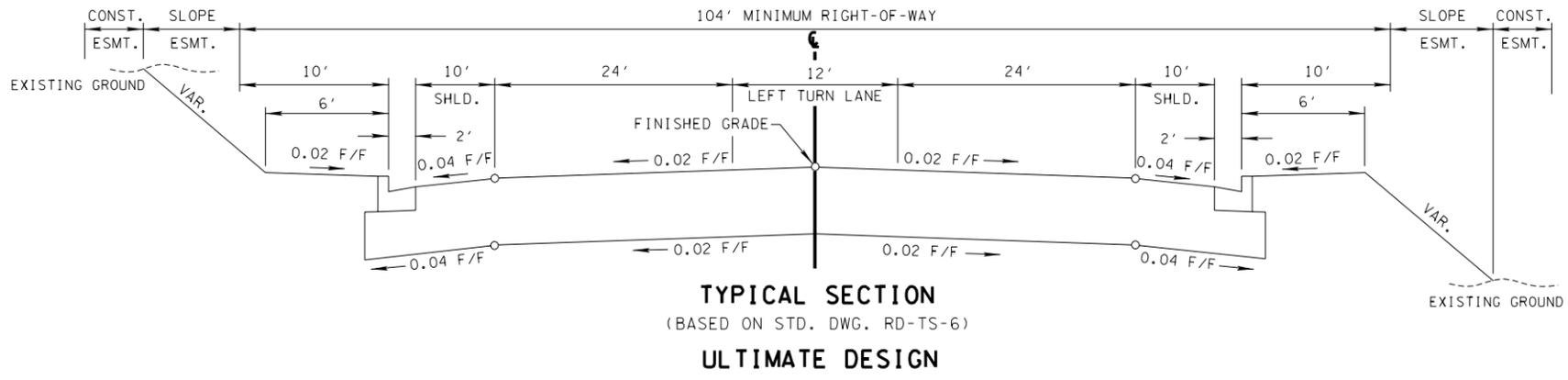
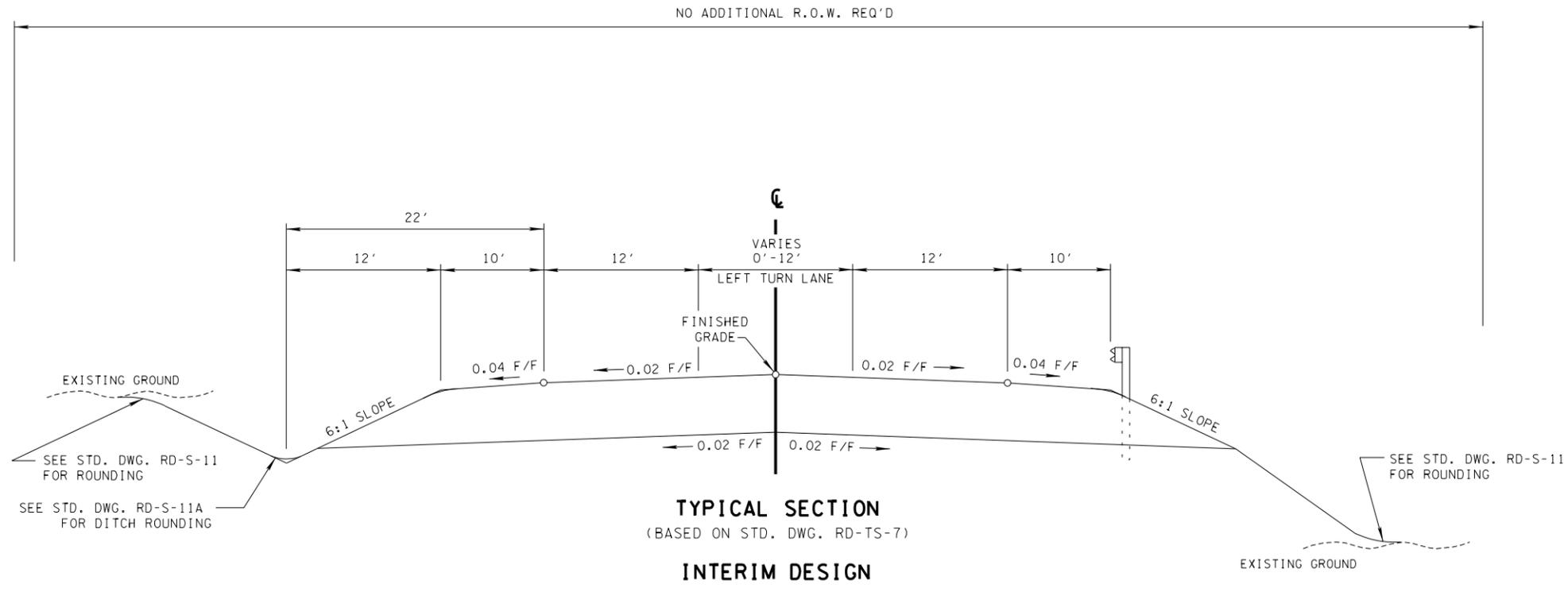


TYPICAL SECTION
 (BASED ON STD. DWG. RD-TS-4)

\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DN\$PEC\$



TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		2A



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DGN\$PEC\$



TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		3



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DDONSPEC\$\$\$\$

SEE SHEET NO. 4
 MATCH LINE



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
 S.R. 50/I65
 PROPOSED LAYOUT
 INTERIM PLAN

SCALE: 1"=100'



TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		3A



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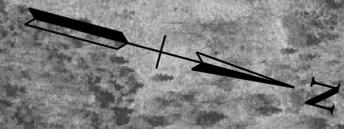


STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
S.R. 50/I65
PROPOSED LAYOUT
ULTIMATE PLAN

SCALE: 1"=100'

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		4



SEE SHEET NO. 3
 MATCH LINE

SEE SHEET NO. 5
 MATCH LINE



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
S.R. 50/I65
PROPOSED LAYOUT
INTERIM PLAN

SCALE: 1"=100'



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$SDONSPEC\$\$\$

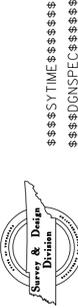
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APR	2003		4A



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
S.R. 50/I65
PROPOSED LAYOUT
ULTIMATE PLAN

SCALE: 1"=100'



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$SDONSPEC\$\$\$

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		5



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DDONSPEC\$\$\$



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
S.R. 50/I65
PROPOSED LAYOUT
INTERIM PLAN

SCALE: 1"=100'



TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2003		5A



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DDONSPEC\$\$\$\$



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

MAURY COUNTY
S.R. 50/I65
PROPOSED LAYOUT
ULTIMATE PLAN

SCALE: 1"=100'

