FILE 7140004.10
SR54 IJR

INTERCHANGE JUSTIFICATION REPORT ON INTERSTATE 75 AT REALIGNED (NEW) S.R. 54 PASCO COUNTY, FLORIDA

TAMPA INTERSTATE STUDY

State Project No. 99007-1402, WPI No. 7140004, FAP No. IR-9999(43)

Submitted To:

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

And

FLORIDA DEPARTMENT OF TRANSPORTATION

Submitted By:

GREINER, INC.

FINAL

MARCH 1989

U.S. Department
of Transportation
Federal Highway
Administration

Florida Division Office

227 N. Bronough St.
Room 2015
Tallahassee, Florida 32301

July 10, 1990

IN REPLY REFER TO: HB-FL

Mr. Pat McCue
State Transportation Planner
Florida Department of Transportation
Tallahassee, Florida

Attention: Mr. Warren D. Merrell, Jr.

Dear Mr. McCue:

Subject: Florida - Project No. IR-9999(43)
State Project No. 99007-1402
Interchange Justification Report
New SR-54 at I-75
Pasco County

The Interchange Justification Report (IJR) for New SR-54 at I-75 that was transmitted by Mr. Warren D. Merrell's January 12, 1990 letter has been reviewed and approved by the Washington Office of the Federal Highway Administration.

Please note that the concurrent construction of the planned improvements on I-75 as shown on Exhibit 5 of the IJR is necessary for acceptable operations on I-75.

Sincerely yours,

Robert M. Callan
for J. R. Skinner
Division Administrator

cc: Mr. William McDaniel
District Secretary, FDOT, District 7, Tampa, FL

INTERCHANGE JUSTIFICATION REPORT
ON INTERSTATE 75 AT REALIGNED (NEW) S.R. 54
PASCO COUNTY, FLORIDA

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INTRODUCTION

The Florida Department of Transportation (FDOT) is requesting a new interchange on I-75 at S.R. 54 (new) to serve north Tampa. For purposes of this document, S.R. 54 (new) refers to the proposed road while S.R. 54 (old) refers to the existing facility. Also, note that prior to July 1, 1988, S.R. 54 (old) was previously designated as Pasco County Route 54. Greiner, Inc. has been requested by the Florida Department of Transportation (FDOT) to perform professional services related to the justification of the new interchange.

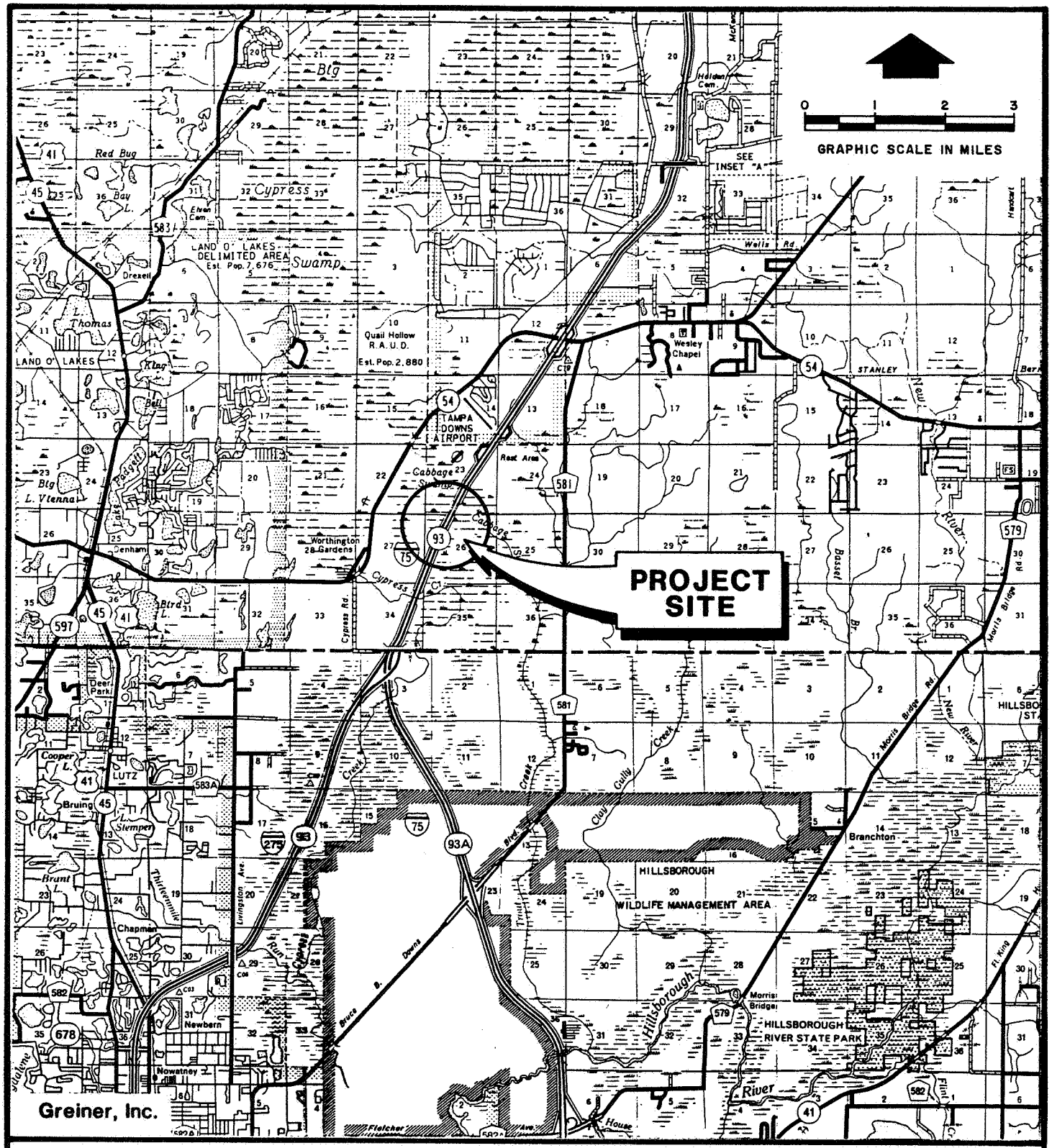
The proposed interchange is part of the new realignment of S.R. 54 (new). This alignment extends from the Zephyrhills East Bypass Westward to U.S. 19, and provides a connection between I-75 and Zephyrhills and between I-75 and the urban areas of New Port Richey in South Pasco County.

The proposed interchange of S.R. 54 and I-75 is also a integral link in the Tampa Interstate Study (TIS). The TIS is a study that recommends the preferred type and location of multi-lane improvements, potential high-occupancy-vehicle (HOV) facilities, transit facilities, traffic management techniques, and traffic surveillance and control systems. The TIS sutdy limits are:

I-275 from the Howard Frankland Bridge, eastward and northward to south of S.R. 54 (old) in Pasco County;

Memorial Highway from I-275 to Cypress Street; and

I-4 from its junction with I-275 at the Tampa Central Business District eastward to I-75.



FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

PROJECT LOCATION MAP

EXHIBIT 1

The proposed interchange provides improved regional accessibility and an alternative connection for traffic traveling along I-75 south destined for the downtown Tampa, Westshore and St. Petersburg business districts. This traffic can exit I-75 at S.R. 54 (new), travel west along S.R. 54 (new) to the improved Dale Mabry Highway and connect to the Northwest Expressway. This alternative route is a key element in the TIS maintenance of traffic plans for the reconstruction of the I-4 and I-275 junction, and I-275 north of the junction which lies south of the I-75 and S.R. 54 (new) interchange.

This document contains the description and justification for the new interchange. The appendices of this document contain support documentation for the traffic forecast and traffic operations calculations.

DESCRIPTION OF THE PROPOSED ACTION

The proposed project site is located approximately 2 miles south of the existing I-75/S.R. 54 (old) interchange. The new S.R. 54 facility would extend from Cypress Creek Road to the proposed Zephyrhills East Bypass (approximately 18 miles in length). Exhibit 1 illustrates the project location.

The proposed interchange will provide full access to the Interstate from S.R. 54 (new). The interchange justification is being conducted in conjunction with the Project Development and Environmental (PD&E) Study on S.R. 54 and TIS.

JUSTIFICATION OF PROPOSED ACTION

Pasco County has experienced a 155 percent population increase from 1970 to 1985 (from 76,000 to 194,000 respectively). The Tampa Bay Regional Planning Council (TBRPC) has projected growth in Pasco County to increase by 25 percent between 1985 and 1990, and an additional 33 percent between 1995 and 2010. In addition to the increase in population, Pasco County has also experienced tremendous economic growth along the northwestern portion of the project. This economic growth is evidenced by the recent surge in real estate and retail trade activity.

The amount of population and economic development projected for Pasco County will increase the travel demand on the area's roadway system. Network traffic forecasts for the year 2010 indicate that several roadway improvements are needed to meet this travel demand. One of these improvements includes the future upgrading of the existing I-75/S.R. 54 (old) interchange to an urban interchange. This proposed action would provide a more desirable volume to capacity (V/C) ratio and less vehicle delay, thus upgrading safety. Design year projections also indicate the need to upgrade the existing S.R. 54 facility to a six-lane arterial from the I-75/I-275 connection, north to the existing S.R. 54 interchange. Because there are currently no major east-west routes in the project area, the proposed six-laning of the existing facility would improve levels of service at the I-75 ramp terminal on S.R. 54.

The following sections of this report provide the engineering justification of the proposed project. The issues addressed include the existing, opening year (1995), and

design year (2010) roadway improvements, traffic volumes, safety, and implementation of the proposed action.

Area Street System

As shown in Exhibit 1, I-75 runs north from its apex with I-275 in the vicinity of the proposed project. Interstate 75 interchanges with existing S.R. 54 and I-275. State Road 581 runs parallel to I-75 on the east while Cypress Creek Road runs parallel to the west. These major roads are further described as follows:

I-275

Interstate 275 is a four-lane, divided facility which intersects I-75 south of the proposed project.

I-75

Interstate 75 is a four-lane divided controlled access freeway in Pasco County. I-75 extends from its junction with I-275 in the project area and continues north to the Florida/Georgia state line, and south to Ft. Lauderdale.

S.R. 54 (Old)

State Road 54 is a two-lane undivided facility which runs from U.S. 19 on the west to U.S. 98 on the east. Existing S.R. 54 is the only continuous east-west roadway between County Line Road and S.R. 52.

County Line Road

The limits of County Line Road south begin at CR 597 and extend approximately five miles west beyond U.S. 41. The road stops here and begins again at Cypress Creek, continuing west to U.S. 93, when the road ends.

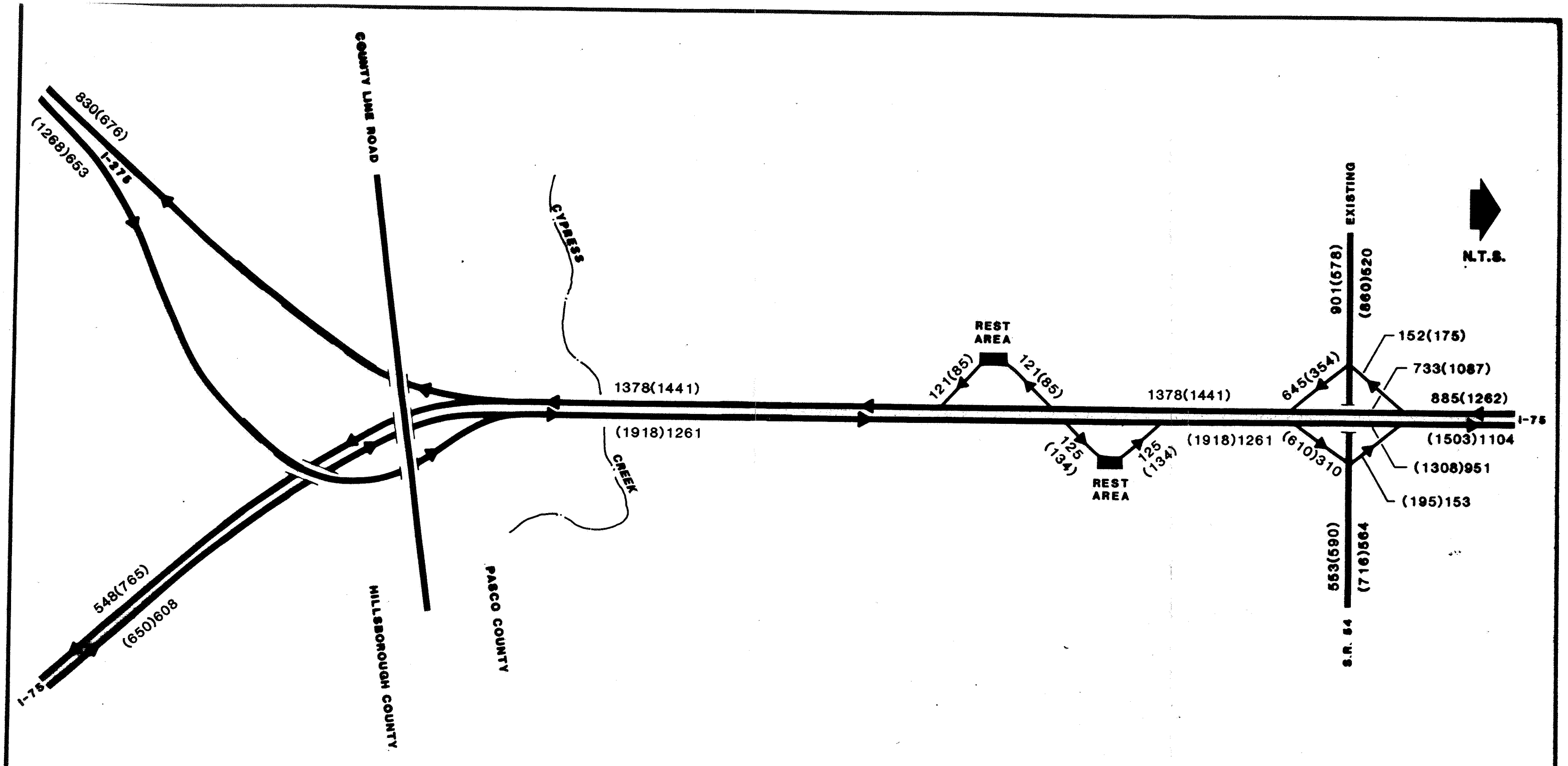
S.R. 581

State Road 581 is a two-lane, undivided roadway which terminates at S.R. 54.

Traffic Volumes

The existing average daily traffic (ADT) and peak hour (A.M. and P.M.) volumes were obtained from traffic count data collected by the FDOT, Computerized Traffic Data Company (for the S.R. 54 PD&E Study) and Greiner, Inc. The existing ADT's and peak-hour (A.M. and P.M.) traffic volumes are presented in Exhibits 2 and 3, respectively.

To assess the benefits of the proposed interchange, traffic volumes were projected to the year 2010, the design year for the proposed interchange. Sources for the design year traffic volumes were the TIS and the S.R. 54 PD&E Study. The design year traffic volumes were projected using the travel demand model developed as a part of FDOT's on-going TIS. Opening year (1995) traffic volumes were developed by use of a straight line projection between 1990 and 2000 traffic volumes obtained from the S.R. 54 PD&E Study.



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LEGEND

XXX AM Peak Hour Traffic Volumes

(XXX) PM Peak Hour Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

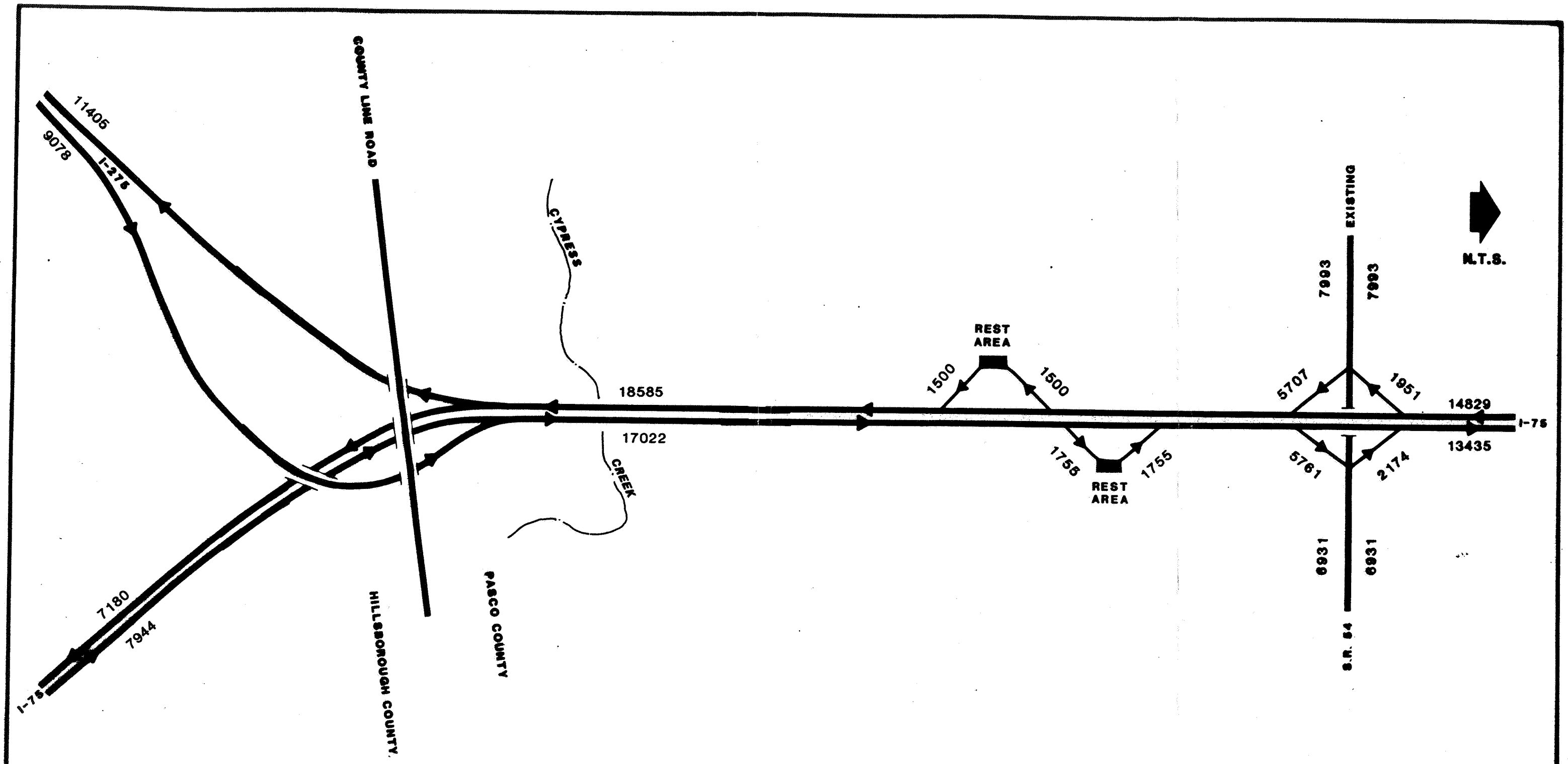
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

EXISTING PEAK HOUR TRAFFIC VOLUMES

EXHIBIT 3



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LEGEND

XXX Existing Average Daily Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

EXISTING AVERAGE DAILY TRAFFIC VOLUMES

EXHIBIT 2

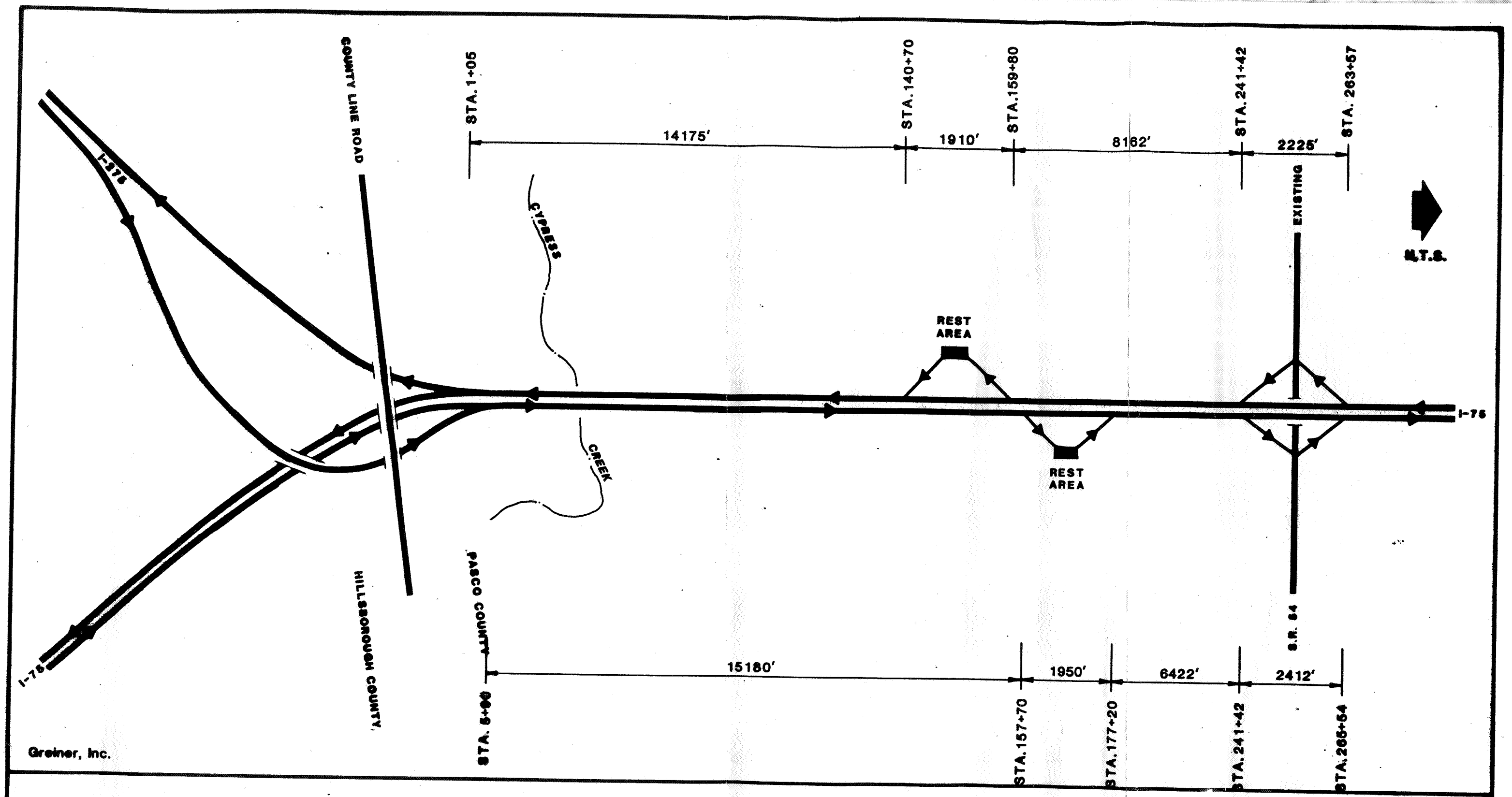
The daily volumes were converted to directional design hour volumes (DDHV's) using a "K" factor (percent of daily traffic in the peak hour) of 8.5 percent and a "D" factor (directional) of 55 percent. The "K" and "D" factors are the same as those used in the S.R. 54 PD&E Study.

Existing Traffic Operations

Using the existing peak hour volumes, traffic operation analyses were conducted for mainline I-75 at the existing S.R. 54 (old) interchange, at the rest area south of S.R. 54 (old), and at the apex with I-275.

The distances between the freeway ramps, illustrated in Exhibit 4, are such that they are beyond the realm of weaving as defined in the 1985 Highway Capacity Manual. In addition, no auxiliary lanes are provided between S.R. 54 (old) and the rest area, nor between the rest area and the I-75/I-275 junction. Therefore, only the ramp junction merge and diverge capacities were evaluated using the methodology described in Chapter 5 - Ramps and Ramp Junctions of the 1985 Highway Capacity Manual. The capacity calculations for the ramp junctions are contained in Appendix A.

Table 1 summarizes the levels of service for existing conditions on I-75 between the I-75/I-275 apex and S.R. 54 (old) inclusive. As seen in the table, the existing operating conditions for the mainline and for the ramp junctions on I-75 are at Level of Service (LOS) C or better.



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FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

EXISTING INTERCHANGE SPACING

EXHIBIT 4

TABLE 1

EXISTING PEAK HOUR I-75 FREEWAY OPERATIONS

Roadway Segment	Direction	Freeway[1] Volume (in ddhv)	Number[2] of lanes	Freeway los[3]	Merge Area					Diverge Area				
					Ramp Volume (in vph)[4]		Merge Volume (in pcph)[5]		Merge LOS[6]	Ramp Volume (in vph)[4]		Diverge Volume (in pcph)[5]		Diverge LOS[6]
From North of S.R. 54 (Old)	NB	1,104 [1,503]	2	A [B]	153	[195]	649	[822]	B [B]	--	--	--	--	- -
to S.R. 54 (Old)	SB	885 [1,262]	2	A [A]	--	--	--	--	- -	152	[175]	596	[750]	A [B]
From S.R. 54 (Old)	NB	1,261 [1,918]	2	A [B]	125	[134]	692	[943]	B [B]	310	[610]	826	[1,229]	B [C]
to Rest Area	SB	1,378 [1,441]	2	B [B]	645	[354]	1,038	[890]	C [B]	121	[85]	763	[766]	B [B]
From Rest Area	NB	1,261 [1,918]	2	A [B]	653	[1,268]	832	[1,229]	B [C]	125	[134]	722	[972]	B [B]
to I-75	SB	1,378 [1,441]	2	A [B]	121	[85]	718	[735]	B [B]	830	[676]	831	[745]	B [B]

[1]Refers to the freeway volume that occurs before diverge and after merge.
[2]Per direction.
[3]LOS = Level of Service
[4]vph = Vehicle Per Hour
[5]pcph = Passenger Cars Per Hour
[6]LOS = Level of Service

xx = A.M. Peak Hour
[xx] = P.M. Peak Hour

Capacity analyses were also conducted for the S.R. 54 (old) ramp terminals. The analyses were conducted using the procedures outlined in Chapter 10 - Unsignalized Intersections of the 1985 Highway Capacity Manual. The levels of service for the two unsignalized intersections at the I-75 ramp terminals with S.R. 54 (old) are shown in Table 2. The unsignalized intersection analyses are contained in Appendix B.

As illustrated in Table 2, the off-ramps at both intersections are operating at deficient levels of service. The northbound ramp left-turn volumes are 162 and 262 vehicles per hour during the A.M. and P.M. peak hours, respectively. These volumes, combined with the total east-west volumes on S.R. 54 (old) of 1,088 and 1,111 vehicles per hour for the A.M. and P.M. peak hours, respectively, result in a deficient level of service. Furthermore, although the southbound left turn ramp volumes are low (42 and 34 vehicles per hour for the A.M. and P.M. peak hours, respectively), the combined volumes on the east-west approaches of S.R. 54 (old) of 1,221 and 1,306 for the A.M. and P.M. peak hour, respectively, result in deficient operations.

Since the volumes on S.R. 54 (old) and the left-turn volumes on the northbound off-ramp from I-75 are at levels that would warrant signalization, signalized intersection capacity analyses were performed to establish the level of service of the ramps when signalized. The capacity analyses were conducted using the procedures outlined in Chapter 9 - Signalized Intersections of the 1985 Highway Capacity Manual. The levels of service for A.M. and P.M. peak hours for signalized conditions are presented in Table 3. The signalized intersection analyses are contained in Appendix B.

TABLE 2

EXISTING S.R. 54 INTERSECTION CAPACITY
ANALYSES (UNSIGNALIZED)

Intersection	Period (Peak Hour)	Level of Service			
		Eastbound Left Turn	Westbound Left Turn	Northbound Left Turn	Southbound Left Turn
S.R. 54 (Old) and I-75 East Ramp	A.M.	B	--	F	--
	P.M.	B	--	F	--
S.R. 54 (Old) and I-75 West Ramp	A.M.	--	B	--	F
	P.M.	--	A	--	E

TABLE 3

EXISTING INTERSECTION CAPACITY
ANALYSES (SIGNALIZED)

Intersection	A.M. Peak Hour V/C[1]	A.M. Peak Hour Average Delay[2]	A.M. Peak Hour LOS[3]	P.M. Peak Hour V/C[1]	P.M. Peak Hour Average Delay[2]	P.M. Peak Hour LOS[3]
S.R. 54 (Old) and I-75 East Ramp	0.631	11.9	B	0.756	13.4	B
S.R. 54 (Old) and I-75 West Ramp	0.607	14.5	B	0.534	9.0	B
S.R. 54 (Old) and I-75 Diamond Interchange	0.539	20.7	C	0.563	20.1	C

[1]V/C = Volume to Capacity Ratio
[2]Average Delay in Seconds Per Vehicle
[3]LOS = Level of Service

As listed in Table 3, both ramp terminals would operate at LOS B during both A.M. and P.M. peak hours when analyzed separately. However, when analyzed as a diamond interchange, the ramps would operate at LOS C during both A.M. and P.M. peak hours.

Projected Traffic Operations

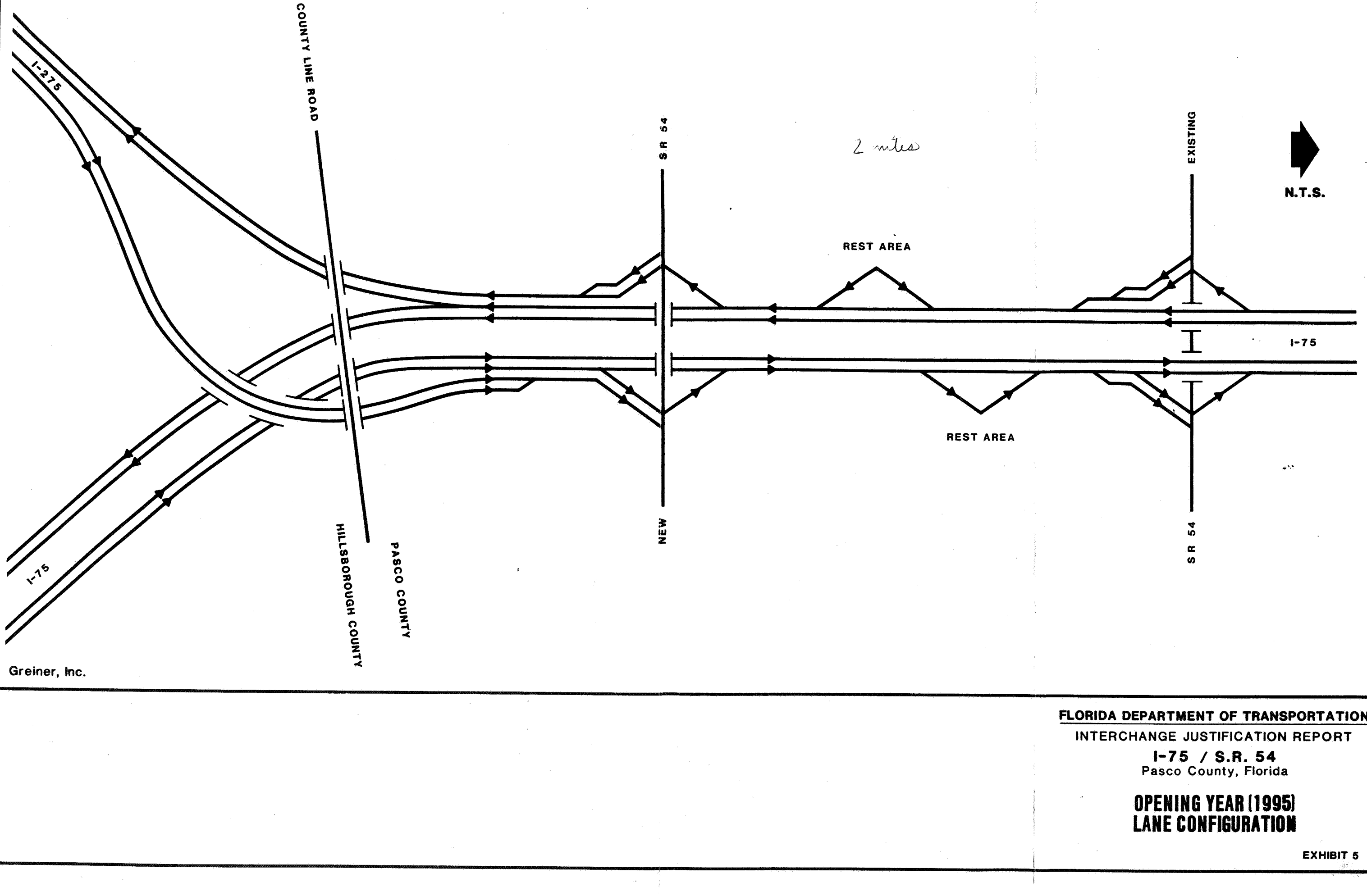
Evaluations for opening year (1995) and design year (2010) operating conditions were based on directional design hour traffic volumes. The analyses were conducted using the following assumptions:

K = 8.5%	Buses/RV's = 0%
D = 55%	Population Factor = 1.00
PHF = 0.95	Terrain = Level
Trucks = 3%	Design Speed = 70 mph

Analyses were conducted for the Build and the No-Build alternatives. The following sections discuss both opening year, design year and No-Build evaluations.

Opening Year (1995) Traffic Operations

The opening year analyses involved mainline and ramp junction evaluations on I-75 and signalized intersection capacity analyses at the ramp terminals. The analyses were conducted using the procedures in the 1985 Highway Capacity Manual. The lane configuration for mainline I-75 and for the ramps for opening year (1995) is illustrated in Exhibit 5. The 1995 ADT and DDHV's are presented in Exhibits 6 and 7, respectively.



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FLORIDA DEPARTMENT OF TRANSPORTATION

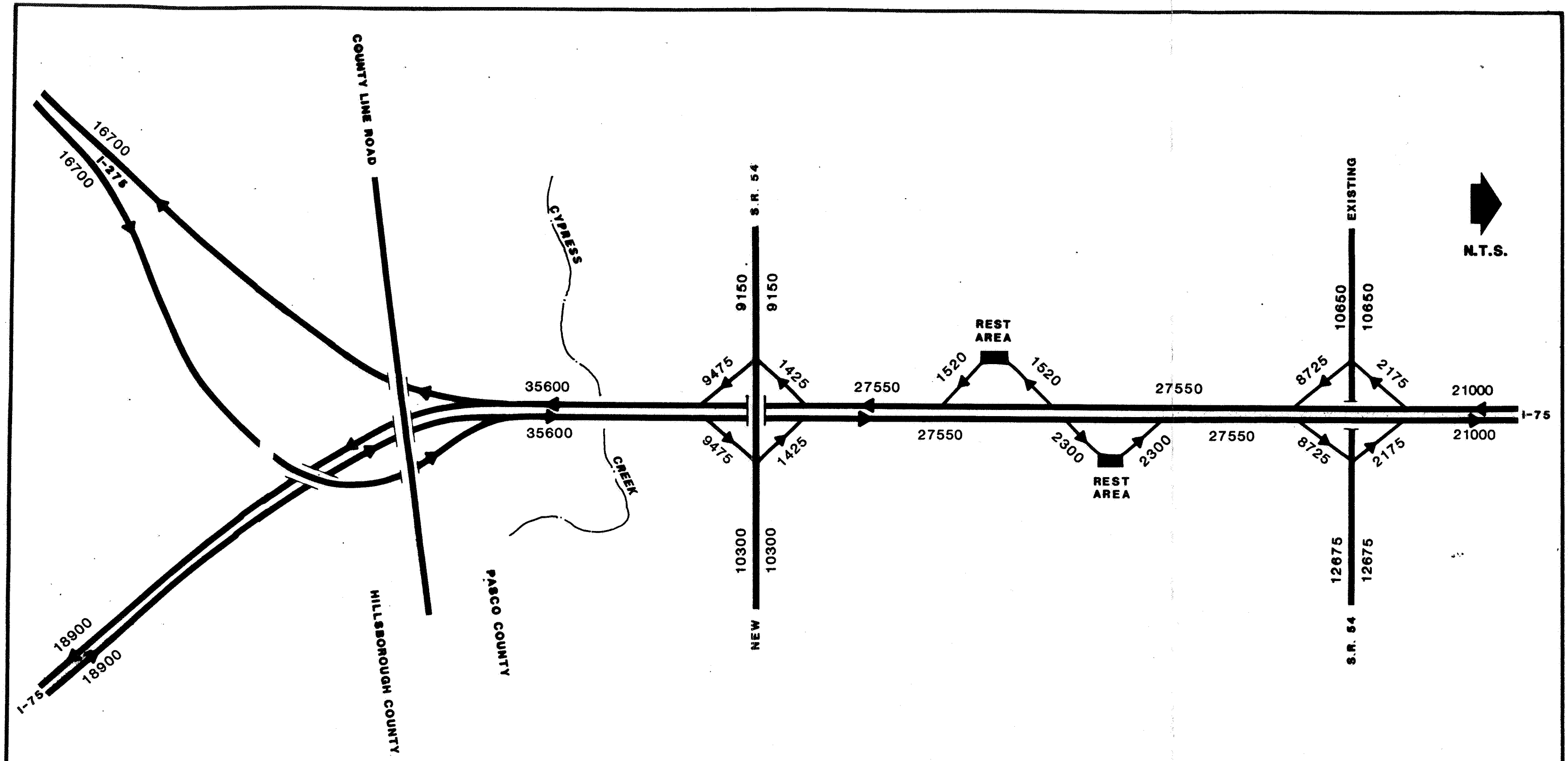
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

OPENING YEAR (1995) LANE CONFIGURATION

EXHIBIT 5



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XXX Average Daily Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

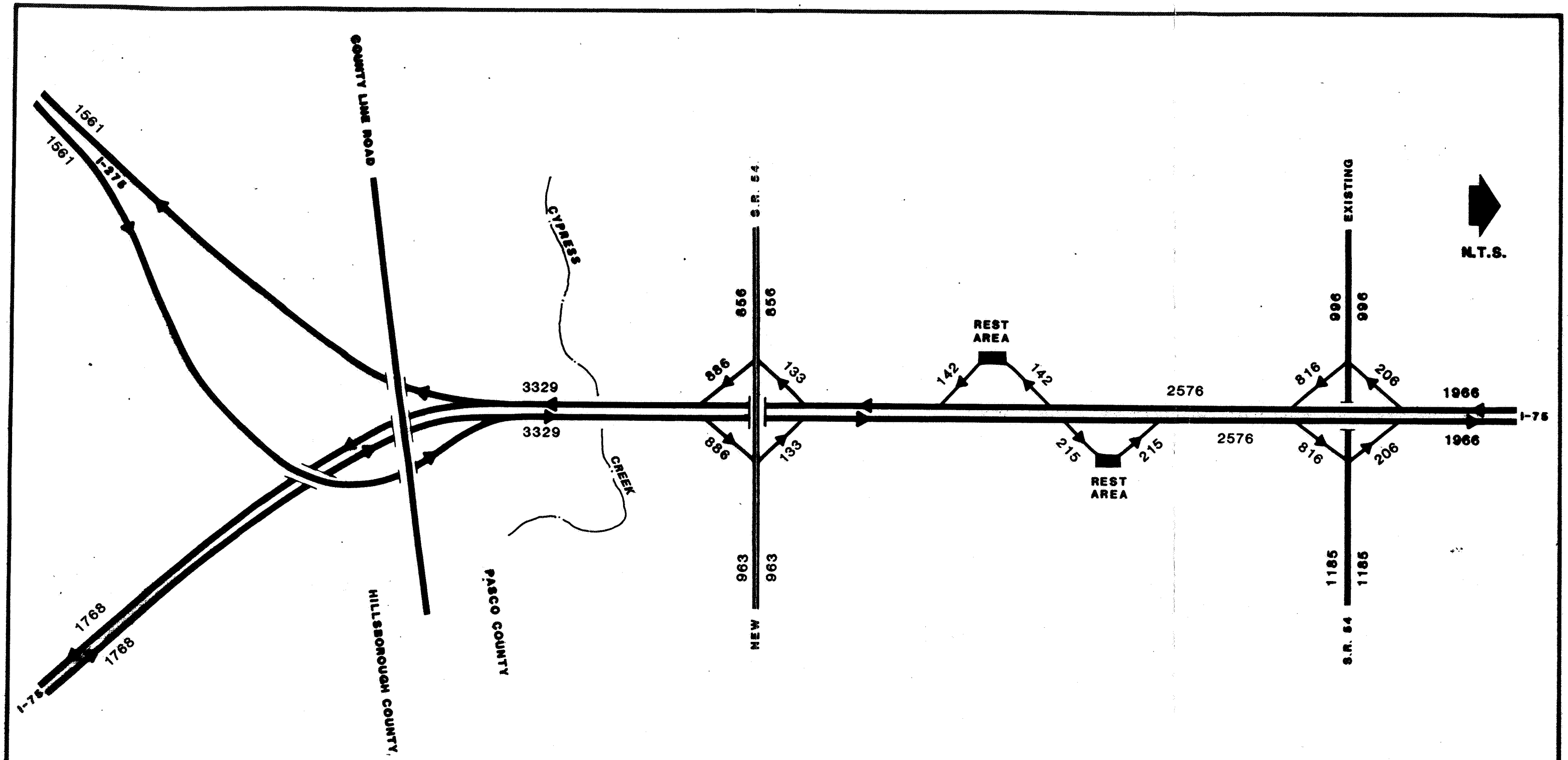
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

OPENING YEAR (1995) AVERAGE DAILY TRAFFIC VOLUMES

EXHIBIT 6



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LEGEND

XXX Directional Design Hour Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

OPENING YEAR (1995) DIRECTIONAL DESIGN HOUR VOLUMES

EXHIBIT 7

Table 4 summarizes the I-75 mainline and ramp junction levels of service for opening year (1995) conditions. As listed in the table, both the mainline and the ramp junctions will operate at LOS C or better with the recommended geometry, except for the following four locations which are projected to operate at LOS D:

- Southbound I-75 on-ramp from S.R. 54 (Old)
- Northbound I-275/I-75 merge
- Northbound I-75 off-ramp to S.R. 54 (New)
- Northbound I-75 off-ramp to S.R. 54 (Old)

The capacity calculations for the ramp junctions are included in Appendix C.

The I-75 ramp terminals at S.R. 54 (old) were analyzed as an urban interchange for opening year (1995) under signalized conditions. The analyses were performed with S.R. 54 (old) as a six-lane divided roadway with dual left-turn lanes, the northbound I-75 off-ramp with dual left-turn lanes and dual right-turn lanes, and the southbound I-75 off-ramp with dual left-turn lanes and a single right-turn lane. The analyses established that the intersection will operate at LOS C for both A.M. and P.M. peak hours.

The I-75 ramp terminals at S.R. 54 (new) were also analyzed. The intersections were analyzed as a diamond interchange. The analyses were performed with S.R. 54 (new) as a six-lane divided roadway with dual left-turn lanes and right-turn lanes, the northbound I-75 off-ramp with dual left-turn lanes and single right-turn lane, and the southbound I-75 off-ramp with a single left-turn and a single right-turn lane. The analyses established that the intersection will operate at LOS C for both A.M. and P.M. peak hours.

Table 5 summarizes the operation levels of the intersections of S.R. 54 (old) with the I-75 ramps, and S.R. 54 (new) with the I-75 ramps. The intersection capacity calculations are included in Appendix D.

TABLE 4

I-75 DESIGN HOUR FREEWAY OPERATIONS - OPENING YEAR (1995)

Roadway Segment	Direction	Freeway[1] Volume (in DDHV)	Number[2] of Lanes	Freeway LOS[3]	Merge Area			Diverge Area		
					Ramp Volume (in vph)[4]	Merge Volume (in pcph)[5]	Merge LOS[6]	Ramp Volume (in vph)[4]	Diverge Volume (in pcph)[5]	Diverge LOS[6]
From North of S.R. 54 (Old)	NB	1,966	2	B	206	1,002	C	--	--	-
to S.R. 54 (Old)	SB	1,966	2	C	--	--	-	206	1,031	B
From S.R. 54 (Old)	NB	2,576	2	C	215	1,236	C	816	1,221/1,604	C/D
to Rest Area	SB	2,576	2	C	816	1,580	D	142	1,247	C
From Rest Area	NB	2,576	2	C	133	1,189	C	215	1,265	C
to S.R. 54 (New)	SB	2,576	2	C	142	1,194	C	133	1,219	C
From S.R. 54 (New)	NB	3,329	3	A	1,561	1,678	D	886	1,511	D
to I-75/I-275 Apex	SB	3,329	3	A	886	952	B	1,561	1,324	C

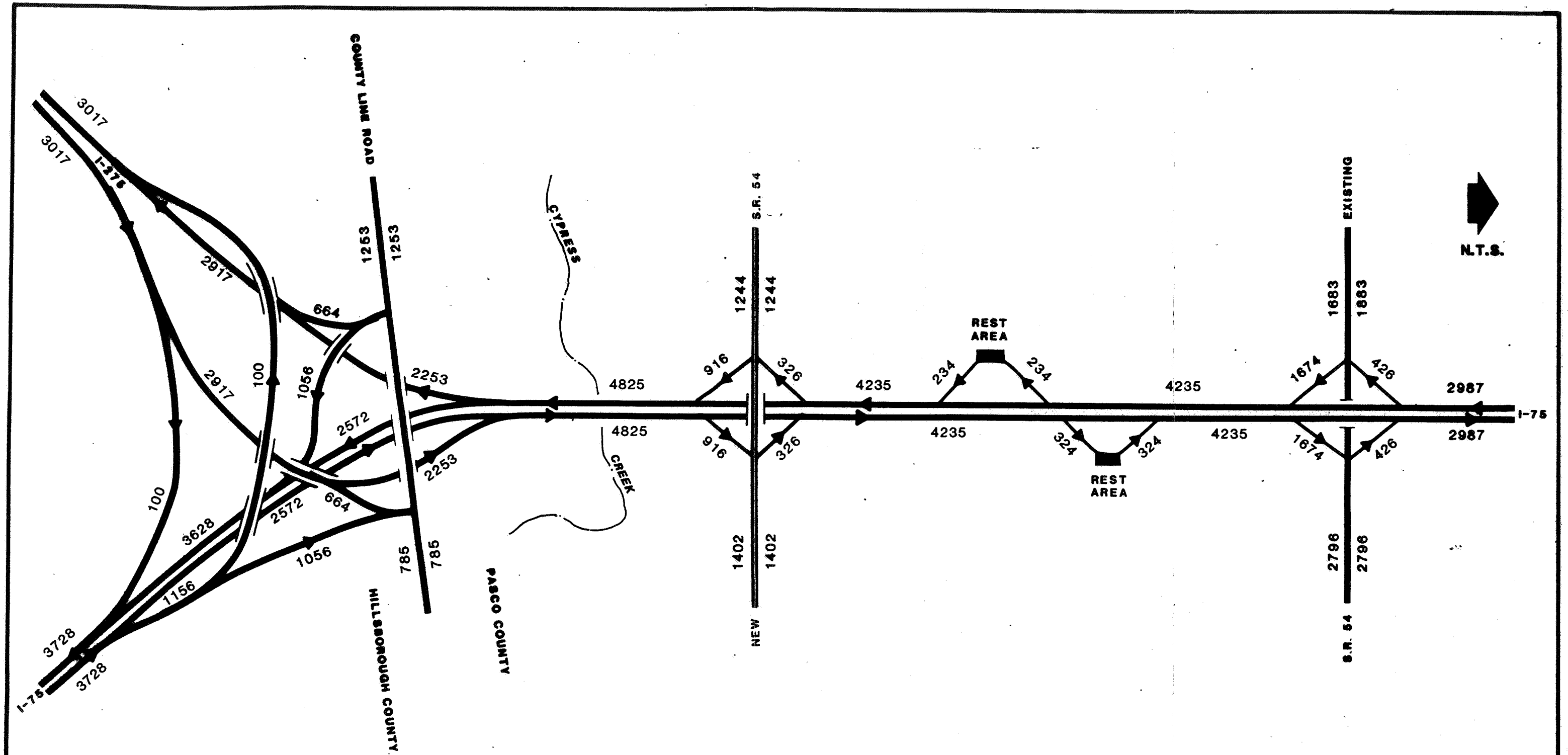
[1]Refers to freeway volume that occurs before diverge and after merge.
[2]Per direction.
[3]LOS = Level of Service
[4]vph = Vehicles Per Hour
[5]pcph = Passenger Cars Per Hour
[6]LOS = Level of Service

TABLE 5

OPENING YEAR (1995) INTERSECTION CAPACITY ANALYSES (SIGNALIZED)

Intersection	Period (Peak Hour)	V/C[1]	Average Delay[2]	Level of Service
S.R. 54 (Old) and I-75 Ramps (Urban Interchange)	A.M.	0.330	18.8	C
	P.M.	0.331	19.4	C
S.R. 54 (New) and 1-75 Ramps (Diamond Interchange)	A.M.	0.563	17.9	C
	P.M.	0.588	18.8	C

[1]V/C = Volume to Capacity Ratio
[2]Average Delay in Seconds Per Vehicle



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XXX Directional Design Hour Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

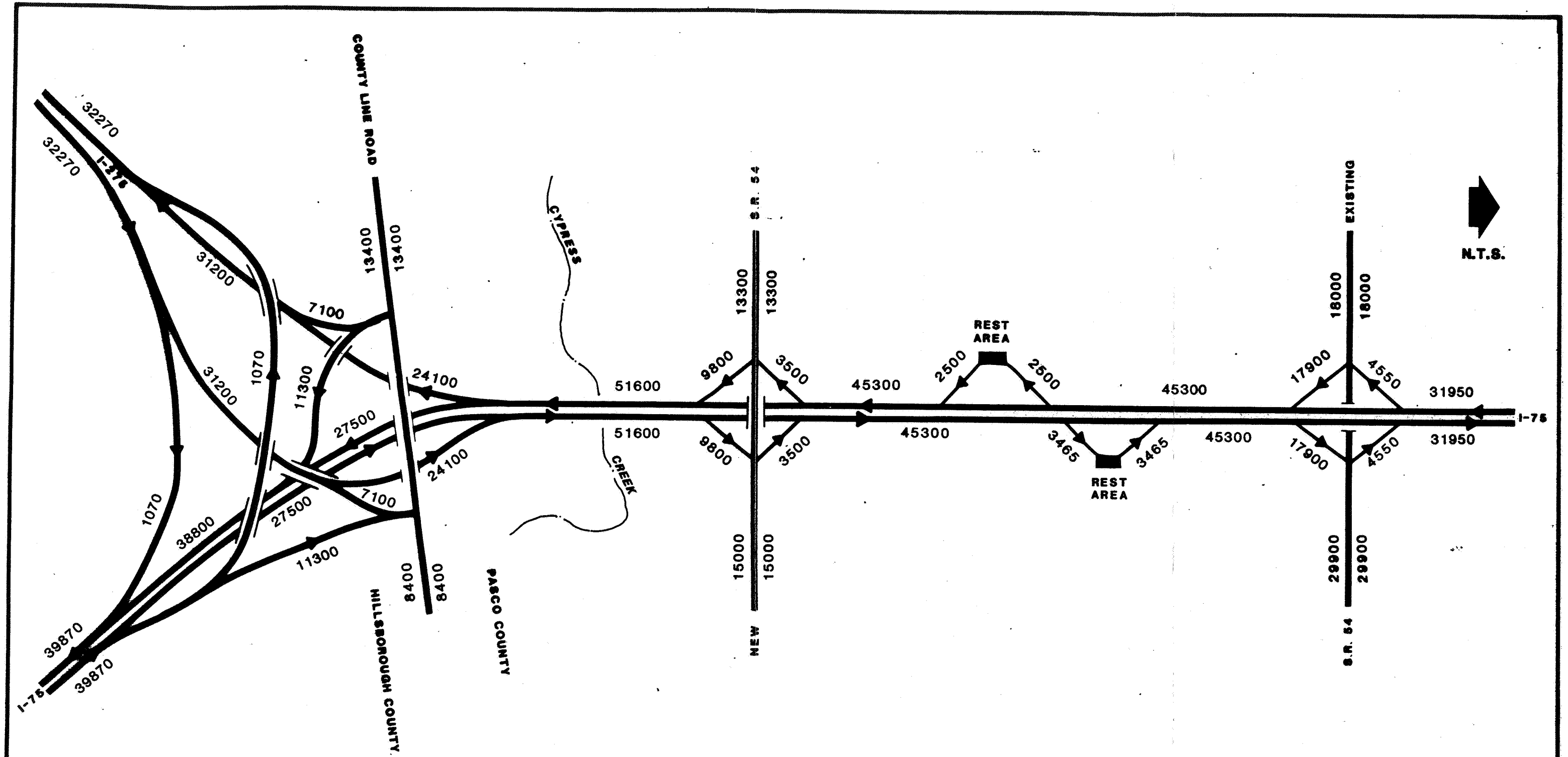
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) DIRECTIONAL DESIGN HOUR VOLUMES WITH COUNTY LINE ROAD INTERCHANGE

EXHIBIT 13



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XXX Average Daily Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

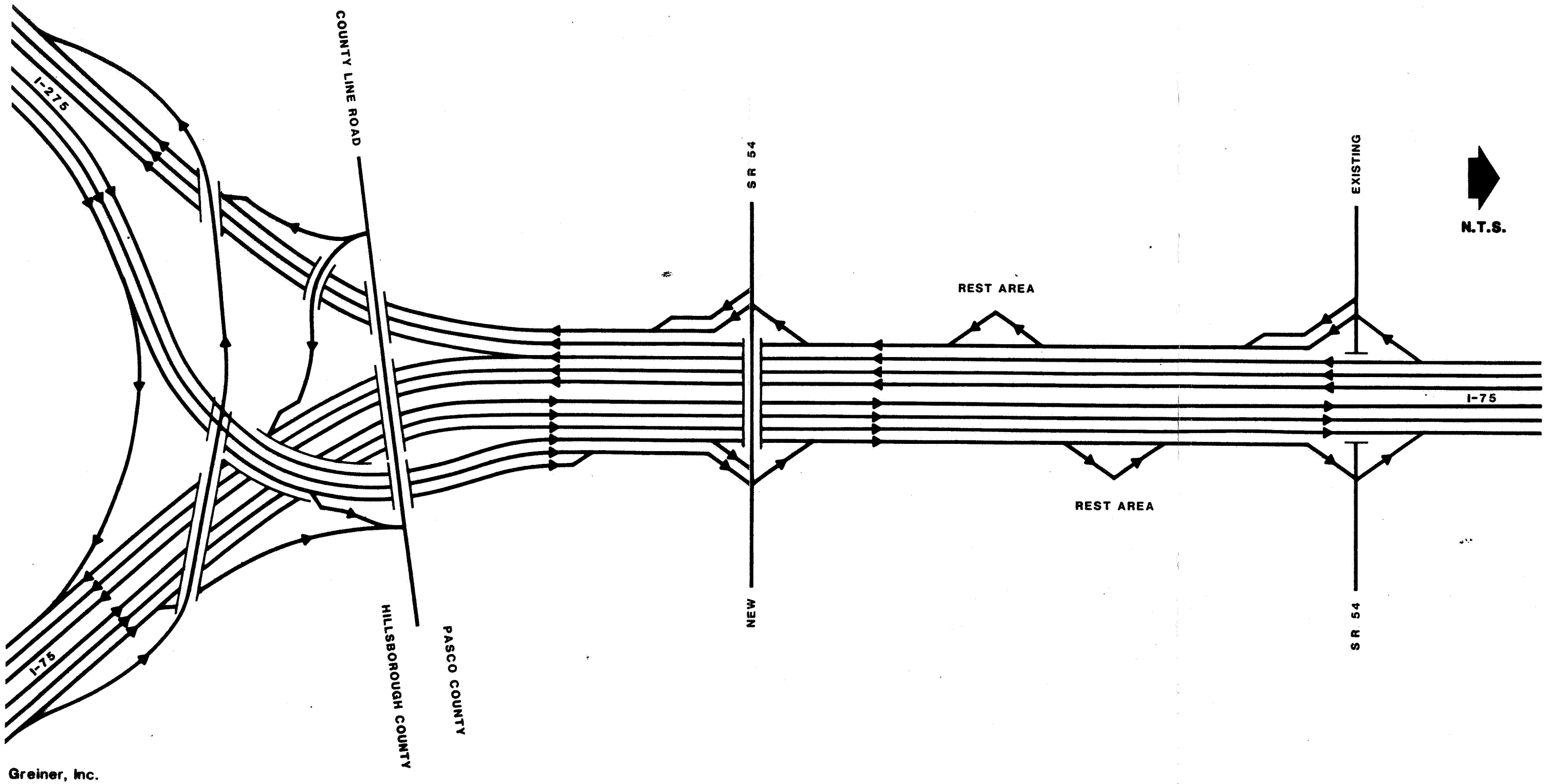
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) AVERAGE DAILY TRAFFIC VOLUMES WITH COUNTY LINE ROAD INTERCHANGE

EXHIBIT 12



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FLORIDA DEPARTMENT OF TRANSPORTATION

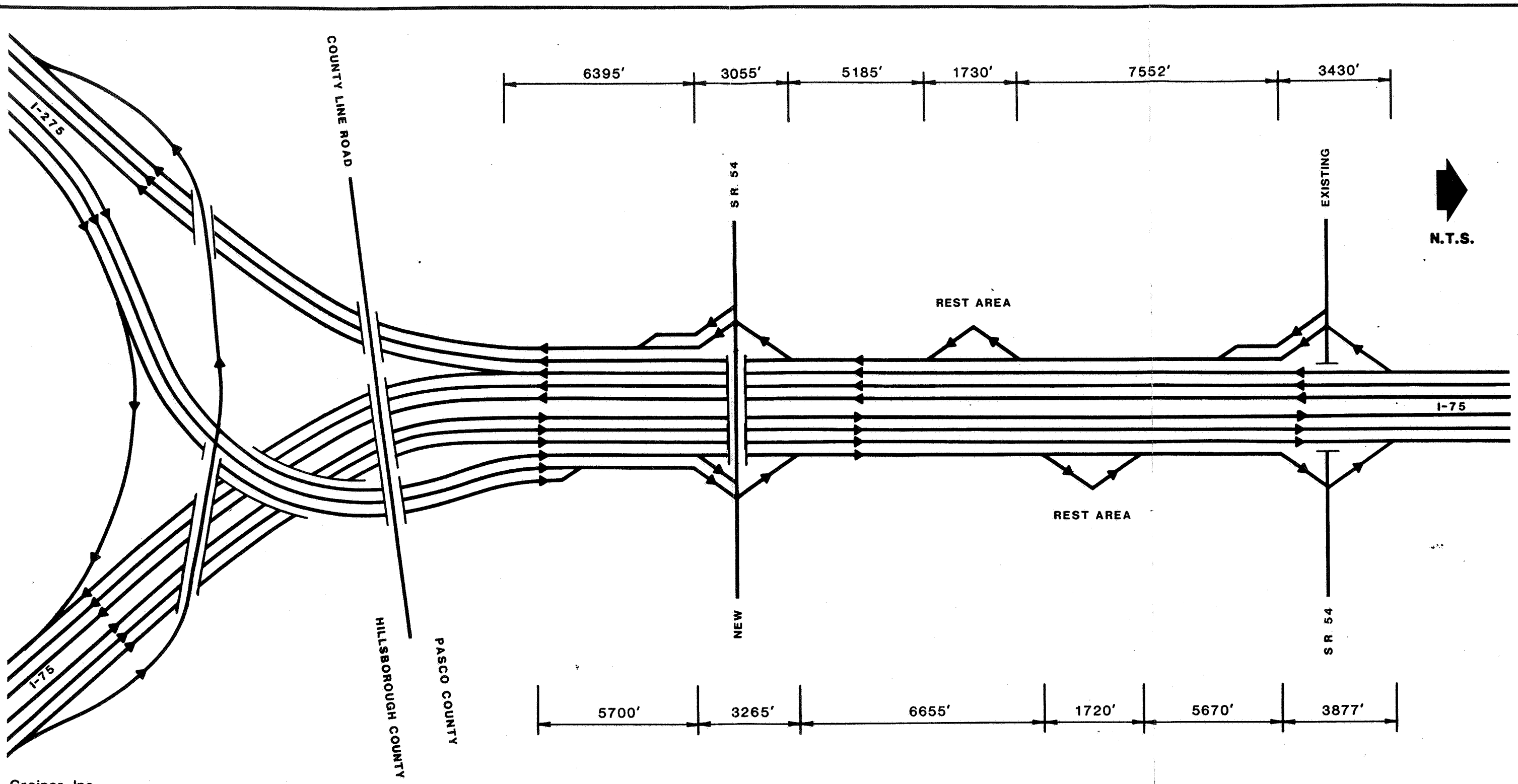
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) LANE CONFIGURATION WITH COUNTY LINE ROAD INTERCHANGE

EXHIBIT 11



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FLORIDA DEPARTMENT OF TRANSPORTATION

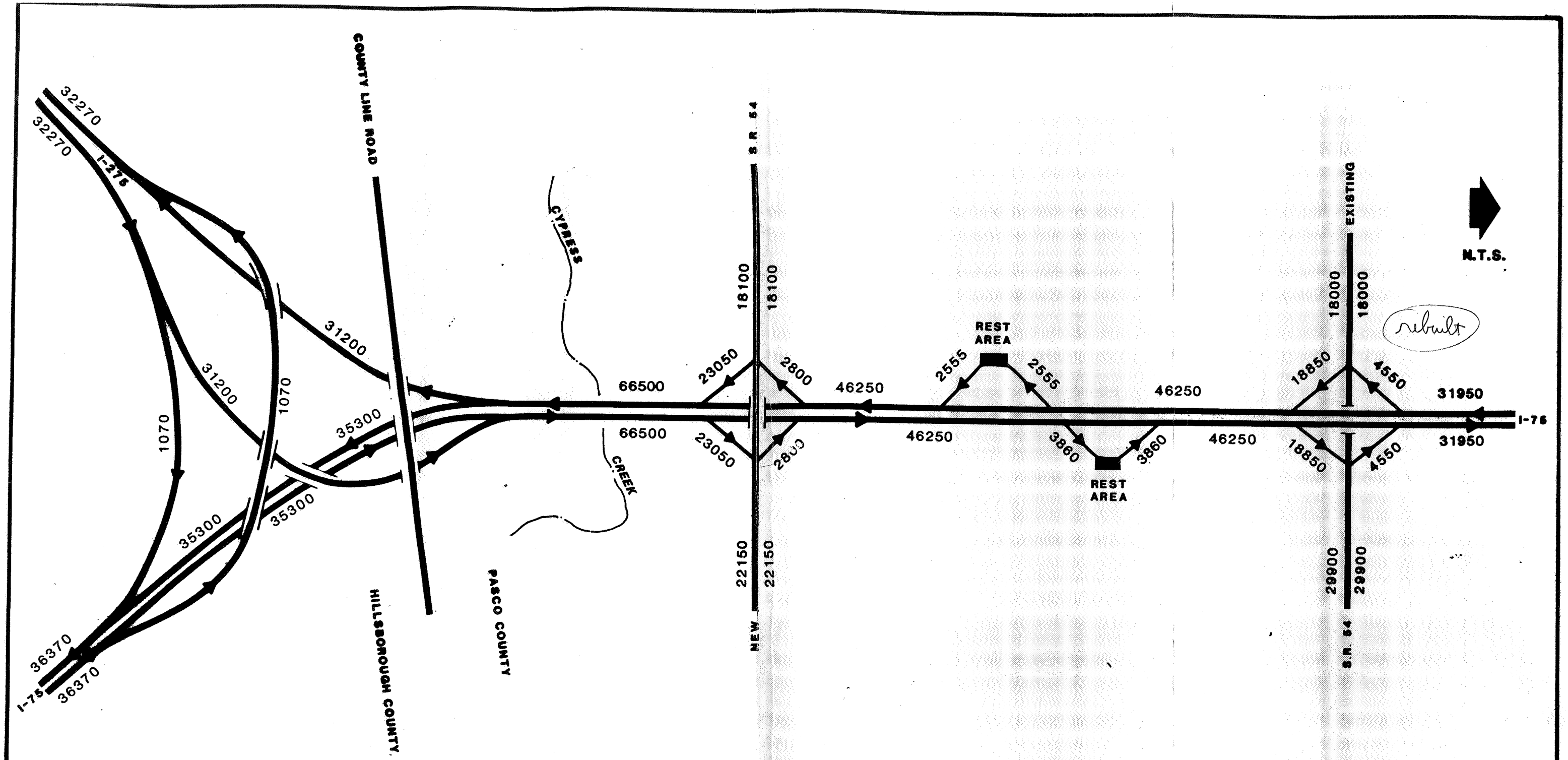
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) LANE CONFIGURATION WITHOUT COUNTY LINE ROAD INTERCHANGE

EXHIBIT 8



Greiner, Inc.

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XXX Average Daily Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

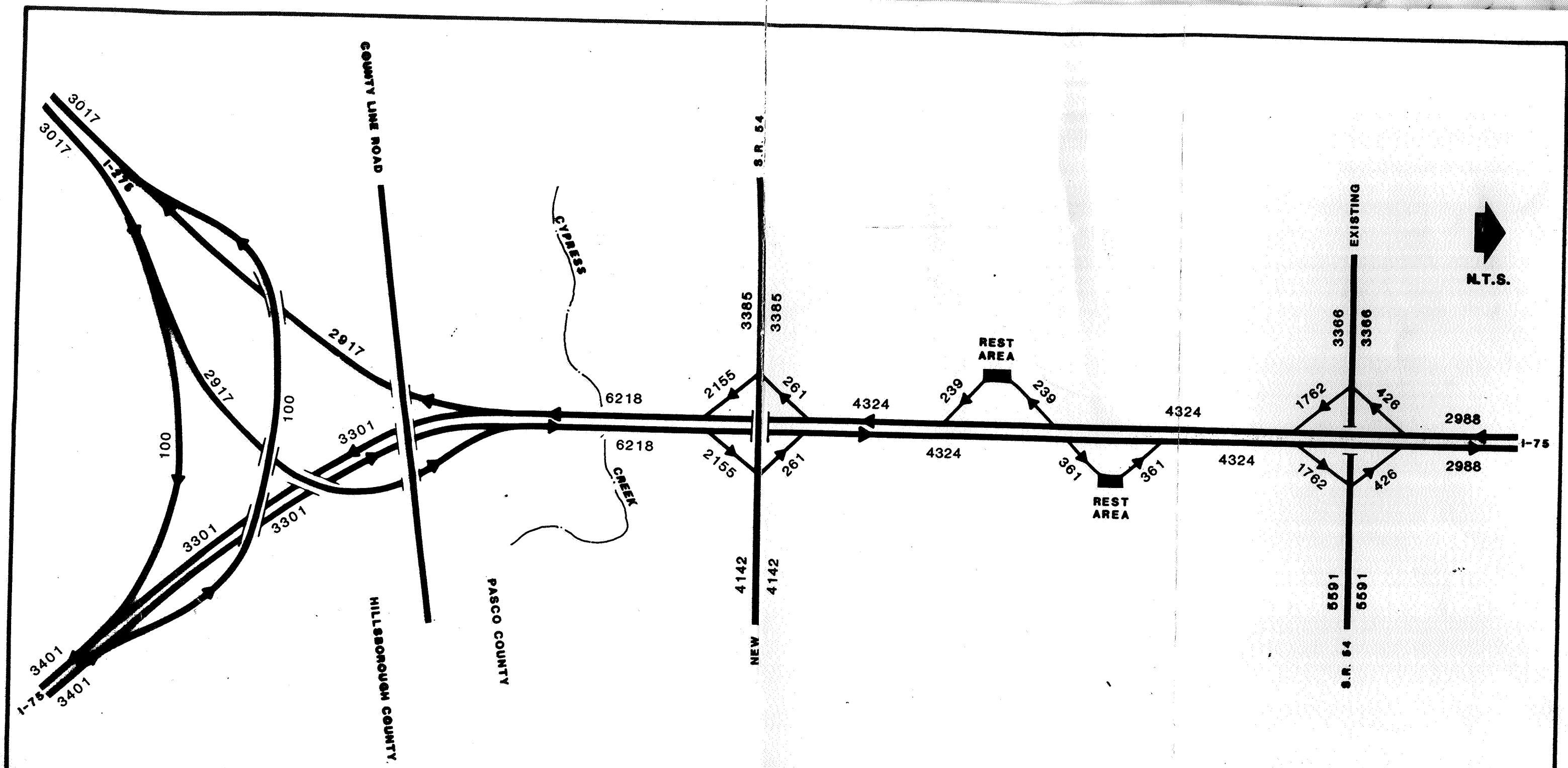
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) AVERAGE DAILY TRAFFIC VOLUMES WITHOUT COUNTY LINE ROAD INTERCHANGE

EXHIBIT 9



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XXX Directional Design Hour Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

DESIGN YEAR (2010) DIRECTIONAL DESIGN HOUR TRAFFIC VOLUMES WITHOUT COUNTY LINE ROAD INTERCHANGE

EXHIBIT 10

Design Year (2010) Traffic Operations

Design year (2010) analyses involved mainline and ramp junction evaluations on I-75 and signalized intersection evaluations at the ramp terminals. The analyses were performed for two scenarios: one scenario with a northbound off-ramp and a southbound on-ramp at County Line Road, and the other scenario without an interchange at County Line Road. The analyses were conducted using the procedures in the 1985 Highway Capacity Manual.

The lane configuration for mainline I-75 and for the ramps for the design year (2010) without the County Line Road interchange is illustrated in Exhibit 8. The corresponding 2010 ADT and DDHV's are presented in Exhibits 9 and 10, respectively.

Table 6 summarizes the I-75 mainline and ramp junctions levels of service for design year (2010) conditions without the County Line Road interchange. As listed in the summary table, both the mainline and the ramps will operate at LOS C or better with the recommended geometry, except for the following three locations which are projected to operate at LOS D:

- Northbound I-75 off-ramp to S.R. 54 (New)
- Southbound I-75 on-ramp from S.R. 54 (New)
- Southbound I-275/I-75 diverge

The capacity calculations for the ramp junctions are included in Appendix E.

The lane configuration for mainline I-275 and for the ramps for the design year (2010) with the County Line Road interchange is illustrated in Exhibit 11. The corresponding 2010 ADT and DDHV's are presented in Exhibits 12 and 13, respectively.

TABLE 6

2010 I-75 DESIGN HOUR FREEWAY OPERATION - WITHOUT COUNTY LINE ROAD INTERCHANGE

Roadway Segment	Direction	Freeway[1] Volume (in DDHV)	Number[2] of Lanes	Freeway LOS[3]	Merge Area			Diverge Area		
					Ramp Volume (in vph)[4]	Merge Volume (in pcph)[5]	Merge LOS[6]	Ramp Volume (in vph)[4]	Diverge Volume (in pcph)[5]	Diverge LOS[6]
From North of S.R. 54 (Old) to S.R. 54 (Old)	NB	2,988	3	A	426	968	B	--	--	-
	SB	2,988	3	A	--	--	-	426	1,072	C
From S.R. 54 (Old) to Rest Area	NB	4,324	4	C	361	975	B	1,762	1,262/1,195	C/C
	SB	4,324	4	C	1,762	1,314/1,314	C/C	239	627	A
From Rest Area to S.R. 54 (New)	NB	4,324	4	C	261	876	B	361	751	B
	SB	4,324	4	C	239	854	B	261	649	A
From S.R. 54 (New) to I-75/I-275 Apex	NB	6,218	5	C	2,917	569	A	2,155	1,526/1,161	D/C
	SB	6,218	5	C	2,155	1,595/1,595	D/D	2,917	1,685	D

[1]Refers to freeway volume that occurs before diverge and after merge.
[2]Per direction.
[3]LOS = Level of Service
[4]vph = Vehicles Per Hour
[5]pcph = Passenger Cars Per Hour
[6]LOS = Level of Service

Table 7 summarizes the I-75 mainline and ramp junctions levels of service for design year (2010) conditions with the County Line Road interchange. As listed in the table, both the mainline and the ramps will operate at LOS C or better, except for the following three locations which are projected to operate at LOS D:

- Southbound I-75 on-ramp from S.R. 54 (Old)
- Southbound I-75 on-ramp from County Line Road
- Northbound I-75 off-ramp to County Line Road and Southbound I-275

The capacity calculations for the ramp junctions are included in Appendix F.

The I-75 ramp terminals and the S.R. 54 (old) intersection were analyzed as an urban interchange for design year (2010) under signalized conditions. The analyses were performed with and without a County Line Road interchange. The analyses were performed with S.R. 54 (old) as a six-lane divided roadway with dual left-turns, the northbound I-75 off-ramp with dual left-turn lanes and dual right-turn lanes, and the southbound I-75 off-ramp with dual left-turn lanes and a single right-turn lane.

The analyses indicate that the intersection will operate at LOS C for the A.M. peak hour and at LOS D for the P.M. peak hour without the County Line Road interchange, and at LOS C for both the A.M. and P.M. peak hours with the County Line Road interchange.

The I-75 ramp terminals and S.R. 54 (new) intersections were also analyzed for design year (2010). The analyses were performed with and without the County Line Road interchange. The intersections were analyzed as a diamond interchange. The analyses indicate that the intersections will operate at LOS C for both the A.M. and P.M. peak hours with and without the County Line Road interchange.

TABLE 7

2010 I-75 DESIGN FREEWAY OPERATION - WITH COUNTY LINE ROAD INTERCHANGE

Roadway Segment	Direction	Freeway[1] Volume (in DDHV)	Number[2] of Lanes	Freeway LOS[3]	Merge Area			Diverge Area		
					Ramp Volume (in vph)[4]	Merge Volume (in pcph)[5]	Merge LOS[6]	Ramp Volume (in vph)[4]	Diverge Volume (in pcph)[5]	Diverge LOS[6]
From North of S.R. 54 (Old)	NB	2,987	3	B	426	1,018	C	--	--	-
to S.R. 54 (Old)	SB	2,987	3	B	--	--	-	426	1,071	C
From S.R. 54 (Old)	NB	4,235	4	C	324	847	B	1,674	1,212/1,163	C/C
to Rest Area	SB	4,235	4	C	1,674	1,265/1,650	C/D	234	614	A
From Rest Area	NB	4,235	4	C	327	884	B	324	706	B
to S.R. 54 (New)	SB	4,235	4	C	234	777	B	327	729	B
From S.R. 54 (New)	NB	4,825	5	B	2,253	517	A	916	803/539	B/A
to I-75/I-275 Apex	SB	4,825	5	B	916	1,227	C	2,253	1,303	C
From Southbound County Line Road On-Ramp to Southbound On-Ramp from I-275	SB	3,628	3	C	1,056	1,696	D	--	--	-
South of Northbound Off-Ramp to County Line Road	NB	3,728	3	C	--	--	-	1,156	1,632	D
For I-275										
From County Line Road Ramps to On	NB	2,917	3	B	--	--	-	664	1,176	C
and Off Ramps to and from I-75	SB	2,917	3	B	664	1,188	C	--	--	-

[1]Refers to freeway volume that occurs before diverge and after merge.
[2]Per direction.
[3]LOS = Level of Service
[4]vph = Vehicles Per Hour
[5]pcph = Passenger Cars Per Hour
[6]LOS = Level of Service

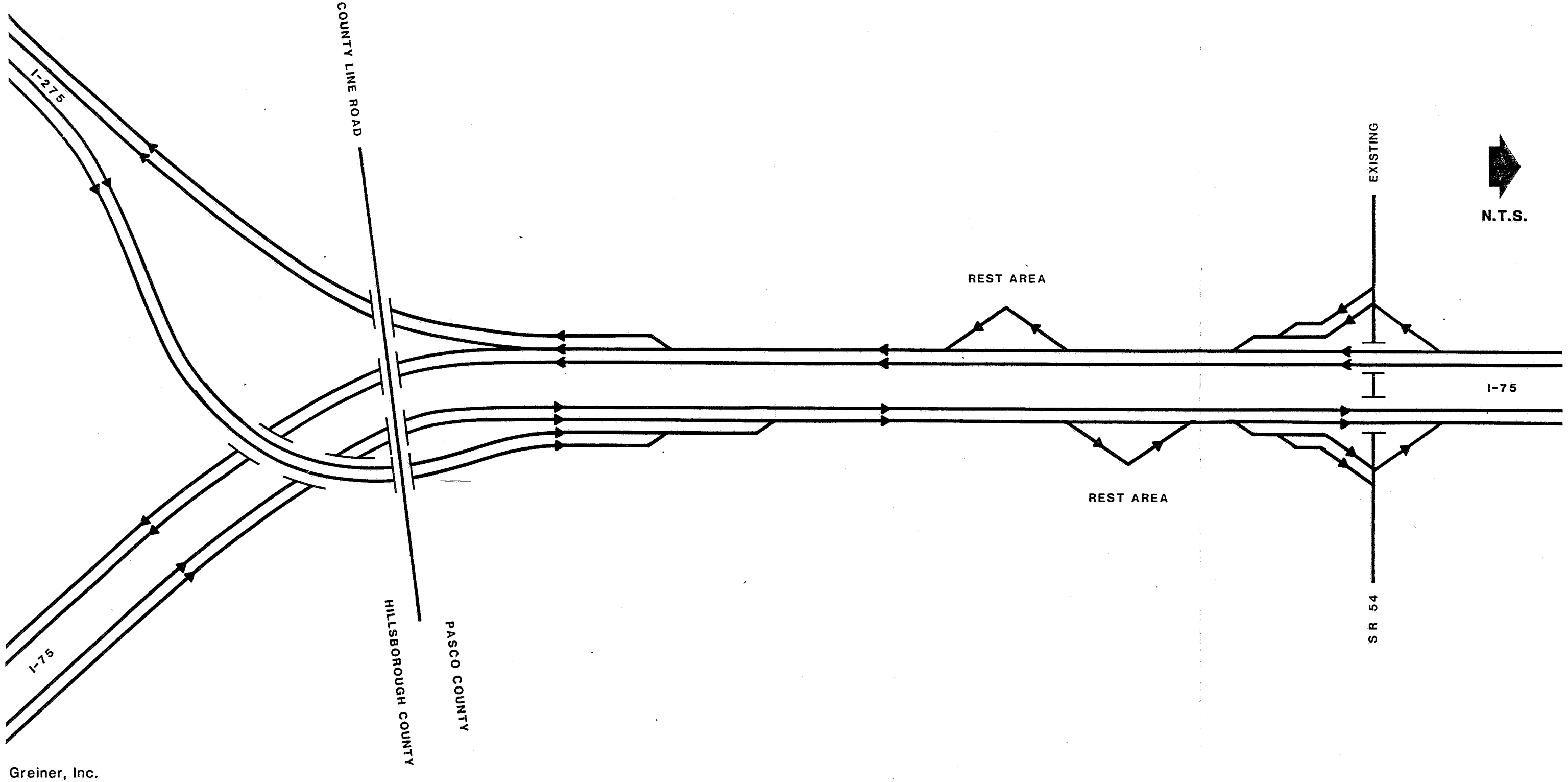
Table 8 summarizes the level of operation at the intersections of S.R. 54 (old) and the I-75 ramp terminals, and of S.R. 54 (new) and the I-75 ramp terminals. The capacity calculations for the ramp terminals are included in Appendix F.

Alternate Routes

With the exception of existing S.R. 54, there are no major east-west routes within the immediate project vicinity. Therefore, the adoption of the No-Build alternative would severely impede traffic flow on the Pasco County street system in the project area. Without the new interchange at S.R. 54 (new) and I-75, S.R. 54 (old) would have to accommodate the vehicle trips that under the Build condition would use S.R. 54 (new) to access I-75.

No-Build analyses involved mainline and ramp junction evaluations on I-75 and signalized intersection evaluations at the ramp terminals for 1995, and for 2010. The 1995 analysis was conducted to provide a comparison with the 1995 opening year Build alternatives analyses. The 2010 analysis was conducted to provide a comparison with the 2010 design year Build alternatives analyses. The 1995 analysis does not include the TIS Master Plan improvements for I-75.

The mainline and ramp analyses were performed for I-75 and the on- and off-ramps to and from S.R. 54 (old). A signalized intersection analysis was performed for the intersection of S.R. 54 (old) and the I-75 ramp terminals. The analyses were conducted using the procedures in the 1985 Highway Capacity Manual.



Greiner, Inc.

FLORIDA DEPARTMENT OF TRANSPORTATION

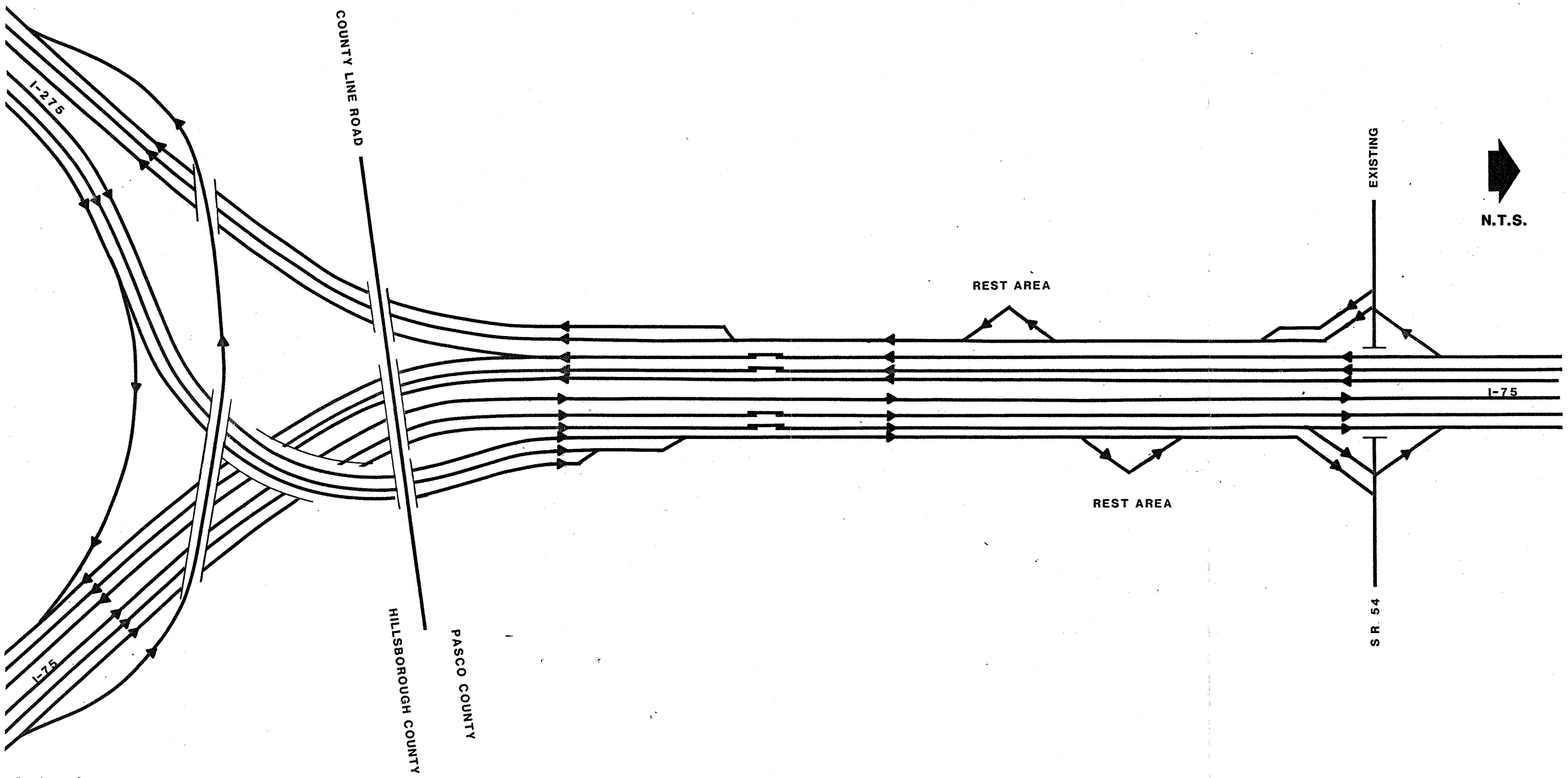
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

1995 NO BUILD ALTERNATIVE LANE CONFIGURATION

EXHIBIT 14



Greiner, Inc.

FLORIDA DEPARTMENT OF TRANSPORTATION

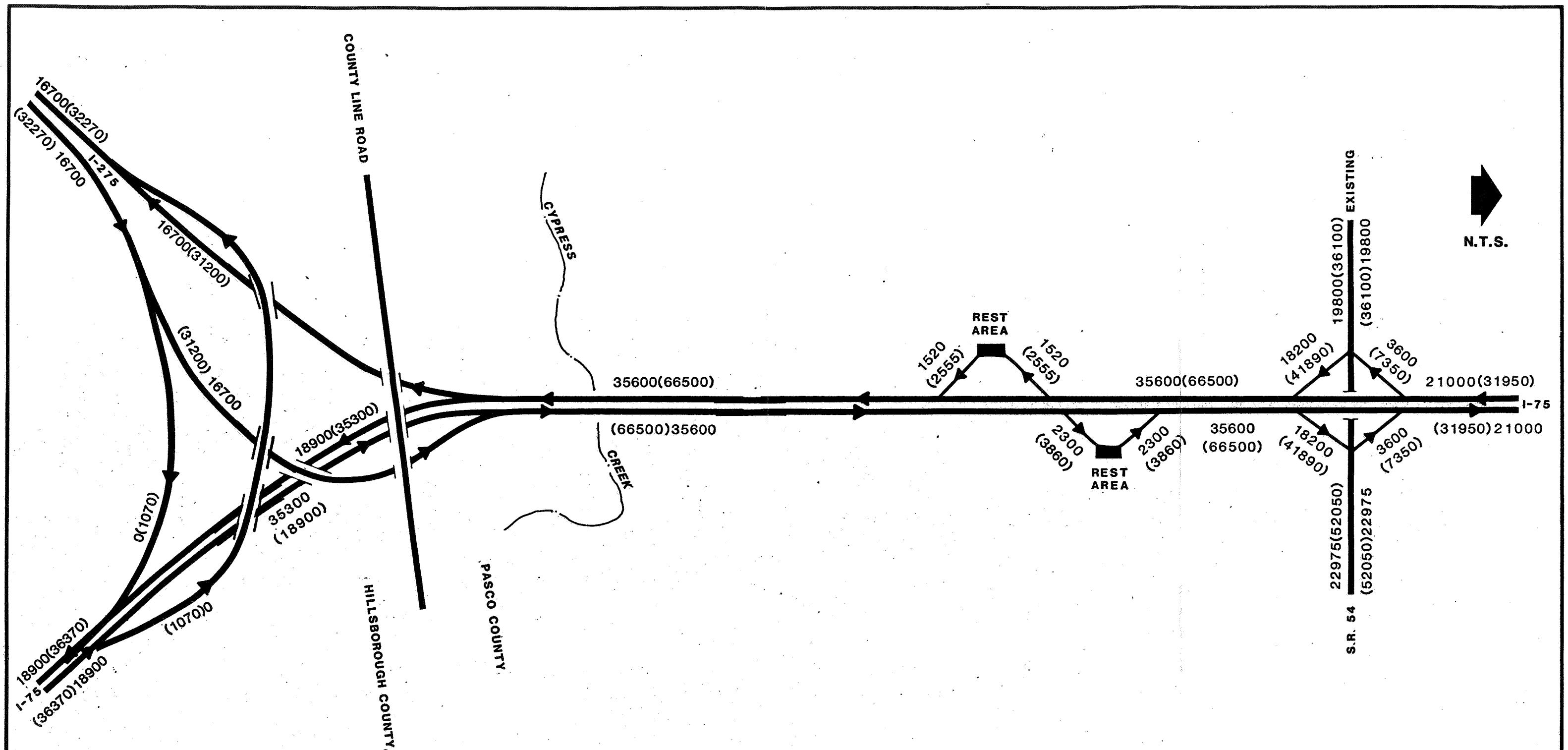
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

2010 NO BUILD ALTERNATIVE LANE CONFIGURATION

EXHIBIT 15



Greiner, Inc.

LEGEND

XXX 1995 Average Daily Traffic Volumes

(XXX) 2010 Average Daily Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

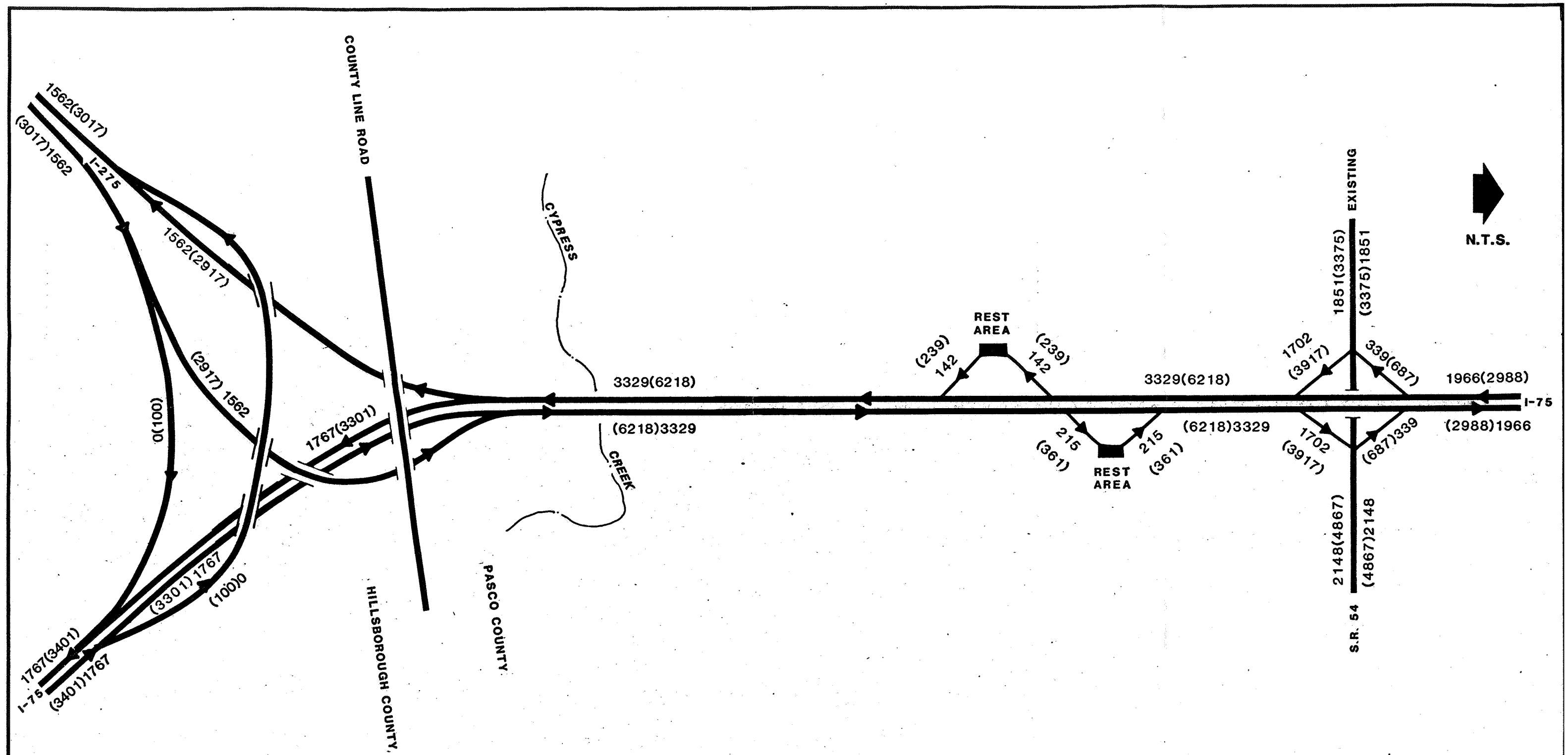
INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

NO BUILD ALTERNATIVE AVERAGE DAILY TRAFFIC VOLUMES (1995/2010)

EXHIBIT 16



Greiner, Inc.

LEGEND

XXX 1995 Directional Design Hour Traffic Volumes

(XXX) 2010 Directional Design Hour Traffic Volumes

FLORIDA DEPARTMENT OF TRANSPORTATION

INTERCHANGE JUSTIFICATION REPORT

I-75 / S.R. 54

Pasco County, Florida

NO BUILD ALTERNATIVE DIRECTIONAL DESIGN HOUR VOLUMES (1995/2010)

EXHIBIT 17

TABLE 8

DESIGN YEAR (2010) INTERSECTION CAPACITY ANALYSES (SIGNALIZED)

Intersection	Conditions	Period (Peak Hour)	V/C[1]	Average Delay[2]	Level of Service
I-75 Ramps and S.R. 54 (Old) (Urban Interchange)	Without County Line Road	A.M.	0.808	21.8	C
		P.M.	0.727	27.5	D
	With County Line Road	A.M.	0.757	21.6	C
		P.M.	0.727	24.7	C
I-75 Ramps and S.R. 54 (New) (Diamond Interchange)	Without County Line Road	A.M.	0.611	31.4	D
		P.M.	0.621	26.8	C
	With County Line Road	A.M.	0.826	20.5	C
		P.M.	0.841	21.2	C

[1] V/C = Volume to Capacity Ration
[2] Average Delay in Seconds per Vehicle

The lane configuration for mainline I-75 and for the ramps for 1995 and for 2010 are illustrated in Exhibits 14 and 15, respectively. The corresponding ADT and DDHV's are presented in Exhibits 16 and 17, respectively.

Table 9 summarizes the I-75 mainline and ramp junctions levels of service for 1995 and for 2010 for the No-Build alternative. As listed in the table, the mainline and the ramps will operate at LOS C or better north of S.R. 54 (old) in 1995 and at LOS B in 2010. The mainline will operate at LOS D south of S.R. 54 (old) in 1995 and at LOS D in 2010. The ramp merge is projected to operate at LOS D/E and the ramp diverge is projected to operate at LOS D/F in 1995. In 2010, the ramp merge and diverge will operate at LOS F. The ramp junction capacity calculations for both 1995 and 2010 are included in Appendix H.

The I-75 ramp terminals and the S.R. 54 (old) intersection were analyzed as an urban interchange for 1995 and for 2010 under signalized conditions. The analyses were performed under the premise that neither the S.R. 54 (new) interchange nor the County Line Road interchange will exist. The analyses were performed with S.R. 54 (old) as a six-lane roadway with dual left-turn lanes, the northbound I-75 off-ramp with dual left-turn lanes and dual right-turn lanes, and the southbound I-75 off-ramp with dual left-turn lanes and a single right-turn lane.

The analyses established that this intersection would operate at LOS C during both the A.M. and P.M. peak hours with the projected traffic volumes in 1995 and would not operate at an acceptable LOS during the A.M. or the P.M. peak hours with the projected traffic volumes in 2010. The V/C ratios in 2010 exceed the limits where delay and levels of service are meaningful. Therefore, even if an urban interchange were constructed at old S.R. 54 (no-build new S.R. 54 interchange) the LOS would not be acceptable.

TABLE 9

I-75 DESIGN HOUR FREEWAY OPERATIONS - NO BUILD

Roadway Segment	Direction	Freeway[1] Volume (in DDHV)	Number[2] of Lanes	Freeway LOS[3]	Merge Area			Diverge Area		
					Ramp Volume (in DDHV)[4]	Merge Volume (in pcph)[5]	Merge LOS[3]	Ramp Volume (in DDHV)[4]	Diverge Volume (in pcph)[5]	Diverge LOS[3]
For 1995										
From North of S.R. 54 (Old)	NB	1,966	2	B	339	1,078	C	--	--	-
to S.R. 54 (Old)	SB	1,966	2	B	--	--	-	339	1,107	C
From S.R. 54 (Old)	NB	3,329	2	D	--	--	-	1,702	1,587/2,386	D/F
to the South	SB	3,329	2	D	1,702	1,564/1,938	D/E	--	--	-
For 2010										
From North of S.R. 54 (Old)	NB	2,988	3	B	687	1,055	C	--	--	-
to S.R. 54 (Old)	SB	2,988	3	B	--	--	-	687	1,202	C
From S.R. 54 (Old)	NB	6,218	4	D	--	--	-	3,917	2,148/2,130	F/F
to the South	SB	6,218	4	D	3,917	2,200/2,228	F/F	--	--	-

[1]Refers to freeway volume that occurs before diverge and after merge.
[2]Per direction.
[3]LOS = Level of Service
[4]DDHV = Directional Design Hour Volume
[5]pcph = Passenger Cars Per Hour

Table 10 summarizes the level of operation of the intersection of S.R. 54 (old) and the I-75 ramp terminals for 1995 and for 2010. The intersection capacity calculations for the ramp terminals are included in Appendix I.

Traffic Safety

Accident data were obtained from FDOT for a five-year period (1983 to 1987). The accident data for each of the roadway segments in the study area are summarized in Tables 11 through 15. Table 11, which summarizes accidents on I-75 south of I-275, does not include the period from 1983 through 1985 as the roadway was not yet opened to traffic.

The safety ratio, the ratio of the actual accident rate to critical accident rate, is the criteria used to identify safety problems and/or high accident locations. The critical accident rate is the statewide average accident rate for a similar facility. Thus, a safety ratio greater than 1.00 indicates that the facility is experiencing more accidents than would be anticipated on this type of facility.

The tables indicate by year, the traffic volumes, the number of accidents, the actual accident rate, the critical accident rate, the safety ratio, the number of fatalities, the number of personal injuries, the number of accidents that resulted in property damage only, and the total economic loss for the year. As seen in the tables, there are only a few roadway segments that experience a safety ratio greater than 1.00. This occurs on I-75 from 0.5 miles south of County Line Road to County Line Road. The high safety ratio in this area is primarily due to driver error, possibly in changing lanes to avoid vehicles merging from I-275 immediately north of this segment of road. The section of I-75 from County Line Road to 0.5 miles north of County Line Road

TABLE 10

NO-BUILD ALTERNATIVE
INTERSECTION CAPACITY ANALYSES (SIGNALIZED)

Intersection	Year	Period (Peak Hour)	V/C[1]	Average Delay	Level of Service
S.R. 54 (Old) and I-75 Ramps	1995	A.M.	0.612	25.1	D
		P.M.	0.569	25.8	D
	2010	A.M.	1.453	*	*
		P.M.	1.393	*	*

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1 V/C = Volume to Capacity Ratio

*Delay and LOS not meaningful when V/C exceeds 1.2

Traffic Safety

Accident data were obtained from FDOT for a five-year period (1983 to 1987). The accident data for each of the roadway segments in the study area are summarized in Tables 11 through 15. Table 11, which summarizes accidents on I-75 south of I-275, does not include the period from 1983 through 1985 as the roadway was not yet opened to traffic.

The safety ratio, the ratio of the actual accident rate to critical accident rate, is the criteria used to identify safety problems and/or high accident locations. The critical accident rate is the statewide average accident rate for a similar facility. Thus, a safety ratio greater than 1.00 indicates that the facility is experiencing more accidents than would be anticipated on this type of facility.

The tables indicate by year, the traffic volumes, the number of accidents, the actual accident rate, the critical accident rate, the safety ratio, the number of fatalities, the number of personal injuries, the number of accidents that resulted in property damage only, and the total economic loss for the year. As seen in the tables, there are only a few roadway segments that experience a safety ratio greater than 1.00. This occurs on I-75 from 0.5 miles south of County Line Road to County Line Road. The high safety ratio in this area is primarily due to driver error, possibly in changing lanes to avoid vehicles merging from I-275 immediately north of this segment of road. The section of I-75 from County Line Road to 0.5 miles north of County Line Road experienced a safety ratio of 1.579 in 1987. This high safety ratio is due in part to the merging of two four-lane freeways to one four-lane freeway.

TABLE 11

ACCIDENT SUMMARY
I-75 FROM 0.53 MILES SOUTH OF COUNTY LINE ROAD TO COUNTY LINE ROAD
(Mile Post Marker 39.00 to 39.53)

Year	Roadway Type[a]	ADT[b]	Accidents	Actual[c] Accident Rate	Critical[c] Accident Rate	Safety Ratio	Number of Fatalities	Number of Injuries	Property Damage	Economic Loss
1986	4LRI	10,797	2	0.957	0.658	1.454	--	--	2	$ 6,000
1987	4LRI	20,004	3	0.775	0.643	1.205	2	5	--	581,500

[a]4LRI = Four-lane Rural Interstate
[b]Average Daily Traffic
[c]Accidents per million vehicle miles

Source: Data supplied by the Florida Department of Transportation.

TABLE 12

ACCIDENT SUMMARY
I-275 FROM 1.02 MILES SOUTH OF COUNTY LINE ROAD TO COUNTY LINE ROAD
(Mile Post Marker 15.00 to 16.02)

Year	Roadway Type[a]	ADT[b]	Accidents	Actual[c] Accident Rate	Critical[c] Accident Rate	Safety Ratio	Number of Fatalities	Number of Injuries	Property Damage	Economic Loss
1983	4LRI	21,586	3	0.373	0.742	0.502	--	3	1	$39,900
1984	4LRI	23,695	3	0.340	0.588	0.578	--	--	3	9,000
1985	4LRI	23,482	4	0.457	0.601	0.760	--	1	3	21,500
1986	4LRI	21,848	4	0.522	0.540	0.966	--	3	2	42,900
1987	4LRI	22,211	2	0.241	0.565	0.426	--	--	2	6,000

[a]4LRI = Four-lane Rural Interstate
[b]Average Daily Traffic
[c]Accidents per million vehicle miles

Source: Data supplied by the Florida Department of Transportation.

TABLE 13

ACCIDENT SUMMARY
I-75/I-275 FROM COUNTY LINE ROAD TO 0.5 MILES NORTH OF COUNTY LINE ROAD
(Mile Post Marker 0.00 to 0.50)

Year	Roadway Type[a]	ADT[b]	Accidents	Actual[c] Accident Rate	Critical[c] Accident Rate	Safety Ratio	Number of Fatalities	Number of Injuries	Property Damage	Economic Loss
1982	4LRI	20,500	4	1.069	0.889	1.203	0	2	2	18,000
1983	4LRI	20,505	3	0.801	0.847	0.945	0	1	2	18,300
1984*	4LRI	2	--	--	--	--	--	--	--	--
1985	4LRI/6LRI	29,093	2	0.376	0.662	0.567	0	2	1	27,600
1986	4LRI/6LRI	35,176	1	0.155	0.557	0.278	0	1	0	12,300
1987	4LRI/6LRI	35,276	6	0.932	0.590	1.579	0	6	2	79,800

[a]4LRI = Four-lane Rural Interstate
[b]Average Daily Traffic
[c]Accidents per million vehicle miles

Source: Data supplied by the Florida Department of Transportation.

TABLE 14

ACCIDENT SUMMARY
I-75 FROM 0.5 MILES NORTH OF COUNTY LINE ROAD TO SOUTH OF S.R. 54 (OLD) RAMPS
(Mile Post Marker 0.500 to 4.500)

Year	Roadway Type[a]	ADT[b]	Accidents	Actual[c] Accident Rate	Critical[c] Accident Rate	Safety Ratio	Number of Fatalities	Number of Injuries	Property Damage	Economic Loss
1983	4LRI	20,505	17	0.567	0.605	0.937	0	12	10	$177,600
1984	4LRI	27,084	12	0.303	0.465	0.651	0	20	--	246,000
1985	4LRI	29,093	19	0.447	0.470	0.951	1	13	9	446,900
1986	4LRI	35,176	11	0.214	0.400	0.535	0	15	3	193,500
1987	4LRI	35,276	10	0.194	0.425	0.456	1	10	2	389,000

[a]4LRI = Four-lane Rural Interstate
[b]Average Daily Traffic
[c]Accidents per million vehicle miles

Source: Data supplied by the Florida Department of Transportation.

TABLE 15

ACCIDENT SUMMARY
I-75 AT S.R. 54 (OLD) INTERCHANGE
(Mile Post Marker 4.50 to 5.50)

Year	Roadway Type[a]	ADT[b]	Accidents	Actual[c] Accident Rate	Critical[c] Accident Rate	Safety Ratio	Number of Fatalities	Number of Injuries	Property Damage	Economic Loss
1983	4LRI	20,809	11	1.442	0.749	1.925	0	9	5	$125,700
1984	4LRI	25,093	13	1.419	0.584	2.429	2	16	3	725,800
1985	4LRI	26,999	13	1.319	0.588	2.243	1	13	2	425,900
1986	4LRI	32,986	6	0.498	0.500	0.996	--	5	3	70,500
1987	4LRI	32,897	6	0.499	0.530	0.941	--	7	2	92,100

[a]4LRI = Four-lane Rural Interstate
[b]Average Daily Traffic
[c]Accidents per million vehicle miles

Source: Data supplied by the Florida Department of Transportation.

to 0.5 miles north of County Line Road experienced a safety ratio of 1.579 in 1987. This high safety ratio is due in part to the merging of two four-lane freeways to one four-lane freeway.

The other location where a high safety ratio was experienced is the I-75 and S.R. 54 (old) interchange. However, the safety ratio dropped below 1.00 in 1986 and 1987.

The anticipated growth in the study area is projected to increase traffic volumes by three to four times beyond the existing volumes. The growth in traffic will potentially increase the accident rate in the study area and result in a safety ratio greater than one. The future lane expansion of I-75 and I-275 in this area will increase the roadway capacity to accommodate the growth, which will in turn maintain or increase the distances between vehicles and reduce the number of conflicts between vehicles entering or exiting the traffic flow.

Environmental Overview

The study corridor for the S.R. 54 realignment project traverses roughly 18 miles from the western terminus located near S.R. 54/Cypress Creek bridge to the eastern terminus at U.S. 301. Through a detailed analysis of numerous parameters and considerations, the final study area was condensed to a 2-mile-wide area located due north of the Pasco County/Hillsborough County line. This study area encompasses an expanse of approximately 26 square miles.

Professional botanists and ecologists have initiated an inventory of the natural features within the study corridor. Utilizing various tools including ground truthing, helicopter flyovers, review of 1"=200' aerial photographs, infrared photographs, and United States Geological Survey (USGS) maps, the environmental team will locate, delineate, and access all natural features, communities, and systems in the project area. This data, combined with socioeconomic information and traffic engineering design criteria will be used to formulate the final roadway alignment.

The land use cover categories of the study corridor are characteristic of the rural region of central Florida. As is typical of this region, the pine palmetto flatwoods community is the most prevalent cover category within the study corridor. This upland community supports a canopy of long leaf pine on the drier sites and slash pine on the wetter area. The typical understory is saw palmetto, wiregrass, wax myrtle, fetterbush, and gallberry. Numerous portions of this community are relatively open due to controlled burning, ranching, and logging activities. Other less prevalent upland land cover categories include pasture, xeric oak, and several small orange groves.

Areas of lower relief support relatively small isolated freshwater marshes as well as cypress domes and occasional bayheads. Additionally, several natural drainage ways flow in a southerly direction through the corridor. Cypress Creek, located near the western termini, is the largest drainage way within the study corridor. Another large system near the western termini is Cabbage Swamp, which flows southeast under I-75, eventually forming Trout Creek. Three other smaller drainage systems within the corridor include Clay Gulley, New River, and Indian Creek. All of the above-referenced systems flow south, eventually reaching the Hillsborough River.

Preliminary field inspections, helicopter flyovers, and communication with applicable wildlife agencies indicate that the study corridor is not likely to support any resident endangered species. Nevertheless, as the project progresses, professional ecologists will conduct detailed wildlife reviews of all the potential alignments under consideration.

Cost-Effectiveness Analysis

A cost-effectiveness analysis has been accomplished for the I-75/S.R. 54 interchange project in order to define, in economic terms, the net benefits which can be expected to be gained if the proposed S.R. 54 improvements, including an interchange with I-75, are implemented. Basically, the analysis compares the costs of implementing the improvements against the road user benefits which can be expected to accrue from having the improvements in place. Costs include costs for engineering design, right-of-way acquisition, construction, maintenance, and operation of the new facility. Benefits include the reduction in road user expenditures which would be expected to result from traffic operations on the more efficient and safer transportation network with the new facility. The specific components of benefits and costs as identified in the study are discussed in detail in later pages.

The methodology used in this analysis follows guidelines written in the American Association of Highway and Transportation Officials (AASHTO) publication, A Manual On User Benefit Analysis Of Highway And Bus-Transit Improvements, 1977, hereinafter referred to as the "AASHTO manual." The AASHTO manual is the nationally accepted handbook for methodologies appropriate to transportation project cost-effectiveness analyses. It should be understood by the reader that the AASHTO

procedure emphasizes road user benefits and highway agency costs and that secondary costs and benefits, which are difficult or impossible to quantify, are not included. More on this subject is included in the final paragraphs of this report section.

Present Value

The AASHTO manual methodology prescribes the computation of "present value" (PV) for the periodic costs and benefits for a "No Improvement" alternative and for the improved condition over a specific time period in order to identify incremental costs and benefits attributable to the project. To paraphrase the AASHTO manual, "Present Value" is an economic concept representing the translation of costs and/or benefits occurring over time into a single amount at a single instant (usually the present). Present value is also called "Present Worth." "Net Present Value" refers to the net cumulative present value of a series of costs and benefits occurring over time, and is derived by applying to each cost or benefit in the series an appropriate discount factor which converts each cost or benefit to a present value. All costs, benefits, and other values presented in monetary terms herein are expressed in constant 1988 dollars.

Discount Rate

The assumption as to the appropriate "discount rate" to use in computing present value of future costs and benefits is an important one, and deserves some discussion here. Perhaps the most lucid and concise guidance to discount rate selection is found in the following passage from the AASHTO manual:

> "The discount rate for performing present value calculations on public projects should represent the opportunity cost of capital to the taxpayer, i.e., the estimated average market rate of return. However, the common practice of calculating benefits in constant dollars (usually at prices prevailing when the economic study is made) and discounting benefits at market rates of interest is in error, because the market or nominal rate of return includes (1) an allowance for expected inflation as well as (2) a return that represents the real cost of capital. Thus, if future benefits or costs are in constant dollars, they will be understated in relation to a market rate of return. Hence, if future benefits and costs are calculated in constant dollars, only the real cost of capital should be represented in the discount rate used. The real cost of capital has been estimated at about 4 percent in recent years for low-risk investments."

Based on the AASHTO manual recommendation, the authors of the present study have selected four percent as the discount rate for this analysis. However, the sensitivity of the analysis to increases in the discount rate has been examined by testing also for seven and ten percent discount rates. The results are discussed in later pages of this report section.

Time Period of the Analysis

Another important study feature is the selection of an analysis period. For the present study, the years 1993 through 2010 were used. Ideally, costs and benefits for investments should be analyzed over their entire economic lifetime which ranges from about five years for some traffic signals to more than 50 years for earthwork and some bridges. However, road user benefits (an important study component) can only be computed based on traffic volume projections which are rarely available for more than 20 to 25 years into the future. In the present analysis, traffic data, as estimated for the study, are available only through the year 2010. Therefore, the year 2010 has been set as the final analysis year.

The first year, 1993, is estimated to be the year during which a 24-month construction expenditure period would begin. The facility is assumed by the analysis to be opened to traffic in mid-1995 and benefits and costs for the project are calculated for a period from that date to the final year, 2010. These assumptions are appropriately conservative for the economic analysis being undertaken, since benefits in years beyond 2010 will certainly be realized as a result of the initial investment, but cannot be quantified for lack of traffic volume projections for those future years. The important point to be made is that benefits will most likely be more than those identified in the analysis. Therefore, if the project is found cost-effective using these conservative assumptions, project sponsors can be confident in its economic desirability.

Measures of Economic Desirability

The output of this analysis consists of a series of economic feasibility and desirability indicators. They are as follow:

* Net Present Value (NPV) - The difference between the present value of the total periodic benefits and the present value of total periodic costs.

* Benefit/Cost (B/C) Ratio - The ratio of the present value of the total periodic benefits to the present value of the total periodic costs.

* Internal Rate of Return (ROR) - A measure of the profitability of the project, ROR is equal to that discount rate for which NPV = 0 and B/C = 1.0.

The NPV and B/C are calculated with equations (1) and (2) respectively:

(1) $NPV = PV(\Delta U) - [PV(\Delta I) + PV(\Delta M) - PV(\Delta R)]$

(2) $B/C = PV(\Delta U) \div [PV(\Delta I) + PV(\Delta M) - PV(\Delta R)]$

Where:

PV = the present value of the associated parenthetical amount or series of amounts over time, discounted at the selected discount rate.

ΔU = reduction in the series of annual highway user expenses due to the investment (user expenses without the improvement less user expenses with the improvement); also termed "User Benefit."

ΔI = increased investment costs due to the construction of the improvement.

ΔM = increase in series of annual maintenance and operating costs due to the construction of the improvement.

ΔR = residual value of the facility due to the project at the end of the analysis period.

The "packback period" and "internal rate of return" measures are derived from the NPV and B/C calculations. The study results are summarized at the end of this report section and receive further introduction and explanation during later pages.

The determination of the values used in the intermediate calculations are discussed below.

Determination of Values of Benefits

In this section, the evaluation of user benefits, as introduced in equations (1) and (2) above, is explained and discussed in detail.

The AASHTO manual prescribes the computation of total road user expenditures ("U") for the condition with the improvement and for a "no improvement" condition, the difference between them ("ΔU") representing changes attributable to the improvement. If "ΔU" represents a reduction in road user expenditures, then that value is a "benefit" and can be used as such in a benefit/cost (B/C) calculation.

For each condition studied, "U" is a summarization of three separate items: 1) vehicle operating expenses, including fuel (gasoline) costs, lubricating oil costs, tire wear costs, auto maintenance (and repair) costs, and depreciation (new car) costs; 2) vehicle travel time expenses, or the cumulative dollar value of the vehicle occupants' time as it moves along a highway at a given speed; and 3) vehicle accident expenses, based on a historic average of the total dollar value of all fatality accidents, injury accidents, and property damage accidents which occur on the various roadway types.

The AASHTO manual provides tables, nomographs, charts, and formulas for computing or determining the values of the various components of "U" and

prescribes that future users of the information should index the prices to values prevailing at the time of the study using the Consumer Price Index.

Since the publishing of the AASHTO manual, the State of Alabama Highway Department Bureau of Urban Planning has undertaken to aggregate and consolidate the AASHTO manual procedures for determining "U" into a more readily usable format. The result has been a very straightforward, concise handbook entitled Road User Costs (1980). Repeated references to the handbook will be made throughout the following explanation of the calculation of "U" for this analysis.

(1) Vehicle Operating Expenses

Values for the various vehicle operating expense components are provided in the Road User Costs document by road type and by traveling speed. Since changes in these costs are most sensitive to fuel prices, the values are provided for various fuel price levels. For the present study, the authors have chosen to use road user cost values based on fuel prices at $1.00/gallon since this is the approximate average cost per gallon of fuel prevailing at the time of this study.

(2) Vehicle Travel Time Expenses

To evaluate vehicle travel time expenses, the AASHTO manual used two studies from the University of Chicago and Stanford Research Institute which established the value of commuter travel time in the late 1960's to be approximately $2.80 per hour. From that basis, the manual used more recent findings of a Highway Research Record study which showed that time value is sensitive to trip purpose, traveler's income levels, and

the amount of time saved during a trip type. In the Road User Cost document, the time value utilized from the AASHTO manual was for a 5- to 15-minute work trip.

The resulting value was $3.69 per hour per vehicle occupant, multiplied times the national average 1.25 persons per vehicle for that trip type, resulting in a travel time per vehicle hour of $4.61 (March 1980 dollars). In order to index that value to 1988 dollars, the Consumer Price Index (CPI) was used as follows:

CPI, Dec. 1988 = 361.0

CPI, Mar. 1980 = 239.8 = 1.50 update factor

$4.61/vehicle hour (March 1980 value) x 1.50 update = $6.91/vehicle hour

Vehicle Accident Expenses

Accident expenses per vehicle mile of travel were computed in the Road User Cost document using actual historic vehicle accident statistics for the State of Alabama and accident costs by type of accident as obtained from the National Safety Council. The accident cost per vehicle mile calculated for Alabama agrees closely with the AASHTO manual-reported average accident cost for a mix of freeway and non-freeway facilities. Therefore, it was deemed appropriate that the Alabama accident cost values be used intact in the present analysis.

Total Road User Expenses ("U") and Benefits ("ΔU")

Total road user expenses ("U") for any given scenario are found from information in the tables contained in the Road User Costs document as described above. Assumptions are required as to facility type and assumed average speed for vehicles on the facility. The Road User Costs tables provide a "cost-per-vehicle-mile-traveled" rate for various facility types and operating speeds. These rates can be applied to the vehicle-miles-traveled data developed for the Build and the No Build conditions for any given year or years.

In the present study, the average vehicle operating speed on the proposed S.R. 54 was assumed to be 36 miles per hour in the 1995 Build condition. Expected traffic volumes on the proposed road were assumed to be as reported.

In the No Build alternative, the traffic which would use the improved S.R. 54 if it were in place in future years was assumed to use the other available routes to make this travel. Those trips were assumed to be distributed over local arterial streets such as C.R. 581, C.R. 577, C.R. 579, and S.R. 54 (old). Total vehicle miles traveled and facility type for potential patrons are summarized on Table 16.

Annual road user expenses ("U") for the conditions with and without the expressway were found by applying the cost-per-vehicle-mile-traveled for freeway and arterials to the VMT data shown in Table 16. The results are summarized in Table 17. The difference ("ΔU") between the annual road user expenses for the "No Improvement" alternative and the annual road user expenses for the condition with the S.R. 54 (new)

TABLE 16

POTENTIAL S.R. 54 PATRONS VEHICLE MILES TRAVELED (VMT) WITH AND WITHOUT IMPROVEMENT

Condition	Facility Type	Average Daily VMT 1995	Average Daily VMT 2010
"No Build" Alternative	Arterials	1,251,037	2,302,803
"No Build" Alternative	Freeway	504,356	874,980
S.R. 54 New In Place	Arterials	1,154,309	2,115,149
S.R. 54 New In Place	Freeway	488,050	822,330

TABLE 17

ANNUAL ROAD USER EXPENSES ("U") AND BENEFITS ("ΔU")

Condition	Annual Road User Expenses ("U")	Annual Road User Benefit ("ΔU")
1995		
No Build Alternative	$297,441,095	N/A
S.R. 54 (new) In Place	$290,038,134	$7,402,961
2010		
No Build Alternative	$750,001,785	N/A
S.R. 54 (new) In Place	$563,201,728	$186,748,049

in place can be considered a "benefit" of implementing the project and is used as such in the B/C ratio calculation. "ΔU" for the opening year (1995) and each succeeding year to the final analysis year (2010) are summarized in the tables at the end of this section.

Determination of Values of Costs

In this section, evaluation of costs, as introduced in equations (1) and (2), is explained and discussed in detail.

(1) "ΔI" Investment Costs

As mentioned previously, "ΔI" includes costs for engineering design, right-of-way acquisition, and construction of the facility. It is estimated these costs for the S.R. 54 (new), including the I-75 interchange, would be approximately $52.1 million. Table 18 provides an estimate of the costs for the S.R. 54 (new). For this analysis, it is assumed the right-of-way/construction activity would begin in 1993 and would span 24 months. The entire project is expected to be completed in mid-1995.

(2) "ΔM" Maintenance and Operating Costs

Maintenance costs include routine or periodic upkeep of the facility (patching, striping, drainage cleanout, landscaping) and replacements (pavement resurfacing, crash barrier replacement). Operating costs include those continuing costs associated with administration of S.R. 54.

TABLE 18

TOTAL PROJECT COST ESTIMATE
S.R. 54 (New) Interchage

Roadway	$27,224,147
Bridges	1,950,000
Subtotal	29,174,147
Contingency 18%	5,251,346
Engineering 10%	2,917,414
Subtotal	37,342,907
Right-of-Way	12,368,000
Subtotal	49,710,907
Legal and Administration @ 5%	2,485,545
TOTAL	$52,196,452

Annual maintenance and operating costs ("ΔM"), found as described above, are summarized in the tables presented at the end of this section.

(3) "ΔR" Residual Value

The residual value of the project at the end of the analysis period is calculated by adding the full cost of land for right-of-way and the product of the proportion of the remaining life of the facility and its cost. In the present analysis, the life of roadway portions of the facility is estimated at 25 years; the life of structural portions is estimated at 50 years. The study period covers only the first 17 years of that expected life. Therefore, residual value is computed for those components of the S.R. 54 (new) expected which are to have a longer useful life. This is accomplished by finding the product of that component's estimated construction costs and a factor which represents the portion of its remaining useful life at the end of the analysis period. The total value of "ΔR" is added in the final year of the analysis.

Conclusions of the Cost-Effectiveness Analysis

As discussed previously, outputs of the analysis include:

* Benefit/Cost Ratio (B/C)
* Net Present Value (NPV)
* Payback Period
* Internal Rate of Return (ROR)

Tables 19 through 21 provide the results of the computations of these indices of cost-effectiveness for the proposed I-75/S.R. 54 Interchange, based on assumed

TABLE 19

Alternative: S.R. 54/I-75
COST EFFECTIVENESS ANALYSIS
NET PRESENT VALUE AND BENEFIT/COST RATIO
(CONSTANT 1988 DOLLARS)

YEAR	COMPOUND INTEREST FACTOR * (PV)	USER BENEFITS (ΔU)	INVESTMENT COSTS (ΔI)	MAINTENANCE COSTS (ΔM)	RESIDUAL VALUE (ΔR)	NET PRESENT VALUE ** (NPV)	BENEFIT/COST RATIO *** (B/C)
1993	1.0000	0	39,147,339	0	0	(39,147,339)	0.00
1994	0.9615	0	13,049,113	0	0	(51,694,563)	0.00
1995	0.9246	7,402,961	0	33,750	0	(44,881,313)	0.13
1996	0.8890	9,180,412	0	33,750	0	(36,749,964)	0.23
1997	0.8548	11,384,629	0	33,750	0	(27,047,185)	0.48
1998	0.8219	14,118,078	0	33,750	0	(15,470,834)	0.79
1999	0.7903	17,507,829	0	33,750	0	(1,660,876)	0.97
2000	0.7599	21,711,459	0	33,750	0	14,812,401	1.29
2001	0.7307	26,924,380	0	33,750	0	34,461,121	1.66
2002	0.7026	33,388,923	0	33,750	0	57,896,023	2.12
2003	0.6756	41,405,604	0	33,750	0	85,845,365	2.65
2004	0.6496	51,347,089	0	33,750	0	119,177,532	3.29
2005	0.6246	63,675,525	0	33,750	0	158,927,997	4.06
2006	0.6006	78,964,019	0	33,750	0	206,331,471	4.97
2007	0.5775	97,923,280	0	33,750	0	262,860,235	6.05
2008	0.5553	121,434,659	0	33,750	0	330,269,851	7.35
2009	0.5339	150,591,121	0	33,750	0	410,653,662	8.89
2010	0.5134	186,748,049	0	33,750	22,366,727	517,990,267	13.76
				0			

* ASSUMES DISCOUNT RATE = 4 %

NOTE : INTERNAL RATE OF RETURN = 30.43 %

** NPV = PV(ΔU) - [PV(ΔI) + PV(ΔM) - PV(ΔR)]

*** B/C = PV(ΔU) ÷ [PV(ΔI) + PV(ΔM) - PV(ΔR)]

TABLE 20

Alternative: S.R. 54/I-75
COST EFFECTIVENESS ANALYSIS
NET PRESENT VALUE AND BENEFIT/COST RATIO
(CONSTANT 1988 DOLLARS)

YEAR	COMPOUND INTEREST FACTOR * (PV)	USER BENEFITS (ΔU)	INVESTMENT COSTS (ΔI)	MAINTENANCE COSTS (ΔM)	RESIDUAL VALUE (ΔR)	NET PRESENT VALUE ** (NPV)	BENEFIT/COST RATIO *** (B/C)
1993	1.0000	0	39,147,339	0	0	(39,147,339)	0.00
1994	0.9346	0	13,049,113	0	0	(51,342,772)	0.00
1995	0.8734	7,402,961	0	33,750	0	(44,906,217)	0.13
1996	0.8163	9,180,412	0	33,750	0	(37,439,817)	0.27
1997	0.7629	11,384,629	0	33,750	0	(28,780,286)	0.44
1998	0.7130	14,118,078	0	33,750	0	(18,738,354)	0.64
1999	0.6663	17,507,829	0	33,750	0	(7,094,638)	0.86
2000	0.6227	21,711,459	0	33,750	0	6,405,150	1.12
2001	0.5820	26,924,380	0	33,750	0	22,055,741	1.43
2002	0.5439	33,388,923	0	33,750	0	40,198,745	1.78
2003	0.5083	41,405,604	0	33,750	0	61,230,098	2.19
2004	0.4751	51,347,089	0	33,750	0	85,608,696	2.66
2005	0.4440	63,675,525	0	33,750	0	113,866,405	3.21
2006	0.4150	78,964,019	0	33,750	0	146,619,660	3.84
2007	0.3878	97,923,280	0	33,750	0	184,582,908	4.58
2008	0.3624	121,434,659	0	33,750	0	228,584,184	5.43
2009	0.3387	150,591,121	0	33,750	0	279,583,175	6.42
2010	0.3166	186,748,049	0	33,750	22,366,727	345,772,873	8.76
				0			

* ASSUMES DISCOUNT RATE = 7 %

NOTE : INTERNAL RATE OF RETURN = 30.43 %

** NPV = PV(ΔU) - [PV(ΔI) + PV(ΔM) - PV(ΔR)]

*** B/C = PV(ΔU) ÷ [PV(ΔI) + PV(ΔM) - PV(ΔR)]

TABLE 21

Alternative: S.R. 54/I-75
COST EFFECTIVENESS ANALYSIS
NET PRESENT VALUE AND BENEFIT/COST RATIO
(CONSTANT 1988 DOLLARS)

YEAR	COMPOUND INTEREST FACTOR * (PV)	USER BENEFITS (ΔU)	INVESTMENT COSTS (ΔI)	MAINTENANCE COSTS (ΔM)	RESIDUAL VALUE (ΔR)	NET PRESENT VALUE ** (NPV)	BENEFIT/COST RATIO *** (B/C)
1993	1.0000	0	39,147,339	0	0	(39,147,339)	0.00
1994	0.9091	0	13,049,113	0	0	(51,010,169)	0.00
1995	0.8264	7,402,961	0	33,750	0	(44,919,912)	0.12
1996	0.7513	9,180,412	0	33,750	0	(38,047,889)	0.25
1997	0.6830	11,384,629	0	33,750	0	(30,295,087)	0.41
1998	0.6209	14,118,078	0	33,750	0	(21,549,827)	0.58
1999	0.5645	17,507,829	0	33,750	0	(11,686,165)	0.77
2000	0.5132	21,711,459	0	33,750	0	(562,073)	0.99
2001	0.4665	26,924,380	0	33,750	0	11,982,604	1.23
2002	0.4241	33,388,923	0	33,750	0	26,128,454	1.51
2003	0.3855	41,405,604	0	33,750	0	42,079,095	1.82
2004	0.3505	51,347,089	0	33,750	0	60,864,107	2.17
2005	0.3186	63,675,525	0	33,750	0	80,342,333	2.57
2006	0.2897	78,964,019	0	33,750	0	103,205,625	3.01
2007	0.2633	97,923,280	0	33,750	0	128,982,998	3.52
2008	0.2394	121,434,659	0	33,750	0	158,045,410	4.08
2009	0.2176	150,591,121	0	33,750	0	190,811,081	4.72
2010	0.1978	186,748,049	0	33,750	22,366,727	232,176,647	5.96
				0			

* ASSUMES DISCOUNT RATE = 10 %

NOTE : INTERNAL RATE OF RETURN = 30.43 %

** NPV = PV(ΔU) - [PV(ΔI) + PV(ΔM) - PV(ΔR)]

*** B/C = PV(ΔU) ÷ [PV(ΔI) + PV(ΔM) - PV(ΔR)]

discount rates of four, seven, and ten percent, respectively. The format of the tables provides the reader with information concerning year-by-year benefits and costs as assumed in the analysis and a "running computation" of NPV and B/C. The payback period is indicated by that year in which the NPV becomes a positive number and the B/C ratio becomes a number equal to or larger than 1.0. The ROR is indicated by a note at the bottom of the table.

As indicated in Table 19, assuming a four percent discount rate, NPV is equal to approximately $517 million, the B/C ratio is 13.76, the Payback Period is eleven years, and the ROR is greater than 30 percent.

Generally speaking, economic desirability of a project is indicated by a NPV which is greater than zero, a B/C ratio greater than 1.0, and an internal ROR greater than the discount rate. It can be seen from Table 20 that the proposed project meets and well exceeds these criteria. Therefore, it can be assumed that the project will provide road user benefits which would exceed project construction, maintenance, and operating costs.

Tables 19 and 20, in the same format as Table 21, show results with assumptions as to the discount rate changed in order to provide the reader with information concerning the sensitivity of the analysis to such changed assumptions. It can be seen from Tables 19 and 20 that the project would exceed traditionally held criteria for cost-effectiveness even at the high 10 percent discount rate.

SUMMARY AND ACTION

The proposed interchange at I-75 and S.R. 54 (new) is necessary to provide safe and efficient access to the Interstate. As documented herein, traffic operations along mainline I-75 will maintain an acceptable level of service with the proposed interchange. Furthermore, the existing S.R. 54 (old) arterial and street system are inadequate to accommodate projected traffic volumes safely and efficiently without the proposed project.

The need for the interchange resulted from extensive analysis of various alternatives to enable the arterial street system to obtain a satisfactory level of service in the future. As a six-lane facility State Road 54 (new) will provide direct access east and west in Pasco County would improve levels of service at the I-75 ramp terminal on S.R. 54.

In view of the facts presented in this report, it is proposed and recommended that the I-75/S.R. 54 interchange be undertaken, as it is vital to the transportation needs of Pasco County. It is further proposed and recommended that the justification contained herein provides the necessary data and evaluations for FDOT to recommend approval to the FHWA.

APPENDICES

APPENDIX A

EXISTING RAMP JUNCTION CAPACITY CALCULATIONS

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	951	153	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 77 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	447	153	951
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	485	164	1021

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1185	A
MERGE:	649	B

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	1308	195	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 71 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	565	195	1308
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	613	209	1405

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1614	B
MERGE:	822	B

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	885	152	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 79 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	549	152	885
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	596	163	951

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	951	A
DIVERGE:	596	A

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	1262	175	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 72 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	691	175	1262
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	750	188	1356

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1356	A
DIVERGE:	750	B

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1261	310	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 72 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	761	310	1261
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	826	333	1354

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1354	A
DIVERGE:	826	B

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1918	610	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	1144	610	1918
ET	1.7	1.7	1.7
Fhv	0.98	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1229	655	2060

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2060	B
DIVERGE:	1229	C

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	733	645	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 81 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	315	645	733
ET	1.7	1.7	1.7
Fhv	0.96	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	345	693	787

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1480	B
MERGE:	1038	C

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1087	354	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 75 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	470	354	1087
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	510	380	1168

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1548	B
MERGE:	890	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1136	125	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 74 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	514	125	1136
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	558	134	1220

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1354	A
MERGE:	692	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1784	134	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	736	134	1784
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	799	144	1916

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2060	B
MERGE:	943	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	1378	121	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 70 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	703	121	1378
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	763	130	1480

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1480	B
DIVERGE:	763	B

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .55
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
VOLUME	N.A.	1441	85	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 69 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	706	85	1441
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	766	91	1548

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1548	B
DIVERGE:	766	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1261	125	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 72 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	665	125	1261
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	722	134	1354

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1354	A
DIVERGE:	722	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1918	134	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	896	134	1918
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	972	144	2060

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2060	B
DIVERGE:	972	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 AM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1257	121	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 72 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	662	121	1257
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	718	130	1350

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1350	A
DIVERGE:	718	B

****

FACILITY LOCATION... I75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1988 PM PEAK HOUR
DATE OF ANALYSIS.... 12/15/88
OTHER INFORMATION... SB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1356	85	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 71 % OF FREEWAY TRUCKS

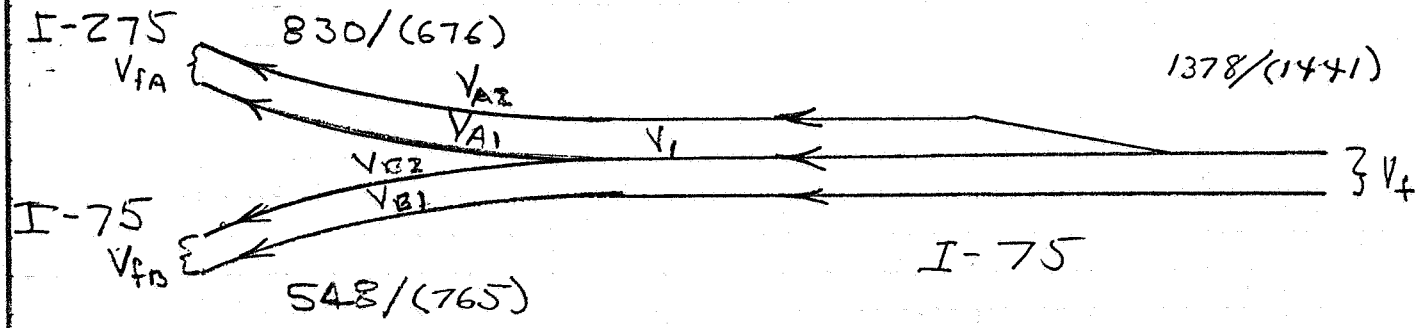
RAMP ANALYZED ALONE USING FIGURE 1.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	677	85	1356
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	735	91	1456

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	1456	B
DIVERGE:	735	B

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & I-275 APEX INTERCHANGE DIVERGE ANALYSIS FOR 1988 TRAFFIC COMPUTED BY VC DATE 12/19/88
CHECKED BY ___ DATE ___



A.M. PEAK HOUR

1. ASSUME V_{B2} = 20 PERCENT OF V_{fB}
   $= .20(548) = 110$ VPH
2. ASSUME V_{A1} = 80 PERCENT OF V_{fA}
   $= .80(830) = 664$ VPH
3. THEN $V_{A1} + V_{B2} = 110 + 664 = 774$ VPH
   $\therefore V_1$ (PCPH) $= 774/(.98)(.95) = 831$ PCPH (LOS B)

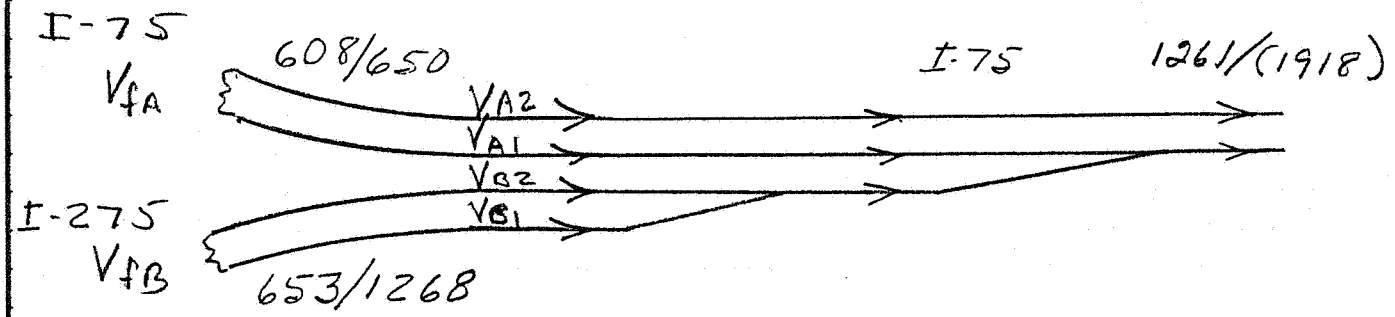
P.M. PEAK HOUR

USING THE SAME ASSUMPTIONS

1. $V_{B2} = .20(765) = 153$ VPH
2. $V_{A1} = .80(676) = 541$ VPH
3. $V_{A1} + V_{B2} = 694$ VPH
   $\therefore V_1 = 694/(.98)(.95) = 745$ PCPH (LOS B)

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & I-275 APEX INTERCHANGE MERGE ANALYSIS FOR 1998 TRAFFIC COMPUTED BY VC DATE 12/19/88
CHECKED BY ___ DATE ___



AM PEAK HOUR

1. ASSUME V_{B1} = 20 PERCENT of V_{fB}
   $= .20(653) = 131$ VPH
2. THEN $V_{B2} = 653 - 131 = 522$ VPH
3. ASSUME V_{A1} = 20 PERCENT OF V_{fA}
   $= .20(608) = 122$ VPH
4. CHECK V_{B1} & V_{B2} MERGE
   $V_{B1} + V_{B2} = 653/(.98)(.95) = 701$ PCPH (LOS B)
5. CHECK V_{B2} & V_{A1} MERGE
   $V_{B2} + V_{A1} = 653 + 122 = 775$ VPH
   $= 775/(.98)(.95) = 832$ PCPH (LOS B)

Greiner, Inc.

JOB I-75 & SR 54 IJR — SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & I-275 APEX INTERCHANGE MERGE ANALYSIS FOR 1988 TRAFFIC — COMPUTED BY VC — DATE 12/19/84
CHECKED BY ___ — DATE ___

P.M PEAK HOUR

USING THE SAME ASSUMPTIONS

1. $V_{B1} = .20(1268) = 254$ VPH
2. $V_{B2} = 1014$ VPH
3. $V_{A1} = (.20)(650) = 130$ VPH
4. CHECK V_{B1} & V_{B2} MERGE

$V_{B1} + V_{B2} = 1268/(.98)(.95) = 1362$ PCPH.

MERGE CRITERIA FROM HCM, ESTABLISHES $V_{B1} + V_{B2}$ LOS AT C

5. CHECK V_{B2} & V_{A1} MERGE

$V_{B2} + V_{A1} = 1014 + 130 = 1144$ VPH

$= 1144/(.98)(.95) = 1229$ PCPH

MERGE CRITERIA FROM HCM ESTABLISHES $V_{B2} + V_{A1}$ LOS AT C.

APPENDIX B

EXISTING RAMP TERMINAL INTERSECTION CAPACITY CALCULATIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET..... 40

PEAK HOUR FACTOR..... .9

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... SR 54 (OLD)

NAME OF THE NORTH/SOUTH STREET..... I-75

NAME OF THE ANALYST..... VG

DATE OF THE ANALYSIS (mm/dd/yy)..... 12/7/88

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION: EAST RAMP

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	166	0	162	0
THRU	414	506	0	0
RIGHT	0	0	0	0

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	2	1	1	1
LANE USAGE			LTR	LTR

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	0.00	90	35	Y

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	3	0	0
WESTBOUND	3	0	0
NORTHBOUND	3	0	0
SOUTHBOUND	3	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.10	5.10	0.00	5.10
SB	6.10	5.10	0.00	5.10
MAJOR LEFTS				
WB	5.80	5.80	0.00	5.80
EB	5.80	5.80	0.00	5.80
MINOR THROUGHS				
NB	7.40	7.40	0.00	7.40
SB	6.90	6.90	0.00	6.90
MINOR LEFTS				
NB	7.90	7.90	0.00	7.90
SB	7.40	7.40	0.00	7.40

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)		SHARED CAPACITY c_{SH} (pcph)		RESERVE CAPACITY $c_R = c_{Sh} - v$		LOS
MINOR STREET									
NB LEFT	183	89	62	>	62	>	-121	>	F
THROUGH	0	113	79	>	62	79 >	-121	79 >	F
RIGHT	0	957	957	>		957 >		957 >	A
MINOR STREET									
SB LEFT	0	113	79	>		79 >		79 >	E
THROUGH	0	138	97	>	0	97 >	0	97 >	E
RIGHT	0	659	659	>		659 >		659 >	A
MAJOR STREET									
EB LEFT	187	505	505			505		318	E
WB LEFT	0	578	578			578		578	A

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET..... 45

PEAK HOUR FACTOR..... .9

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... ST 54 (OLD)

NAME OF THE NORTH/SOUTH STREET..... I-70

NAME OF THE ANALYST..... VB

DATE OF THE ANALYSIS (mm/dd/yy)..... 12/7/88

TIME PERIOD ANALYZED..... AM PEAK HOUR

OTHER INFORMATION: WEST RAMP

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	227	0	42
THRU	538	456	0	0
RIGHT	0	0	0	0

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	1	2	1	1
LANE USAGE			LTR	LTR

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	0.00	90	35	Y

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	3	0	0
WESTBOUND	3	0	0
NORTHBOUND	3	0	0
SOUTHBOUND	3	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.10	5.10	0.00	5.10
SB	6.10	5.10	0.00	5.10
MAJOR LEFTS				
WB	5.30	5.30	0.00	5.30
EB	5.30	5.30	0.00	5.30
MINOR THROUGHS				
NB	6.90	6.90	0.00	6.90
SB	7.40	7.40	0.00	7.40
MINOR LEFTS				
NB	7.40	7.40	0.00	7.40
SB	7.90	7.90	0.00	7.90

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R			LOS
MINOR STREET										
NB LEFT	0	68	54	>		54	>	54	>	E
THROUGH	0	113	70	>	0	70	>	0 70	>	E
RIGHT	0	632	632	>		632	>	632	>	A
MINOR STREET										
SB LEFT	47	70	44	>		44	>	-4	>	F
THROUGH	0	88	54	>	44	54	>	-4 54	>F	E
RIGHT	0	934	934	>		934	>	934	>	A
MAJOR STREET										
EB LEFT	0	623	623			623		623		A
WB LEFT	256	557	557			557		301		B

1980 HCM: UNSIGNALIZED INTERSECTIONS

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET..... 45
PEAK HOUR FACTOR..... .9
AREA POPULATION..... 150000
NAME OF THE EAST/WEST STREET..... SR 54 (OLD)
NAME OF THE NORTH/SOUTH STREET..... I 75
NAME OF THE ANALYST..... VS
DATE OF THE ANALYSIS (mm/dd/yy)..... 12/??/85
TIME PERIOD ANALYZED..... PM PEAK HOUR
OTHER INFORMATION: EAST RAMP

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG
MAJOR STREET DIRECTION: EAST/WEST
CONTROL TYPE NORTHBOUND: STOP SIGN
CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	71	0	262	0
THRU	356	684	0	0
RIGHT	0	0	0	0

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	2	1	1	0
LANE USAGE			LR	

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	3	0	0
WESTBOUND	3	0	0
NORTHBOUND	3	0	0
SOUTHBOUND	3	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.10	5.10	0.00	5.10
SB	6.10	6.10	0.00	6.10
MAJOR LEFTS				
WB	5.80	5.80	0.00	5.80
EB	5.80	5.80	0.00	5.80
MINOR THROUGHS				
NB	7.40	7.40	0.00	7.40
SB	6.90	6.90	0.00	6.90
MINOR LEFTS				
NB	7.90	7.90	0.00	7.90
SB	7.40	7.40	0.00	7.40

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) Sh		RESERVE CAPACITY c = c - v R Sh		LOS
MINOR STREET									
NB LEFT	295	86	73	>		73	>	-222	> F
THROUGH	0	109	93	>	73	93	> -222	93	> F
RIGHT	0	985	985	>		985	>	985	> E
MINOR STREET									
SB LEFT	0	109	93			93		93	E
THROUGH	0	134	115	>		115	>	115	> E
RIGHT	0	388	388	>	0	388	> 0	388	> E
MAJOR STREET									
EB LEFT	80	388	386			388		308	E
WB LEFT	0	624	624			624		624	E

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET..... 45

PEAK HOUR FACTOR..... .9

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... SR 54 (OLD)

NAME OF THE NORTH/SOUTH STREET..... I-75

NAME OF THE ANALYST..... VG

DATE OF THE ANALYSIS (mm/dd/yy)..... 12/7/95

TIME PERIOD ANALYZED..... PM PEAK HOUR

OTHER INFORMATION: WEST RAMP

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND:

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	0	178	0	64
THRU	392	736	0	0
RIGHT	0	0	0	0

NUMBER OF LANES AND LANE USAGE

	EB	WB	NB	SB
LANES	1	2	1	1
LANE USAGE			LTR	LTR

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	0.00	90	35	Y
SOUTHBOUND	0.00	90	35	Y

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	3	0	0
WESTBOUND	3	0	0
NORTHBOUND	3	0	0
SOUTHBOUND	3	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS				
NB	6.10	5.10	0.00	5.10
SB	6.10	5.10	0.00	5.10
MAJOR LEFTS				
WB	5.30	5.30	0.00	5.30
EB	5.30	5.30	0.00	5.30
MINOR THROUGHS				
NB	6.90	6.90	0.00	6.90
SB	7.40	7.40	0.00	7.40
MINOR LEFTS				
NB	7.40	7.40	0.00	7.40
SB	7.90	7.90	0.00	7.90

MOVEMENT	FLOW-RATE v (pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
NB LEFT	0	75	58	>	58	>	58	>	E
THROUGH	0	97	75	>	0 75	>	0 75	>	E
RIGHT	0	766	766	>	766	>	766	>	A
MINOR STREET									
SB LEFT	38	60	46	>	46	>	8	>	E
THROUGH	0	75	58	>	46 58	>	8 58	>	E E
RIGHT	0	788	788	>	788	>	788	>	A
MAJOR STREET									
EB LEFT	0	417	417		417		417		A
WB LEFT	201	674	674		674		473		A

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....12/6/88
TIME.....AM PEAK HOUR
COMMENT.....EAST RAMP

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	166	0	162	0	L	12.0	T	12.0	L	12.0		12.0	
TH	414	506	0	0	T	12.0		12.0		12.0		12.0	
RT	0	0	0	0		12.0		12.0		12.0		12.0	
RR	0	0	0	0		12.0		12.0		12.0		12.0	
						12.0		12.0		12.0		12.0	
						12.0		12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.90	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.90	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.90	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.90	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 59.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT						RT				
	PD						PD				
WB	LT					SB	LT				
	TH		X				TH				
	RT						RT				
	PD						PD				
GREEN		15.0	20.0	0.0	0.0	GREEN		10.0	0.0	0.0	0.0
YELLOW		4.0	5.0	0.0	0.0	YELLOW		5.0	0.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.404	0.271	13.7	B	5.7	B
	T	0.373	0.695	2.5	A		
WB	T	0.854	0.373	17.3	C	17.3	C
NB	L	0.525	0.203	17.1	C	17.1	C

INTERSECTION: Delay = 11.5 (sec/veh) V/C = 0.631 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....12/6/88
TIME.....AM PEAK HOUR
COMMENT.....WEST RAMP

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	0	227	0	42	: T	12.0	L	12.0	L	12.0	L	12.0	
TH	538	456	0	0	:	12.0	T	12.0		12.0		12.0	
RT	0	0	0	0	:	12.0		12.0		12.0		12.0	
PD	0	0	0	0	:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUF. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.90	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 59.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT					NB	LT				
	TH		X				TH				
	RT						RT				
	PD						PD				
WB	LT	X				SB	LT	X			
	TH	X	X				TH				
	RT						RT				
	PD						PD				
GREEN		15.0	20.0	0.0	0.0	GREEN		10.0	0.0	0.0	0.0
YELLOW		4.0	5.0	0.0	0.0	YELLOW		3.0	0.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	T	0.904	0.373	21.0	C	21.3	C
WB	L	0.552	0.271	15.1	C	6.6	B
	T	0.411	0.695	2.6	A		
SB	L	0.136	0.203	14.6	B	14.6	B

INTERSECTION: Delay = 14.5 (sec/veh) V/C = 0.607 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....12/22/88
TIME.....1988 AM PEAK HOUR
COMMENT..... DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	166	227	162	42	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	372	294	0	0	: T	12.0	T	12.0		12.0		12.0	
RT	0	0	0	0	:	12.0		12.0		12.0		12.0	
RR	0	0	0	0	:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 88.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT			X		NB	LT	X			
	TH		X	X			TH				
	RT						RT				
	PD						PD				
WB	LT	X				SB	LT		X		
	TH	X	X				TH				
	RT						RT				
	PD						PD				
GREEN		15.0	15.0	12.0	0.0	GREEN		15.0	10.0	0.0	0.0
YELLOW		4.0	5.0	4.0	0.0	YELLOW		4.0	4.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.652	0.159	30.2	D	19.3	C
	T	0.572	0.386	14.5	B		
WB	L	0.734	0.193	31.1	D	20.2	C
	T	0.415	0.420	11.8	B		
NB	L	0.524	0.193	25.5	D	25.5	D
SB	L	0.192	0.136	25.7	D	25.7	D

INTERSECTION: Delay = 20.7 (sec/veh) V/C = 0.539 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VC
DATE.....12/6/88
TIME.....PM PEAK HOUR
COMMENT.....EAST RAMP

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB			EB		WB		NB		SB
LT	71	0	262	0	: L	12.0		12.0	L	12.0		12.0
TH	356	684	0	0	: T	12.0		12.0		12.0		12.0
RT	0	0	0	0	:	12.0		12.0		12.0		12.0
RR	0	0	0	0	:	12.0		12.0		12.0		12.0
					:	12.0		12.0		12.0		12.0
					:	12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min	ARR. TYPE
EB	0.00	7.00	N	0	0	0.90	0	N	0.0	3
WB	0.00	7.00	N	0	0	0.90	0	N	0.0	3
NB	0.00	7.00	N	0	0	0.90	0	N	0.0	3
SB	0.00	2.00	N	0	0	0.90	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 72.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT						RT				
	PD						PD				
WB	LT					SB	LT				
	TH		X				TH				
	RT						RT				
	PD						PD				
GREEN		5.0	35.0	0.0	0.0	GREEN		18.0	0.0	0.0	0.0
YELLOW		4.0	5.0	0.0	0.0	YELLOW		5.0	0.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.574	0.083	28.3	D	8.0	B
	T	0.356	0.639	4.0	A		
WB	T	0.851	0.514	14.5	B	14.5	B
NB	L	0.635	0.278	19.4	C	19.4	C

INTERSECTION: Delay = 13.4 (sec/veh) V/C = 0.736 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....12/6/88
TIME.....PM PEAK HOUR
COMMENT.....WEST RAMP

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	0	178	0	34	: T	12.0	L	12.0	L	12.0	L	12.0	
TH	392	736	0	0	:	12.0	T	12.0		12.0		12.0	
RT	0	0	0	0	:	12.0		12.0		12.0		12.0	
RR	0	0	0	0	:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	
					:	12.0		12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.90	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.90	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 84.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT					NB	LT				
	TH		X				TH				
	RT						RT				
	PD						PD				
WB	LT	X				SB	LT	X			
	TH	X	X				TH				
	RT						RT				
	PD						PD				
GREEN		10.0	35.0	0.0	0.0	GREEN		5.0	0.0	0.0	0.0
YELLOW		4.0	5.0	0.0	0.0	YELLOW		5.0	0.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	T	0.425	0.576	5.0	B	5.0	B
WB	L	0.683	0.172	23.3	C	6.1	B
	T	0.579	0.797	2.0	A		
SB	L	0.205	0.109	19.8	C	19.8	C

INTERSECTION: Delay = 9.0 (sec/veh) V/C = 0.584 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....12/22/88
TIME.....1988 PM PEAK HOUR
COMMENT..... DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	71	178	262	34	L	12.0	L	12.0	L	12.0	L	12.0	
TH	322	474	0	0	T	12.0	T	12.0		12.0		12.0	
RT	0	0	0	0		12.0		12.0		12.0		12.0	
RR	0	0	0	0		12.0		12.0		12.0		12.0	
						12.0		12.0		12.0		12.0	
						12.0		12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 86.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT			X		NB	LT	X			
	TH		X	X			TH				
	RT						RT				
	PD						PD				
WB	LT	X				SB	LT		X		
	TH	X	X				TH				
	RT						RT				
	PD						PD				
GREEN		12.0	15.0	8.0	0.0	GREEN		20.0	10.0	0.0	0.0
YELLOW		4.0	5.0	4.0	0.0	YELLOW		4.0	4.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.382	0.116	27.3	D	17.4	C
	T	0.548	0.349	15.2	C		
WB	L	0.683	0.163	30.4	D	20.0	C
	T	0.712	0.395	16.1	C		
NB	L	0.640	0.256	23.9	C	23.9	C
SB	L	0.152	0.140	24.7	C	24.7	C

INTERSECTION: Delay = 20.1 (sec/veh) V/C = 0.563 LOS = C

APPENDIX C

OPENING YEAR (1995) RAMP JUNCTION CAPACITY CALCULATIONS

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB ON RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (typical = 2% T/HR)
PEAK HOUR FACTOR..... .93
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1760	206	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	720	206	1760
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	781	221	1890

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2111	B
MERGE:	1002	C

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/23/88
OTHER INFORMATION... SB OFF RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1966	206	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 65 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	950	206	1966
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1031	221	2112

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2112	B
DIVERGE:	1031	B

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB OFF RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) TWO LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2576	816	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 68 % OF FREEWAY TRUCKS

FIRST RAMP RESULTS USING FIGURE I.5- 2 (NOTE 4)

SECOND RAMP RESULTS USING FIGURE I.5- 2 (NOTE 4)

ITEM	VPH	Fhv	PCPH
V1	1478	0.97	1604
V(1+A)	1125	0.97	1221
Va	408	0.98	438
Vb	405	0.98	438
Vf	2576	0.98	2767

Vd1 = 1221 pcph (LOS = C)
Vd2 = 1604 pcph (LOS = D)

Vf(Before diverge) = 2767 pcph (LOS = C)

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/23/88
OTHER INFORMATION... SB ON RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1760	816	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	649	816	1760
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	704	876	1890

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2766	C
MERGE:	1580	D

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB ON RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HP)
PEAK HOUR FACTOR..... .92
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2361	215	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	926	215	2361
ET	1.7	1.7	1.7
FHV	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1005	231	2536

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2767	C
MERGE:	1236	C

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB OFF RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2576	142	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 68 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	1008	142	2576
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.96
PHF	0.95	0.95	0.95
PCPH	1094	153	2767

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2920	C
MERGE:	1247	C

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB OFF RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2576	215	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 68 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	1166	215	2576
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1265	231	2767

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2767	C
DIVERGE:	1265	C

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB ON RAMP W/SR 54 W/O DO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2434	142	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	959	142	2434
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1041	153	2614

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2767	C
MERGE:	1194	C

****

FACILITY LOCATION... I 75 & SR 54 (NEW)
ANALYST:..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB ON RAMP W/SR 54 W/O CR LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2443	133	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 67 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	964	133	2443
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.93
PCPH	1046	143	2624

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2767	C
MERGE:	1169	C

****

FACILITY LOCATION... I 75 & SR 54 (NEW)
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB OFF RAMP W/S.R 54 W/O Co LINE Rd.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2576	133	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 68 % OF FREEWAY TRUCKS

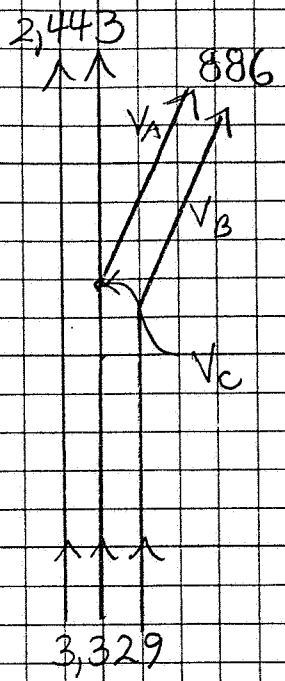
RAMP ANALYZED ALONE USING FIGURE 1.5- 2

	Vi	Vr	Vf
	****	****	*****
VPH	1123	133	2576
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1219	143	2767

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2767	C
DIVERGE:	1219	C

Greiner, Inc.

JOB SR54 Interchange Justification Rpt. SHEET 1 OF 1 PROJ. NO.
DESCRIPTION NB I-75 Off-Ramp to SR54 (New) - Without County Line Road (1995) COMPUTED BY GSR DATE
CHECKED BY DATE



Using Fig. I.5-13

$V_c = 64 + 0.285(3,329) + 0.141(886) = 1,138$

$V_1 = 173 + 0.295(3,329) - 0.320(886) = 872$

$V_A = V_c - V_1 = 1,138 - 872 = 266$ vph

$V_B = V_r - V_A = 886 - 266 = 620$ vph

$V_{d_2} = V_B = 620/(0.98)(0.95) = 666$ pcph (LOS B)

# of trucks in lane C

$= (0.03)(266) + (0.66)(0.03)(2,443) = 56$

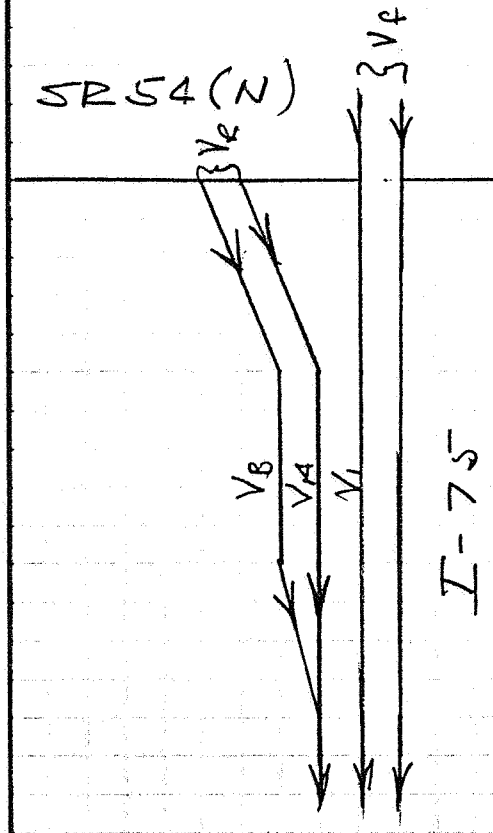
$P_{T_C} = 56/1,138 = 0.049$

$f_{HV_C} = 1/[1 + (0.049)(1.7-1)] = 0.97$

$V_{d_1} = V_c = 1,138/(0.97)(0.95) = 1,235$ pcph (LOS C)

Greiner, Inc.

JOB I-75 & SR54 IJR — SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR54 (NEW) S. BOUND OU RAMP - RAMP ANALYSIS - W/O CO. LINE RD. (1995) — COMPUTED BY VG DATE 12/19/88
CHECKED BY ___ DATE ___



1. CALCULATE V_A & V_B USING FIG I.5-11.

$V_1 = 54 + .07V_f + .049V_R$

WHERE $V_f = 2443$ & $V_R = 886$

$V_1 = 54 + .07(2443) + .049(886)$

$= 268$ VPH

$V_{1+A} = -205 + .287V_f + .575V_R$

$= -205 + .287(2443) + .575(886)$

$= 1006$

$V_A = V_{1+A} - V_1$

$= 1006 - 268$

$= 738$ VPH

$V_B = V_R - V_A$

$= 886 - 738$

$= 148$ VPH

2. CHECK LOS FOR V_B MERGING WITH V_A

$V_M = V_A + V_B = 886$ VPH

$= 886/(.98)(.95)$

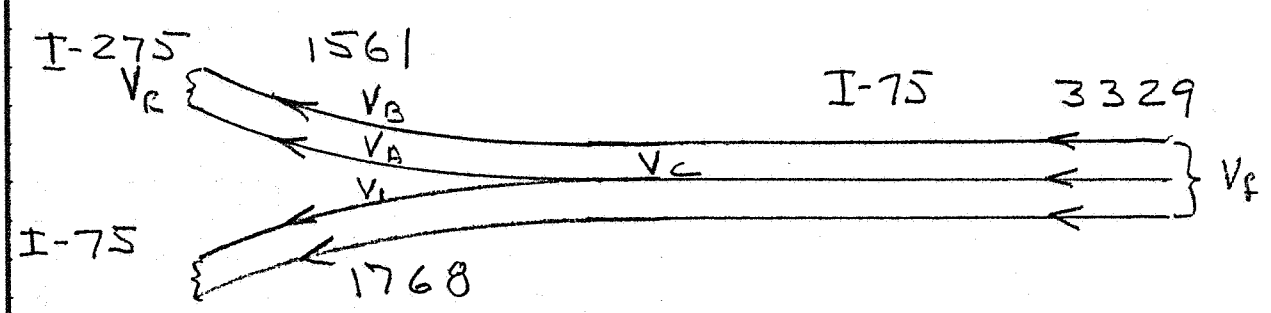
$= 953$ PCPH

MERGE CRITERIA FROM '85 HCM ESTABLISHES LOS OF V_M AT B.

Form No. GI002-87

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & I-275 APEX INTERCHANGE DIVERGE ANALYSIS FOR 1995 W SR54(N) W/O Co LINE RD. COMPUTED BY JG DATE 12/27/88
CHECKED BY ___ DATE ___



1. $V_c = 64 + .285 V_f + .141 V_R$

WHERE $V_f = 3329$ & $V_R = 1562$

$V_c = 64 + .285(3329) + .141(1561)$

$= 1233$ VPH

2. $V_1 = 173 + .295 V_f - .32 V_R$

$= 173 + .295(3329) - .32(1561)$

$= 655$ VPH

$\therefore$ V_c (PCPH) $= 1233 / (.98)(.95)$

$= 1324$ PCPH

DIVERGE CRITERIA FROM HCM ESTABLISHES LOS TO BE C

$V_A = V_c - V_1 = 1233 - 655 = 578$

$V_B = V_R - V_A = 1561 - 578$

$= 983$ VPH

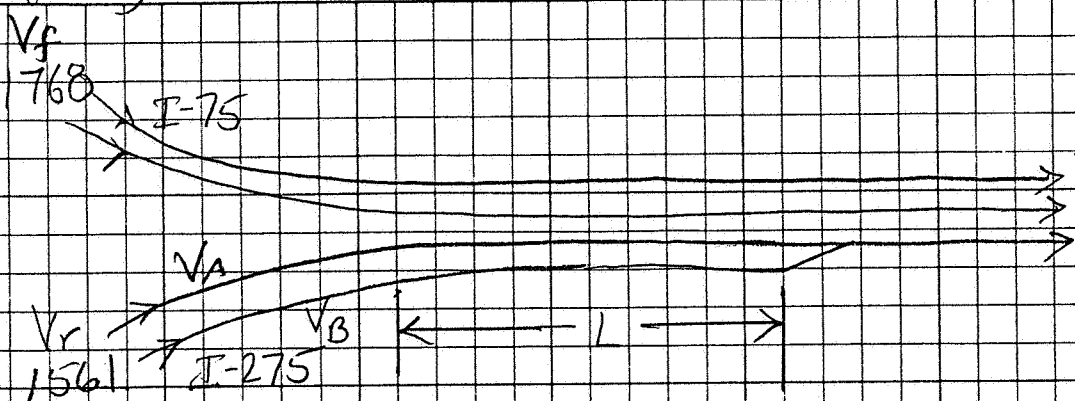
$= 983 / (.98)(.95)$

$= 1,056$ PCPH

DIVERGE CRITERIA FROM HCM ESTABLISHES LOS TO BE C.

Greiner, Inc.

JOB SR54 Interchange Justification Rpt. SHEET 1 OF 1 PROJ. NO. _____
DESCRIPTION NB I-275/I-75 Major Merge - Without Cundy Line Road (1995) COMPUTED BY GSR DATE _____
CHECKED BY _____ DATE _____



Using Fig. I.5-11 to determine volume distribution on I-275:

$V_1 = 54 + 0.070(1,768) + 0.049(1,561) = 254$ vph

$V_{1+A} = -205 + 0.287(1,768) + 0.575(1,561) = 1,200$ vph

$V_A = V_{1+A} - V_1 = 1,200 - 254 = 946$ vph

$V_B = V_r - V_A = 1,561 - 946 = 615$ vph

$V_{m_1} = 946/(0.98)(0.95) = 1,016$ pcph (LOS C)

Length (L) required for 2nd merge to operate at LOS C

V_m^{max} (LOS C) = 1,450 pcph $\Rightarrow$ 1,350 vph

Maximum # of vehicles that can remain in lane A prior to 2nd merge = 1,350 − 615 = 735 vph

Proportion of V_A remaining = 735/946 = 0.777 (≈ 0.78)

If L = 800'

$V_{m_2} = 0.76(946)/(0.98)(0.95) + 615/(0.98)(0.95) = 1,433$ pcph (LOS C)

APPENDIX D

OPENING YEAR (1995) RAMP TERMINAL INTERSECTION CAPACITY CALCULATIONS

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 W/O CO LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....AM PEAK HOUR
COMMENT.....1995 URBAN INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	86	510	251	101	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	452	630	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	306	82	417	105	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.250	0.117	36.7	D	24.6	C
	T	0.537	0.183	29.1	D		
	R	0.450	0.475	13.9	B		
WB	L	0.384	0.450	16.8	C	12.5	B
	T	0.265	0.517	10.5	B		
	R	0.071	0.808	1.5	A		
NB	L	0.292	0.292	25.1	D	18.3	C
	R	0.385	0.450	14.3	B		
SB	L	0.196	0.175	32.2	D	34.4	D
	R	0.629	0.117	36.7	D		

INTERSECTION: Delay = 18.8 (sec/veh) V/C = 0.330 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I 75 W/O CO LINE RD
AREA TYPE.....OTHER
ANALYST.......VG
DATE.....1/4/89
TIME.....PM PEAK HOUR
COMMENT.....1995 URBAN INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	105	417	306	82	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	630	452	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	251	101	510	86	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0		3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0		3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0		3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0		3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.305	0.117	37.0	D	22.8	C
	T	0.484	0.283	23.2	C		
	R	0.405	0.433	15.3	C		
WB	L	0.404	0.350	22.6	C	14.5	B
	T	0.190	0.517	10.0	B		
	R	0.087	0.808	1.5	A		
NB	L	0.355	0.292	25.6	D	18.5	C
	R	0.454	0.467	14.2	B		
SB	L	0.159	0.175	31.9	D	33.0	D
	R	0.515	0.117	34.0	D		

INTERSECTION: Delay = 19.4 (sec/veh) V/C = 0.331 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/O COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....AM
COMMENT.....1995 DIAMOND INTERCHANGE

	VOLUMES				:	GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	94	545	279	19	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	323	462	0	0	: L	12.0	L	12.0	L	12.0	R	12.0	
RT	341	15	446	115	: T	12.0	T	12.0	R	12.0		12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT	X	X				RT	X			
	PD						PD				
WB	LT			X		SB	LT		X		
	TH		X	X			TH				
	RT		X	X			RT		X		
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.174	0.183	31.4	D	20.5	C
	T	0.313	0.225	25.1	D		
	R	0.469	0.508	12.6	B		
WB	L	0.443	0.417	19.2	C	15.9	C
	T	0.219	0.458	12.7	B		
	R	0.014	0.742	2.6	A		
NB	L	0.473	0.200	32.7	D	16.9	C
	R	0.301	0.617	7.0	B		
SB	L	0.142	0.083	38.8	D	25.1	D
	R	0.301	0.267	22.8	C		

INTERSECTION: Delay = 17.9 (sec/veh) V/C = 0.563 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/O COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....PM PEAK HOUR
COMMENT.....1995 DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	115	446	341	15	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	462	323	0	0	: L	12.0	L	12.0	L	12.0	R	12.0	
RT	279	19	545	94	: T	12.0	T	12.0	R	12.0		12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT	X	X				RT	X			
	PD						PD				
WB	LT			X		SB	LT		X		
	TH		X	X			TH				
	RT		X	X			RT		X		
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.213	0.183	31.7	D	22.0	C
	T	0.447	0.225	26.0	D		
	R	0.365	0.533	10.6	B		
WB	L	0.386	0.392	20.0	C	16.8	C
	T	0.162	0.433	13.4	B		
	R	0.018	0.742	2.6	A		
NB	L	0.513	0.225	31.5	D	16.7	C
	R	0.367	0.617	7.4	B		
SB	L	0.112	0.083	38.7	D	24.6	C
	R	0.246	0.267	22.4	C		

INTERSECTION: Delay = 18.8 (sec/veh) V/C = 0.588 LOS = C

APPENDIX E

DESIGN YEAR (2010) RAMP JUNCTION CAPACITY CALCULATIONS WITHOUT COUNTY LINE ROAD INTERCHANGE

****

FACILITY LOCATION... I 75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB OFF RAMP W/SR 54 W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2988	486	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 49 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 7

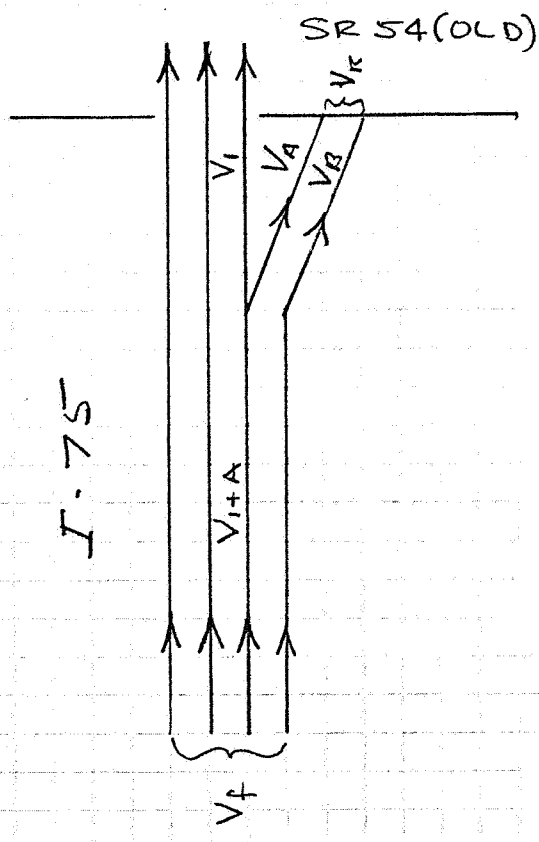
	Vi	Vr	Vf
	****	****	*****
VPH	980	426	2988
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1072	458	3209

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3209	B
DIVERGE:	1072	C

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) N BOUND OFF RAMP - RAMP ANALYSIS W SR 54 (NEW) W/O COLINE RD COMPUTED BY VG DATE 12/22/88
CHECKED BY ___ DATE ___

2010



1. CALCULATE V_A & V_B USING FIG. I. 5-12

$V_{1+A} = -158 + .035 V_f + .567 V_R$

WHERE $V_f = 4324$ AND $V_R = 1762$

$V_{1+A} = -158 + .035(4324) + .567(1762)$

$= 992$ VPH

$V_1 = 18 + .06 V_f + .072 V_R$

$= 18 + .06(4324) + .072(1762)$

$= 405$ VPH

$V_A = V_{1+A} - V_1$

$= 992 - 405$

$= 587$ VPH

$V_B = V_R - V_A$

$= 1762 - 587 = 1175$ VPH

$V_{d_2} = V_B(PCPH) = 1175/(.98)(.95) = 1262$ pcph

DIVERGE CRITERIA FROM HCM ESTABLISHES V_{d_2} LOS TO BE C.

2. CALCULATE LOS USING COMPUTER PROGRAM WITH

$V_A = 587$ VPH &

$V_{fA} = V_f - V_B = 4324 - 1175 = 3149$ VPH

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 1/3/88
OTHER INFORMATION... NB OFF RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	3149	587	426
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	OFF	ON
DISTANCE	N.A.	N.A.	N.A.	2412

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 49 % OF FREEWAY TRUCKS

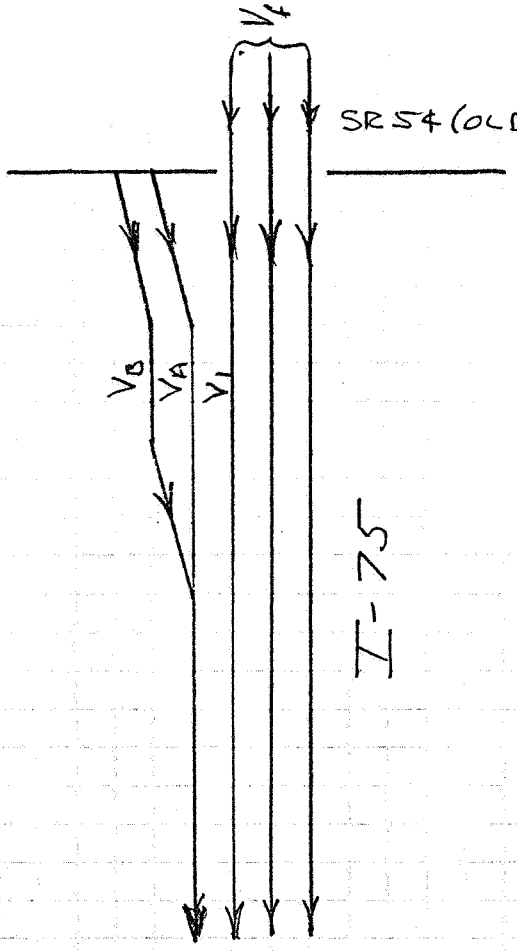
RAMP ANALYZED WITH DOWNSTREAM RAMP USING FIGURE I.5- 7

	V1	Vr	Vf
	****	****	*****
VPH	1101	587	3149
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1195	631	3382

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3382	C
DIVERGE:	1195	C

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) COMPUTED BY VG DATE 12/22/88
S. BOUND ON RAMP-RAMP ANALYSIS CHECKED BY ___ DATE ___
W SR 54 (NEW) W/O G-LINE RD 2010



1. CALCULATE V_A & V_B USING FIG I. 5-11

$V_1 = 54 + .07 V_f + .049 V_R$

WHERE $V_f = 2562$ & $V_R = 1762$

$V_1 = 54 + .07(2562) + .049(1762)$

$= 320$ VPH

$V_{1+A} = -205 + .287 V_f + .575 V_R$

$= -205 + .287(2562) + .575(1762)$

$= 1543$ VPH

$V_A = V_{1+A} - V_1$

$= 1543 - 320 = 1223$ VPH

$V_B = V_R - V_A$

$= 1762 - 1223 = 539$ VPH

$V_{m_1} = V_A = 1,223 / (0.98)(0.95) = 1,314$ pcph

2. CALCULATE LOS OF V_B (LOS

MERGING INTO V_A

$V_A = 1223 / (.98)(.95) = 1314$ PCPH

$V_B = 539 / (.98)(.95) = 579$ PCPH

$V'_m = V_A + V_B = 1893$ PCPH

MERGE CRITERIA FROM HCM ESTABLISHES THE LOS TO BE E WHICH IS UNACCEPTABLE.

Greiner, Inc.

JOB I-75 & SR 54 IJR
DESCRIPTION I-75 & SR 54 (OLD S BOUND ON RAMP - RAMP ANALYSIS; W SR 54 (NEW), W/O CO LINE RD. 2010
SHEET ___ OF ___ PROJ. NO. ___
COMPUTED BY VG DATE 12/22/88
CHECKED BY ___ DATE ___

3. TO DETERMINE THE LENGTH RAMP THAT IS NEEDED FOR LOS C, FIG 5-5 IS USED. SINCE THE LOS C MERGE VOLUME IS 1450 PCPH, 1893-1450 = 443 PCPH WILL HAVE TO TRANSFER FROM THE ADD LANE TO THE OTHER FREEWAY LANES. HENCE, 443 ÷ 1314 = .337 OR 33.7 PERCENT OF THE ADD LANE TRAFFIC MUST TRANSFER TO OTHER FREEWAY LANES. USING FIG 5-5, IT WOULD REQUIRE ABOUT 500 + (33.7/40)(500) ≅ 921 FEET TO ACCOMPLISH THE TRANSFER.

IT IS THEREFORE RECOMMENDED THAT A 1000 FOOT ACCELERATION LANE BE USED.

$V_{m_2} = 0.60(1,223)/(0.98)(0.95) + 539/(0.98)(0.95)$

$= 788 + 579$

$= 1,367$ pcph (LOS C)

Form No. GI002-87

****

FACILITY LOCATION... I-75 & REST AREA
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/22/88
OTHER INFORMATION... NB ON RAMP W SR 54 (N) W/O CO.LINE RD

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	361	4324	361	N.A.
% TRUCKS	3	3	3	N.A.
RAMP TYPE	OFF	N.A.	ON	N.A.
DISTANCE	1680	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 35 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 9

	V1	Vr	Vf
	****	****	*****
VPH	530	361	3963
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	587	388	4257

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	975	B

****

FACILITY LOCATION... I-75 & REST AREA
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/22/88
OTHER INFORMATION... SB OFF RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	4324	239	239
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	OFF	ON
DISTANCE	N.A.	N.A.	N.A.	1640

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 37 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	566	239	4324
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	627	257	4644

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4644	C
DIVERGE:	627	A

****

FACILITY LOCATION... I-75 & REST AREA
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/22/88
OTHER INFORMATION... NB OFF RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	4324	361	361
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	OFF	ON
DISTANCE	N.A.	N.A.	N.A.	1680

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 37 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	678	361	4324
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	751	388	4644

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4644	C
DIVERGE:	751	B

****

FACILITY LOCATION... I-75 & REST AREA
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/22/88
OTHER INFORMATION... SB ON RAMP W SR 54 W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	239	4324	239	261
% TRUCKS	3	3	3	3
RAMP TYPE	OFF	N.A.	ON	OFF
DISTANCE	1640	N.A.	N.A.	5340

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 36 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 9

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1300 vph

	V1	Vr	Vf
	****	****	*****
VPH	539	239	4085
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	597	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	854	B

RAMP ANALYZED WITH UPSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	327	239	4085
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	374	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	631	B

C) RAMP ANALYSIS RESULTS (CONTINUED)

RAMP ANALYZED WITH DOWNSTREAM RAMP USING FIGURE I.5- 10

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1100 vph
Normal range for Dd is 1500 to 3000 ft

	V1	Vr	Vf
	****	****	*****
VPH	573	239	4085
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	635	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	892	B

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	327	239	4085
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	374	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	631	B

****

C) RAMP ANALYSIS RESULTS (CONTINUED)

RAMP ANALYZED ALONE USING FIGURE I.5- 9

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1300 vph

	V1	Vr	Vf
	****	****	*****
VPH	539	239	4085
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	597	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	854	B

RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	327	239	4085
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	374	257	4388

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4645	C
MERGE:	631	B

****

FACILITY LOCATION... I 75 & SR 54 (NEW)
ANALYST..... MLP
TIME OF ANALYSIS.... 2013 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB ON RAMP W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HR)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	4063	261	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	UN	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 36 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 5

WARNING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1300 vph

	Vi	Vr	Vf
	****	****	*****
VPH	538	261	4063
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.96
PHF	0.95	0.95	0.95
PCPH	566	280	4364

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4644	C
MERGE:	876	B

RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	Vi	Vr	Vf
	****	****	*****
VPH	325	261	4063
ET	1.7	1.7	1.7
Fhv	0.91	0.98	0.96
PHF	0.95	0.95	0.95
PCPH	376	280	4364

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4644	C
MERGE:	656	B

****

FACILITY LOCATION... I 75 & SR 54 (NEW)
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB OFF RAMP W/O CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HR)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	4324	261	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 37 % OF FREEWAY TRUCKS

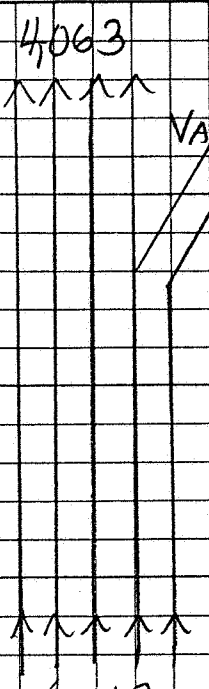
RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	Vi	Vr	VF
	****	****	*****
VPH	586	261	4324
Et	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	649	280	4644

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4644	C
DIVERGE:	649	A

Greiner, Inc.

JOB SR54 Interchange Justification Rpt SHEET 1 OF 1 PROJ. NO.
DESCRIPTION NB I-75 Off-Ramp to SR54(New) - Without County Line Road (2010) COMPUTED BY GSR DATE
CHECKED BY DATE



Converting to an equivalent 8-lane fwy

V_f (8-lane) = (0.85)(6,218) = 5285 vph

Using Fig. E. 5-12 to determine off-ramp distribution

$V_{1+A} = -158 + 0.035(5,285) + 0.567(2,155)$
$= 1,249$ vph

$V_1 = 18 + 0.060(5,285) + 0.072(2,155)$
$= 490$ vph

$V_A = V_{1+A} - V_1 = 1,249 - 490 = 759$ vph

$V_B = V_r - V_A = 2,155 - 759 = 1,396$ vph

$V_{d_2} = V_B = 1,396/(0.98)(0.95) = 1,499$ pcph (LOS C)

Using Table 5-3 and Fig. 5-5

$V_1 = 94 + 0.231(5,285 - 1,396) + 0.473(759) + 2$
$= 1,353$ vph

# of trucks in lane 1 =
$(0.03)(759) + (0.49)(0.03)(3,130) = 69$

$P_{T_1} = 69/1353 = 0.051$

$f_{HV} = 1/1 + [(0.051)(1.7-1)] = 0.97$

$V_{d_1} = 1,353/(0.97)(0.95) = 1,468$ pcph (LOS C)

****

FACILITY LOCATION... I-75 & SR 54 (NEW)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 1/5/89
OTHER INFORMATION... NB OFF RAMP W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	4797	734	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 42 % OF FREEWAY TRUCKS

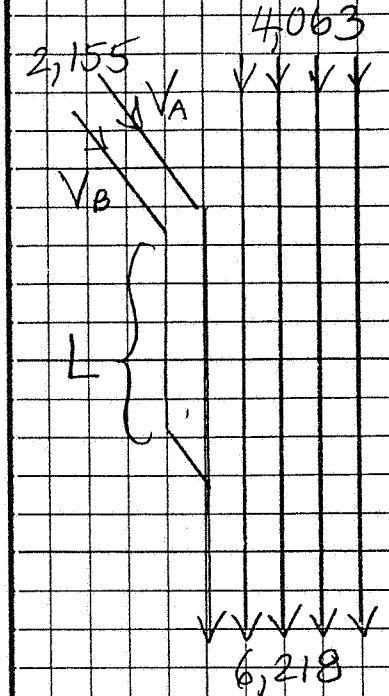
RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	1059	734	4797
ET	1.7	1.7	1.7
Fhv	0.96	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1161	788	5153

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	5153	C
DIVERGE:	1161	C

Greiner, Inc.

JOB SR54 Interchange Justification Rpt. SHEET 1 OF 2 PROJ. NO.
DESCRIPTION SB I-75 On-Ramp from SR54 (New) - Withalf Cundy Line Road (2010) COMPUTED BY GSR DATE
CHECKED BY DATE



Using Fig. I.5-11 to determine on-ramp distribution

$V_1 = 54 + 0.070(4,063) + 0.049(2,155)$
$= 444$ vph

$V_{1+A} = -205 + 0.287(4,063) + 0.575(2,155)$
$= 2,200$ vph

$V_A = V_{1+A} - V_1 = 2,200 - 444 = 1,756$ vph
$V_B = V_r - V_A = 2,155 - 1,756 = 399$ vph

$V_{m_1} = V_A = 1,756/(0.98)(0.95) = 1,886$ pcph (LOS E)

Set: $V_A = V_m^{max}$ (LOS C) $= 1,450$ pcph $\Rightarrow 1,350$ vp
$V_B = V_r - V_A = 2,155 - 1,350 = 805$ vph

Maximum amount of traffic in V_A that can remain prior to 2nd merge
$= 1,350 - 805 = 545$ vph

Proportion of V_A remaining $= \frac{545}{1350} = 0.404$

If $L = 1,350'$ $\Rightarrow$ 39% of V_A will remain

$V_{m_2} = 0.39(1,350)/(0.98)(0.95) + 805/(0.98)(0.95)$
$= 1,430$ pcph (LOS C)

Set: $V_A = V_m^{max}$ (LOS D) $= 1,780$ pcph $\Rightarrow 1,629$ v
$V_B = V_r - V_A = 2,155 - 1,629 = 526$ vph

Maximum amount of traffic in V_A that can remai
$= 1,629 - 526 = 1,103$ vph

Proportion of V_A remaining $= \frac{1,103}{1,629} \approx 0.68$

Greiner, Inc.

JOB SR 54 Interchange Justification Rpt SHEET 2 OF 2 PROJ. NO. _____
DESCRIPTION SB I-15 Off-Ramp from SR 54 (New) - Wrhalf County Line Road (2010) COMPUTED BY GSR DATE _____
CHECKED BY _____ DATE _____

If $L = 900' \Rightarrow 68\%$ of V_A will remain

$V_{m_2} = 0.68(1,629)/(0.98)(0.95) + 526/(0.98)(0.95)$

$= 1,755$ pcph (LOS D)

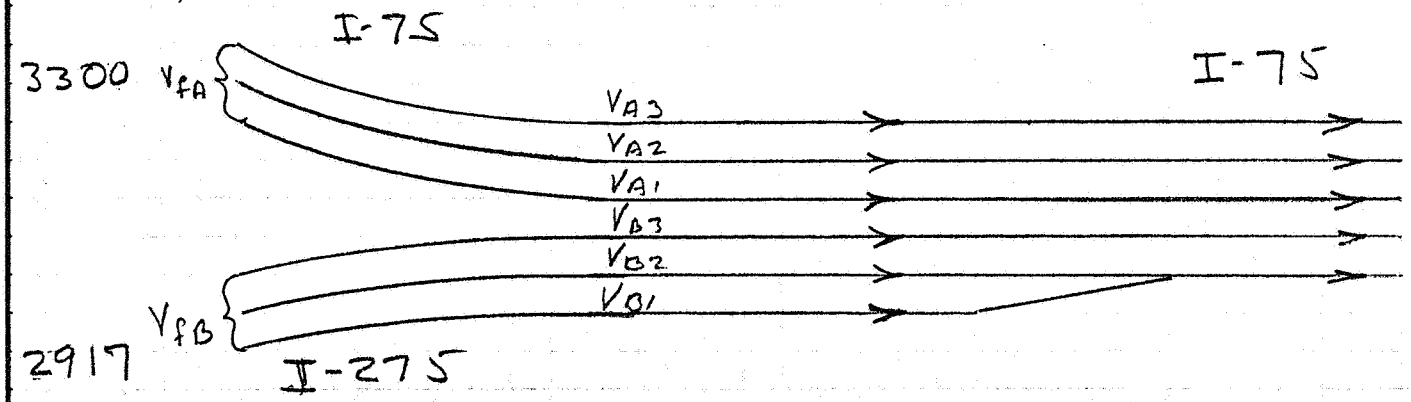
If $L = 1,000' \Rightarrow 60\%$ of V_A will remain

$V_{m_2} = (0.60)(1,629)/(0.98)(0.95) + 526/(0.98)(0.95)$

$= 1,615$ pcph (LOS D)

Greiner, Inc.

JOB I-75 & SR 54 IJR — SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & I-275 APEX MERGE ANALYSIS - W/O COUNTY LINE RD. 2010 — COMPUTED BY VG DATE 12/20/89
CHECKED BY ___ DATE ___



1. ASSUME $V_{A3} = .47\ V_{fA} = .47(3300) = 1551$ VPH
2. ASSUME $V_{B1} = .06\ V_{fB} = .06(2917) = 175$ VPH
3. ASSUME $V_f = (V_{fA} - V_{A3}) + (V_{fB} - V_{B1})$
$= (3000 - 1551) + (2917 - 175)$
$= 4191$ VPH
4. THEN ANALYZE A 4 LANE FREEWAY SECTION WITH 4191 VPH WITH AN ON RAMP WITH 175 VPH

SINCE 175 VPH IS LESS THAN THE MINIMUM OF 300 VPH FOR THIS TYPE ANALYSIS, A RAMP VOLUME OF 300 VPH WILL BE USED.

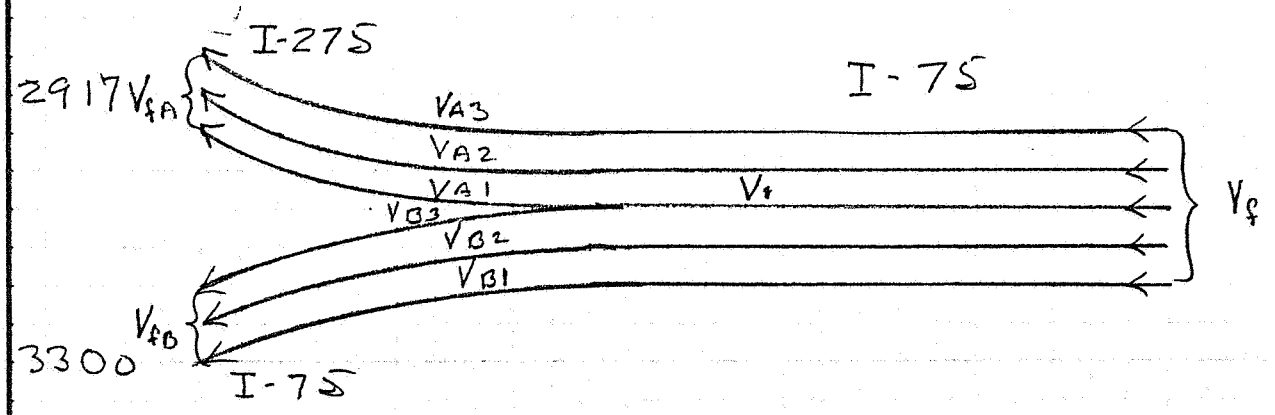
$V_i = -.312 + .201\ V_f + .127\ V_r$
$= -.312 + .201(4066) + .127(300)$
$= 543$ VPH

$\therefore V_i(PCPH) = 543/(.98)(.95) = 583$ PCPH
$V_r(PCPH) = 175/(.98)(.95) = 188$ PCPH
$V_m = V_i + V_r = 583 + 188 = 771$ PCPH (LOS B)

Greiner, Inc.

JOB I-75 & SR 54 IJR
DESCRIPTION I-75 & I-275 APEX DIVERGE ANALYSIS WITHOUT COUNTY LINE RD 2010

SHEET ___ OF ___ PROJ. NO. ___
COMPUTED BY VC DATE 12/20/~~08~~
CHECKED BY ___ DATE ___



1. ASSUME $V_{B3} = .06\ V_{fB} = .06(3300) = 198$ VPH
2. ASSUME $V_{A1} = .47\ V_{fA} = .47(2917) = 1371$ VPH

THEN $V_{A1} + V_{B3} = 1371 + 198 = 1569$ VPH

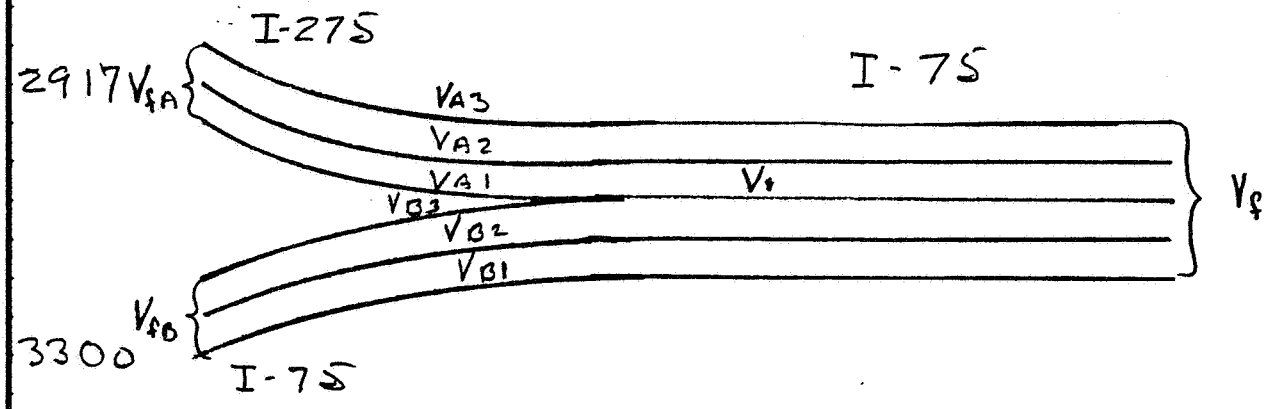
$\therefore V_d$ (PCPH) $= 1569/(.98)(.95) = 1685$ PCPH

DIVERGE CRITERIA FROM HCM ESTABLISHES V_d LOS AT D.

Greiner, Inc.

JOB I-75 & SR 54 IJR
DESCRIPTION I-75 & I-275 APEX DIVERGE AUALYSIS WITHOUT COUNTY LINE RD 2010

SHEET ___ OF ___ PROJ. NO. ___
COMPUTED BY VC DATE 12/20/~~05~~
CHECKED BY ___ DATE ___



1. ASSUME $V_{B3} = .06\ V_{fB} = .06(3300) = 198$ VPH
2. ASSUME $V_{A1} = .47\ V_{fA} = .47(2917) = 1371$ VPH

THEN $V_{A1} + V_{B3} = 1371 + 198 = 1569$ VPH

$\therefore V_1$ (PCPH) $= 1569/(.98)(.95) = 1685$ PCPH

DIVERGE CRITERIA FROM 'TIS ESTABLISHES V_1 LOS AT D.

APPENDIX F

DESIGN YEAR (2010) RAMP JUNCTION CAPACITY CALCULATIONS WITH COUNTY LINE ROAD INTERCHANGE

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/28/88
OTHER INFORMATION... NB ON RAMP W SR 54(NEW) W/O CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2561	426	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 50 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 6

	V1	Vr	Vf
	****	****	*****
VPH	505	426	2561
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	560	458	2751

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3209	B
MERGE:	1018	C

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB OFF RAMP W/SR 54(NEW) & W/CR LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2987	426	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 43 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE 1.5- 7

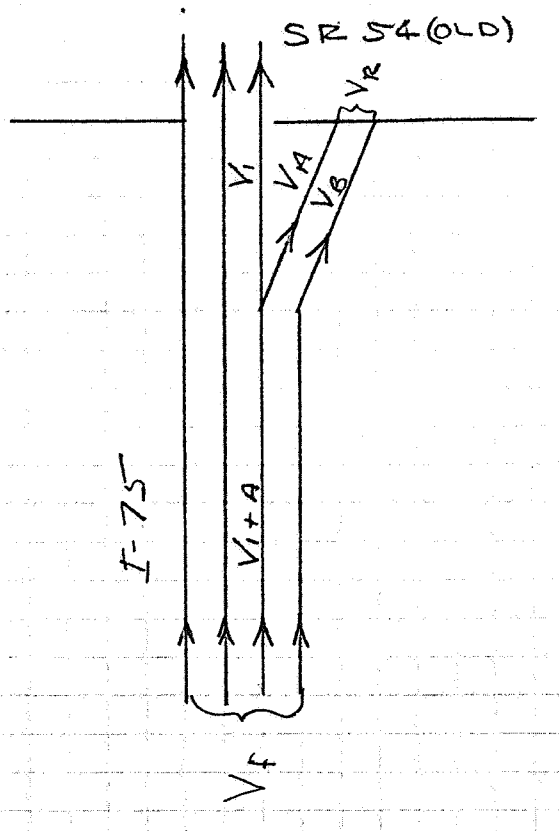
	VI	VR	VF
	****	****	*****
VPH	987	426	2987
ET	1.7	1.7	1.7
FHV	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1071	458	3206

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3208	B
DIVERGE:	1071	C

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) N. BOUND OFF RAMP - RAMP ANALYSIS. W SR 54 (NEW) & CO. LINE RD. COMPUTED BY VG DATE 12/6/88
CHECKED BY ___ DATE ___

2010



1. CALCULATE V_A & V_B USING FIG I. 5-12

$V_{1+A} = -158 + .035\,V_f + .567\,V_R$

WHERE $V_f = 4235$ & $V_R = 1674$

$V_{1+A} = -158 + .035(4235) + .567(1674)$

$= 939$ VPH

$V_1 = 18 + .06\,V_f + .072\,V_R$

$= 18 + .06(4235) + .072(1674)$

$= 393$

$V_A = V_{1+A} - V_1 = 939 - 393$

$= 546$ VPH

$V_B = V_R - V_A = 1674 - 546 = 1128$ VPH

$V_{d_2} = V_B(pcph) = 1128/(.98)(.95) = 1212$ pcph

DIVERGE CRITERIA FROM HCM ESTABLISHES - V_{d_2} LOS TO BE C.

2. CALCULATE LOS USING COMPUTER PROGRAM WITH

$V_A = 546$ VPH &

$V_{fA} = V_f - V_B$

$= 4235 - 1128$

$= 3107$ VPH

1985 HCM:RAMP ANALYSIS

FACILITY LOCATION... I 70 & S.R. 24 (OLD)
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/20/88
OTHER INFORMATION... NB OFF RAMP w/S.R. 24(NEW) & w/OLD [illegible] RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 2.0 %/lane)
PEAK HOUR FACTOR..... .98
HIGHWAY DESIGN SPEED (MPH)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
VOLUME	N.A.	3107	546	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 49 % OF FREEWAY TRUCKS

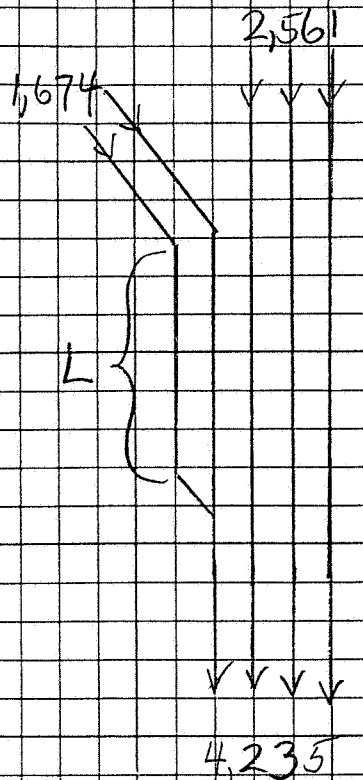
RAMP ANALYZED ALONE USING FIGURE 1.5- 7

	V1	Vr	Vf
	****	****	*****
VPH	1072	546	3107
E)	1.7	1.7	1.7
Fhv	0.57	0.58	0.58
PHF	0.95	0.95	0.95
PCPH	1163	566	3337

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3337	C
DIVERGE:	1163	C

Greiner, Inc.

JOB SR54 Interchange Justification Rpt SHEET 1 OF ___ PROJ. NO. ___
DESCRIPTION SB I-75 On-Ramp from SR54 (Old) + With County Line Road (2010) COMPUTED BY GSR DATE ___
CHECKED BY ___ DATE ___



Using Fig. I.5-11 to determine on-ramp distribution

$V_1 = 54 + 0.070(2,561) + 0.049(1,674) = 315$ vph

$V_{1+A} = -205 + 0.287(2,561) + 0.575(1,674)$
$= 1,493$ vph

$V_A = V_{1+A} - V_A = 1,493 - 315 = 1,178$ vph

$V_B = V_r - V_A = 1,674 - 1,178 = 496$ vph

$V_{m_1} = V_A(pcph) = 1,178/(0.98)(0.95) = 1,265$ pcph (LOS C)

Determination of length (L) required for 2nd merge to operate at LOS C

$V_{m_2}^{max}$ (LOS C) $= 1,750$ pcph $\Rightarrow 1,350$ vph

Maximum # of vehicles that can remain in V_A
$= 1,350 - 496 = 854$ vph

Proportion of V_A remaining $= 854/1,178 = 0.72$

If L = 850 $\Rightarrow$ 72% of V_A will remain in lane A

$V_{m_2} = 0.72(1,178)/(0.98)(0.95) + 496/(0.98)(0.9$
$= 1,444$ pcph (LOS C)

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/6/88
OTHER INFORMATION... SB ON RAMP W SR 54(NEW) & CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) TWO LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2561	1674	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 50 % OF FREEWAY TRUCKS

RESULTS USING FIGURE I.5- 11

ITEM	VPH	Fhv	PCPH
******	*****	****	******
V1	315	0.92	360
V(1+A)	1493	0.97	1620
Va	1178	0.98	1265
Vb	496	0.98	533
Vf	2561	0.98	2751

Vm1 = 1625 pcph (LOS = D)
Vm2 = 2153 pcph (LOS = F)

Vf(After merge) = 4549 pcph (LOS = C)

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... NB ON RAMP W/SR 54(NEW) & W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	324	3911	324	N.A.
% TRUCKS	3	3	3	N.A.
RAMP TYPE	OFF	N.A.	ON	N.A.
DISTANCE	1680	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 34 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 9

	V1	Vr	Vf
	****	****	*****
VPH	450	324	3587
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	499	348	3853

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4201	B
MERGE:	847	B

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... SB OFF RAMP W/SR 54(NEW) & W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	4235	234	234
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	OFF	ON
DISTANCE	N.A.	N.A.	N.A.	1640

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 36 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	554	234	4235
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	614	251	4549

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4549	C
DIVERGE:	614	A

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... NB OFF RAMP W/SR 54(NEW) & W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	4235	324	324
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	OFF	ON
DISTANCE	N.A.	N.A.	N.A.	1680

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 36 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	637	324	4235
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	706	348	4549

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4549	C
DIVERGE:	706	B

****

FACILITY LOCATION... I 75 & REST AREA
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... SB ON RAMP W/SR 54(NEW) & W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	234	4001	234	327
% TRUCKS	3	3	3	3
RAMP TYPE	OFF	N.A.	ON	OFF
DISTANCE	1640	N.A.	N.A.	5340

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 34 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 9

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1300 vph

	V1	Vr	Vf
	****	****	*****
VPH	475	234	3767
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	526	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	777	B

RAMP ANALYZED WITH UPSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	301	234	3767
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	344	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	595	A

****

C) RAMP ANALYSIS RESULTS (CONTINUED)

RAMP ANALYZED WITH DOWNSTREAM RAMP USING FIGURE I.5- 10

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1100 vph
Normal range for Dd is 1500 to 3000 ft

	V1	Vr	Vf
	****	****	*****
VPH	542	234	3767
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	601	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	852	B

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	301	234	3767
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	344	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	595	A

C) RAMP ANALYSIS RESULTS (CONTINUED)

RAMP ANALYZED ALONE USING FIGURE I.5- 9

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 300 to 1300 vph

	V1	Vr	Vf
	****	****	*****
VPH	475	234	3767
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	526	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	777	B

RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	301	234	3767
ET	1.7	1.7	1.7
Fhv	0.92	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	344	251	4046

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4297	B
MERGE:	595	A

****

FACILITY LOCATION... I-75 & SR 54 (NEW)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... SB OFF RAMP W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Light - 100 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	234	4235	326	N.A.
% TRUCKS	3	3	3	N.A.
RAMP TYPE	ON	N.A.	OFF	N.A.
DISTANCE	5185	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 38 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	657	326	4469
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	728	350	4800

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4800	C
DIVERGE:	728	B

****

FACILITY LOCATION... I-75 & SR 54 (NEW)
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/27/88
OTHER INFORMATION... NB ON RAMP W/CO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Light - 100 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	168	3909	326	N.A.
% TRUCKS	3	3	3	N.A.
RAMP TYPE	OFF	N.A.	ON	N.A.
DISTANCE	3265	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 34 % OF FREEWAY TRUCKS

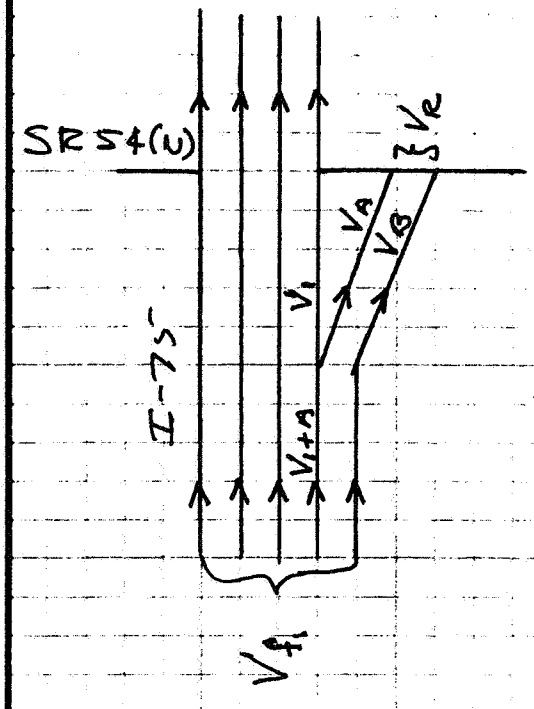
RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 9

	V1	Vr	Vf
	****	****	*****
VPH	481	326	3741
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	533	350	4018

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4368	B
MERGE:	883	B

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (NEW) N. BOUND OFF RAMP RAMP ANALYSIS - WITH Co. LINE RD. (2010) COMPUTED BY VG DATE 12/4/88
CHECKED BY ___ DATE ___



1. CALCULATE V_A & V_B USING FIG I.5-12

$V_{1+A} = -158 + .035 V_f + .567 V_R$

WHERE $V_f = (0.9 V_{f,1}) = (0.9)(4825) = 4343$

AND $V_R = 916$

$\therefore V_{1+A} = -158 + .035(4343) + .567(916)$

$= -158 + 152 + 519$

$= 513$

$V_1 = 18 + .06 V_f + .072 V_R$

$= 18 + .06(4343) + .072(916)$

$= 18 + 261 + 66$

$= 345$

$V_A = V_{1+A} - V_1$

$= 513 - 345$

$= 168$

$V_B = V_R - V_A$

$= 916 - 168 = 748$ VPH

V_B(pcph $= 748/(.98)(.95) = 803$ pcph - LOS B

2. CALCULATE LOS USING COMPUTER PROGRAM

USING $V_A = 168$ & $V_f = 4825 - 748$

$= 4077$

FACILITY LOCATION... I 75 & SR 54 (NEW)
ANALYST:..... MLF
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... NB OFF RAMP W/OO LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 4 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
VOLUME	N.A.	4077	168	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 36 % OF FREEWAY TRUCKS

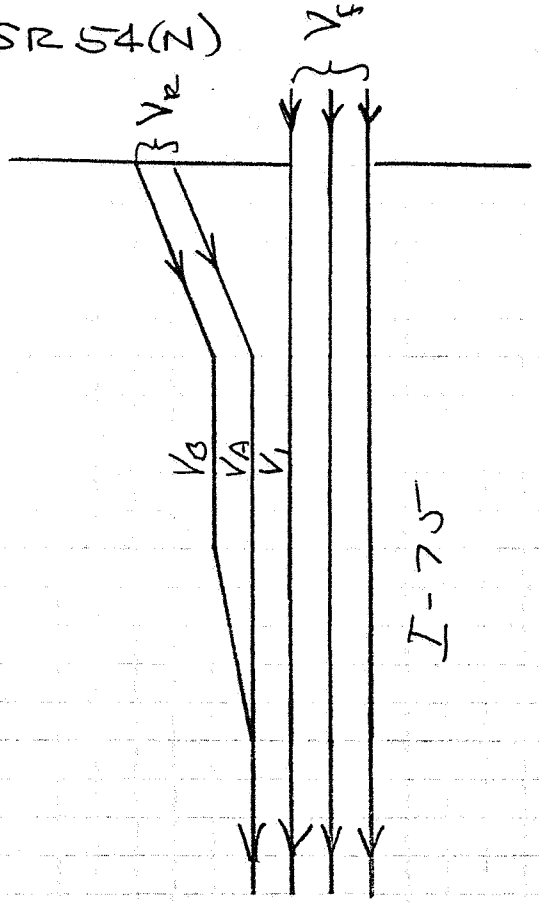
RAMP ANALYZED ALONE USING APPROXIMATION METHOD

	V1	Vr	Vf
	****	****	*****
VPH	481	168	4077
ET	1.7	1.7	1.7
Fhv	0.94	0.96	0.98
PHF	0.95	0.95	0.95
PCPH	539	180	4379

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4379	B
DIVERGE:	539	A

Greiner, Inc.

JOB I-75 & SR54 IJR — SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR54 (NEW) S. BOUND ON RAMP - RAMP ANALYSIS, W. GALENE RD (2010) — COMPUTED BY VC DATE 12/19/88
CHECKED BY ___ DATE ___



1. CALCULATE V_A & V_B USING FIG. I.5-11.

$V_1 = 54 + .07 V_f + .049 V_R$

WHERE $V_f = 3909$ & $V_R = 916$

$V_1 = 54 + .07(3909) + .049(916)$

$= 373$ vph

$V_{1+A} = -205 + .287 V_f + .575 V_R$

$= -205 + .287(3909) + .575(916)$

$= 1444$

$V_A = V_{1+A} - V_1$

$= 1444 - 373$

$= 1071$ VPH

$V_B = V_R - V_A$

$= 916 - 1071$

$= -155$ VPH ← infeasible

2. CHECK LOS OF RAMP A

$V_A = 1916 / (.98)(.95) = 1984$ pcph

MERGE CRITERIA FROM HCM ESTABLISHES V_A LOS AT B.

∴ RAMP B IS NOT REQUIRED FOR ACCESS TO I-75, BUT IS NEEDED TO ACCEPT

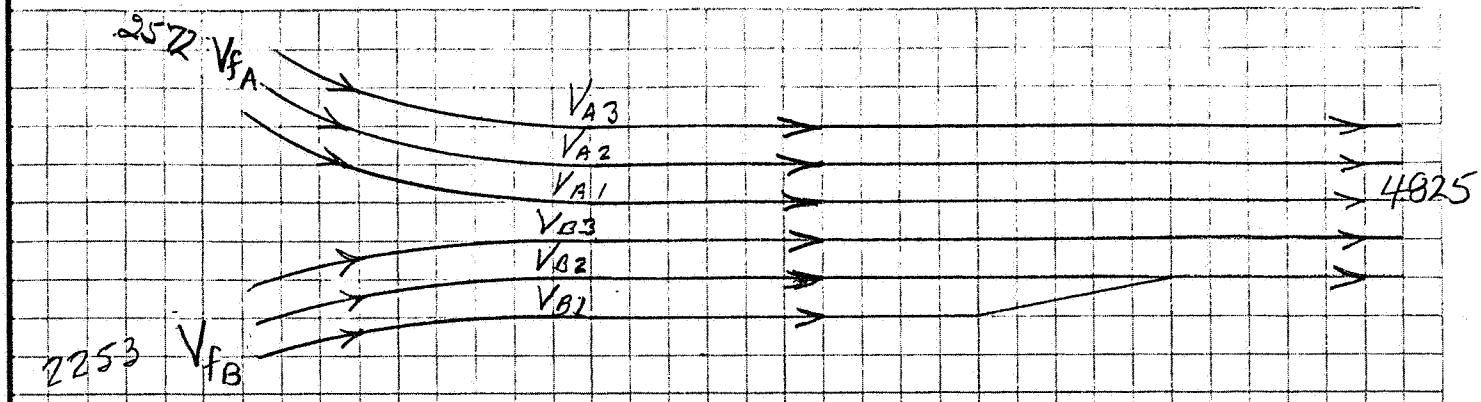
Greiner, Inc.

JOB I-75 & SR 54 EJR SHEET ___ OF ___ PROJ. NO. _____
DESCRIPTION I-75 & SR 54 (NEW) S. BOUND OD RAMP - RAMP ANALYSIS W. GO. LINE RD. (2010) COMPUTED BY VG DATE 12/19/88
CHECKED BY _____ DATE _____

THE DUAL WEST BOUND TO SOUTH LEFT TURNS FROM SR 54 (NEW) TO THE WEST ON RAMP OF I-75.

Greiner, Inc.

JOB I-75 & SR 54 ITR — SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I75/I-275 APEX MERGE ANALYSIS — WITH COUNTY LINE ROAD 2010 — COMPUTED BY VG — DATE 12/12/88
CHECKED BY ___ — DATE ___



1. ASSUME $V_{A3} = .47\,V_{fA} = .47(2572) = 1209$ VPH
2. ASSUME $V_{B1} = .06\,V_{fB} = .06(2253) = 135$ VPH
3. ASSUME $V_f = (V_{fA} - V_{A3}) + (V_{fB} - V_{B1})$
$= (2572 - 1209) + (2253 - 135)$
$= 3481$ VPH

4. THEN, ANALYZE A 4-LANE FREEWAY SECTION WITH 3481 VPH WITH AN ON RAMP WITH 135 VPH.

SINCE 135 VPH IS LESS THAN THE MINIMUM OF 300 VPH FOR THIS TYPE OF ANALYSIS, A RAMP VOLUME OF 300 VPH WILL BE USED.

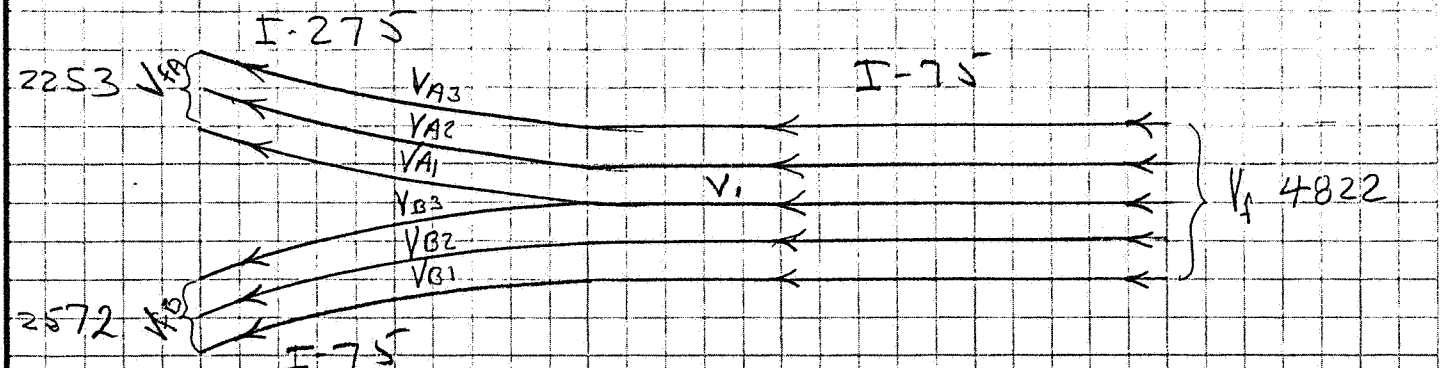
$V_1 = -312 + .201\,V_f + .127\,V_R$
$= -312 + .201(3481 - 165) + .127(300)$
$= 393$ VPH

$\therefore V_1(pcph) = (393)/(.98)(.95) = 422$ pcph
$V_r(pcph) = (135)/(.98)(.95) = 145$ pcph
$V_m = 567$ pcph

MERGE CRITERIA FROM HCM ESTABLISHES V_m LOS AT A

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75/I-275 APEX DIVERGE ANALYSES - WITH COUNTY LINE ROAD 2010 COMPUTED BY VG DATE 12/12/88
CHECKED BY ___ DATE ___



1. ASSUME V_{B3} = 6 percent of V_{B+R} = .06(2572) = 154

2. ASSUME V_{A1} = 47 PERCENT of $V_{R.A.}$ = .47(2253) = 1059

THEN, $V_{A1} + V_{B3}$ = 1059 + 154 = 1213 VPH

∴ V_1(pcph) = (1213)/(.98)(.95) = 1303 PCPH

FROM TABLE 5-1(HCM) LOS IS C

****

FACILITY LOCATION... I 270 & RAMP K
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/16/88
OTHER INFORMATION... SB ON RAMP K FROM CO LINE ...

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical = 2.0 %)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2253	664	100
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	ON	ON
DISTANCE	N.A.	N.A.	N.A.	1240

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 51 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING FIGURE 1.3- 6

WARNING! IN USING THIS NOMOGRAPH:
Normal range for Vf is 2400 to 6600 vph

	Vi	Vr	Vf
	****	****	*****
VPH	469	664	2253
ET	1.7	1.7	1.7
Fhv	0.95	0.95	0.95
PHF	0.95	0.95	0.95
PCPH	475	713	2420

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3133	B
MERGE:	1188	C

RAMP ANALYZED WITH DOWNSTREAM RAMP USING APPROXIMATION METHOD

	Vi	Vr	Vf
	****	****	*****
VPH	135	664	2253
ET	1.7	1.7	1.7
Fhv	0.85	0.96	0.96
PHF	0.95	0.95	0.95
PCPH	167	713	2420

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3133	B
MERGE:	880	B

****

FACILITY LOCATION... I-275 & RAMP C1
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... NB OFF RAMP C1 FROM I-275 TO CO. LINE RD

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	100	3017	664	N.A.
% TRUCKS	3	3	3	N.A.
RAMP TYPE	OFF	N.A.	OFF	N.A.
DISTANCE	1950	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 49 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH UPSTREAM RAMP USING FIGURE I.5- 7

	V1	Vr	Vf
	****	****	*****
VPH	1084	664	2917
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1176	713	3133

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3133	B
DIVERGE:	1176	C

****

FACILITY LOCATION... I-75 & RAMP C
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/28/88
OTHER INFORMATION... NB OFF RAMP C TO CO. LINE RD.

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	3728	1156	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 50 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 7

	V1	Vr	Vf
	****	****	*****
VPH	1504	1156	3728
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1632	1242	4004

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4004	C
DIVERGE:	1632	~~D~~ C

****

FACILITY LOCATION... I-75 & RAMP J
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... SB ON RAMP J FROM CO. LINE RD TO I-75

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP ********	FREEWAY *******	ANALYSIS RAMP ********	DOWNSTREAM RAMP **********
VOLUME	N.A.	2572	1056	100
% TRUCKS	N.A.	3	3	3
RAMP TYPE	N.A.	N.A.	ON	ON
DISTANCE	N.A.	N.A.	N.A.	1540

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 50 % OF FREEWAY TRUCKS

RAMP ANALYZED WITH DOWNSTREAM RAMP USING FIGURE I.5- 6

	V1	Vr	Vf
	****	****	*****
VPH	507	1056	2572
ET	1.7	1.7	1.7
Fhv	0.95	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	562	1134	2763

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3897	C
MERGE:	1696	D

APPENDIX G

DESIGN YEAR (2010) RAMP TERMINAL INTERSECTION CAPACITY CALCULATIONS

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I 75 - A
AREA TYPE.....OTHER
ANALYST.....MLP
DATE.....11/14/88
TIME.....2010 AM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/SR 54 (NEW) & W/O CO LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	111	1360	329	290	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	864	1199	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	402	237	1113	136	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	60	60	60	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.265	0.142	35.0	D	28.8	D
	T	0.836	0.225	31.9	D		
	R	0.574	0.417	18.1	C		
WB	L	0.906	0.508	25.9	D	16.8	C
	T	0.441	0.592	8.8	B		
	R	0.158	0.783	2.1	A		
NB	L	0.582	0.192	34.6	D	20.3	C
	R	0.796	0.550	15.8	C		
SB	L	0.655	0.150	38.7	D	37.9	D
	R	0.671	0.142	36.1	D		

INTERSECTION: Delay = 21.8 (sec/veh) V/C = 0.808 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I 75 - A
AREA TYPE.....OTHER
ANALYST.....MLP
DATE.....11/14/88
TIME.....2010 PM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/SR 54 (NEW) W/O CO LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	136	1113	402	237	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	1199	864	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	329	290	1360	111	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	60	60	60	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT	X	X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.351	0.125	36.7	D	28.9	D
	T	0.890	0.267	31.8	D		
	R	0.376	0.500	12.1	B		
WB	L	0.937	0.383	36.7	D	22.8	C
	T	0.326	0.525	10.6	B		
	R	0.201	0.800	1.9	A		
NB	L	0.472	0.275	27.8	D	29.8	D
	R	0.980	0.525	30.5	D		
SB	L	0.612	0.125	39.7	D	38.5	D
	R	0.620	0.125	35.8	D		

INTERSECTION: Delay = 27.5 (sec/veh) V/C = 0.727 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/O COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/6/89
TIME.....AM
COMMENT.....2010 DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	184	1360	650	37	: L	12.0	L	12.0	L	12.0	L	12	
TH	545	818	0	0	: L	12.0	L	12.0	L	12.0	R	12	
RT	795	31	1113	224	: T	12.0	T	12.0	R	12.0		12	
RR	60	30	0	60	: T	12.0	T	12.0	R	12.0		12	
					: T	12.0	T	12.0		12.0		12	
					: R	12.0	R	12.0		12.0		12	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TY
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 120

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH
EB	LT	X				NB	LT	X	X		
	TH	X					TH				
	RT	X					RT		X		
	PD						PD				
WB	LT		X	X		SB	LT	X			
	TH			X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LO
EB	L	0.254	0.233	28.5	D	37.0	D
	T	0.462	0.233	25.7	D		
	R	1.024	0.475	47.5	E		
WB	L	0.975	0.450	37.9	D	37.5	D
	T	0.883	0.183	36.7	D		
	R	0.001	0.700	3.5	A		
NB	L	0.839	0.250	37.9	D	20.9	C
	R	0.686	0.608	10.9	B		
SB	L	0.277	0.083	39.5	D	16.2	C
	R	0.217	0.500	10.9	B		

INTERSECTION: Delay = 31.4 (sec/veh) V/C = 0.611 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/O COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....PM
COMMENT.....2010 DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	224	1113	795	31	: L	12.0	L	12.0	L	12.0	L	12	
TH	818	545	0	0	: L	12.0	L	12.0	L	12.0	R	12	
RT	650	37	1360	184	: T	12.0	T	12.0	R	12.0		12	
RR	90	30	90	90	: T	12.0	T	12.0	R	12.0		12	
					: T	12.0	T	12.0		12.0		12	
					: R	12.0	R	12.0		12.0		12	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TY
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3	

SIGNAL SETTINGS — CYCLE LENGTH = 120

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH
EB	LT	X				NB	LT	X	X		
	TH	X					TH				
	RT	X					RT		X		
	PD						PD				
WB	LT		X	X		SB	LT	X			
	TH			X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LO
EB	L	0.364	0.208	31.1	D	27.3	D
	T	0.855	0.208	33.6	D		
	R	0.706	0.525	15.5	C		
WB	L	0.943	0.400	36.3	D	34.8	D
	T	0.712	0.167	32.1	D		
	R	0.006	0.742	2.6	A		
NB	L	0.851	0.317	34.0	D	20.4	C
	R	0.789	0.633	11.9	B		
SB	L	0.232	0.083	39.2	D	19.4	C
	R	0.140	0.442	12.9	B		

INTERSECTION: Delay = 26.8 (sec/veh) V/C = 0.621 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I 75
AREA TYPE.....OTHER
ANALYST.....MLP
DATE.....12/27/88
TIME.....2010 AM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/CO LINE RD.

	VOLUMES				:	GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	111	1316	293	290	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	920	1254	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	358	237	1077	136	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.253	0.142	34.9	D	34.0	D
	T	0.809	0.225	31.0	D		
	R	0.909	0.275	41.4	E		
WB	L	0.835	0.508	21.9	C	14.3	B
	T	0.419	0.592	8.6	B		
	R	0.211	0.783	2.2	A		
NB	L	0.493	0.192	33.4	D	19.2	C
	R	0.775	0.550	15.3	C		
SB	L	0.624	0.150	38.1	D	37.5	D
	R	0.671	0.142	36.1	D		

INTERSECTION: Delay = 21.6 (sec/veh) V/C = 0.757 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I 75
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....2010 PM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/CO LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	136	1077	358	237	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	1254	920	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	293	290	1316	111	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.132	0.333	21.2	C	25.2	D
	T	0.851	0.292	28.7	D		
	R	0.403	0.508	11.9	B		
WB	L	0.787	0.442	23.9	C	19.2	C
	T	0.455	0.400	17.2	C		
	R	0.342	0.592	8.2	B		
NB	L	0.533	0.217	32.3	D	30.0	D
	R	0.977	0.533	29.4	D		
SB	L	0.612	0.125	39.7	D	33.0	D
	R	0.233	0.333	18.7	C		

INTERSECTION: Delay = 24.7 (sec/veh) V/C = 0.727 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....AM
COMMENT.....2010 DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	230	655	214	47	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	565	749	0	0	: L	12.0	L	12.0	L	12.0	R	12.0	
RT	262	38	536	281	: T	12.0	T	12.0	R	12.0		12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR.	TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	20.5		3
WB	0.00	3.00	N	0	0	0.95	0	N	20.5		3
NB	0.00	3.00	N	0	0	0.95	0	N	38.5		3
SB	0.00	3.00	N	0	0	0.95	0	N	38.5		3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT	X	X				RT	X			
	PD						PD				
WB	LT			X		SB	LT		X		
	TH		X	X			TH				
	RT		X	X			RT		X		
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.623	0.125	40.0	D	24.7	C
	T	0.492	0.250	25.1	D		
	R	0.333	0.550	9.7	B		
WB	L	0.592	0.375	23.5	C	16.6	C
	T	0.326	0.500	11.6	B		
	R	0.033	0.800	1.6	A		
NB	L	0.414	0.175	33.8	D	16.9	C
	R	0.405	0.550	10.2	B		
SB	L	0.235	0.125	36.1	D	33.6	D
	R	0.785	0.250	33.2	D		

INTERSECTION: Delay = 20.5 (sec/veh) V/C = 0.826 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 N/I 75 W/COUNTY LINE RD.
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....PM
COMMENT.....2010 DIAMOND INTERCHANGE

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	281	536	262	38	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	749	565	0	0	: L	12.0	L	12.0	L	12.0	R	12.0	
RT	214	47	655	230	: T	12.0	T	12.0	R	12.0		12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0		12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X			
	TH	X	X				TH				
	RT	X	X				RT	X			
	PD						PD				
WB	LT			X		SB	LT		X		
	TH		X	X			TH				
	RT		X	X			RT		X		
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.476	0.200	32.7	D	19.4	C
	T	0.435	0.375	18.2	C		
	R	0.233	0.642	5.9	B		
WB	L	0.641	0.283	29.7	D	20.2	C
	T	0.268	0.458	13.0	B		
	R	0.045	0.725	3.0	A		
NB	L	0.627	0.142	38.8	D	24.2	C
	R	0.640	0.425	18.4	C		
SB	L	0.190	0.125	35.8	D	23.6	C
	R	0.494	0.325	21.6	C		

INTERSECTION: Delay = 21.2 (sec/veh) V/C = 0.841 LOS = C

APPENDIX H

NO-BUILD ALTERNATIVE RAMP JUNCTIONS CAPACITY CALCULATIONS

****

FACILITY LOCATION... I-75 & SR 54 (OLD) NO BUILD
ANALYST..... VG
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1627	339	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 67 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	658	339	1627
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	714	364	1748

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2112	B
MERGE:	1078	C

FACILITY LOCATION... I-75 & SR 54 NO BUILD.
ANALYST..... MLP
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/19/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
VOLUME	N.A.	1966	339	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 65 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	1020	339	1966
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1107	364	2112

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	2112	B
DIVERGE:	1107	C

****

FACILITY LOCATION... I-75 & SR 54 (OLD) NO BUILD
ANALYST..... VG
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) TWO LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	3329	1702	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 82 % OF FREEWAY TRUCKS

WARNING: % trucks in lane 1, ... Volume is outside Fig 5.6

FIRST RAMP RESULTS USING FIGURE I.5- 2 (NOTE 4)

WARINING! IN USING THIS NOMOGRAPH:
Normal range for Vr is 50 to 1500 vph

SECOND RAMP RESULTS USING FIGURE I.5- 2 (NOTE 4)

ITEM	VPH	Fhv	PCPH
V1	2199	0.97	2386
V(1+A)	1462	0.97	1587
Va	851	0.98	914
Vb	851	0.98	914
Vf	3329	0.98	3576

Vd1 = 1587 pcph (LOS = D)
Vd2 = 2386 pcph (LOS = F)

Vf(Before diverge) = 3576 pcph (LOS = D)

FIRST RAMP RESULTS USING APPROXIMATION METHOD (NOTE 4)

SECOND RAMP RESULTS USING FIGURE I.5- 2 (NOTE 4)

ITEM	VPH	Fhv	PCPH
V1	2109	0.97	2289
V(1+A)	1462	0.97	1587
Va	851	0.98	914
Vb	851	0.98	914
Vf	3329	0.98	3576

Vd1 = 1587 pcph (LOS = D)
Vd2 = 2289 pcph (LOS = F)

Vf(Before diverge) = 3576 pcph (LOS = D)

****

FACILITY LOCATION... I-75 & SR 54 (OLD)
ANALYST..... VG
TIME OF ANALYSIS.... 1995 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... SB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) TWO LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	1627	1702	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 67 % OF FREEWAY TRUCKS

FIRST RAMP RESULTS USING FIGURE I.5- 1 (NOTE 3)

SECOND RAMP RESULTS USING FIGURE I.5- 5 (NOTE 3)

ITEM	VPH	Fhv	PCPH
V1	599	0.97	650
V(1+A)	934	0.96	1024
Va	851	0.98	914
Vb	851	0.98	914
Vf	1627	0.98	1748

Vm1 = 1564 pcph (LOS = D)
Vm2 = 1938 pcph (LOS = E)

Vf(After merge) = 3576 pcph (LOS = D)

****

FACILITY LOCATION... I-75 & SR 54 (OLD) NO BUILD
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... NB ON RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2301	687	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	ON	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 66 % OF FREEWAY TRUCKS

RAMP ANALYZED ALONE USING FIGURE I.5- 1

	V1	Vr	Vf
	****	****	*****
VPH	851	687	2301
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	923	738	2472

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3210	D
MERGE:	1661	D

****

FACILITY LOCATION... I-75 & SR 54 (OLD) NO BUILD
ANALYST..... VG
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/29/88
OTHER INFORMATION... SB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 2 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	2988	687	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 78 % OF FREEWAY TRUCKS

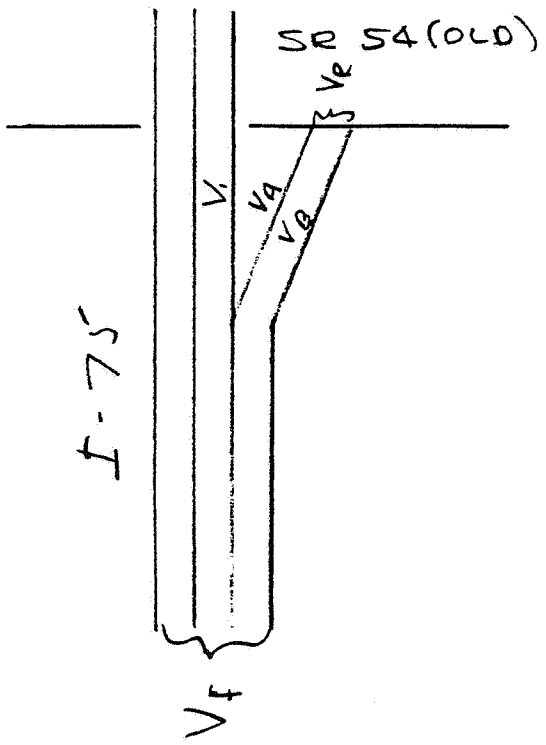
RAMP ANALYZED ALONE USING FIGURE I.5- 2

	V1	Vr	Vf
	****	****	*****
VPH	1553	687	2988
ET	1.7	1.7	1.7
Fhv	0.97	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1685	738	3209

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	3209	D
DIVERGE:	1685	D

Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) COMPUTED BY VG DATE 12/20/88
N. BOUND RAMP - RAMP ANALYSIS W/O SR 54 (NEW) & W/O COLINE RD. 2010 CHECKED BY ___ DATE ___



1. CALCULATE V_A & V_B USING FIG I. 5-12

$V_{1+A} = -158 + .035 V_f + .567 V_R$

WHERE $V_f = 6218$ & $V_R = 3917$

$V_{1+A} = -158 + .035(6218) + .567(3917)$

$= 2281$ VPH

$V_1 = 18 + .06 V_f + .072 V_R$

$= 18 + .06(6218) + .072(3917)$

$= 673$ VPH

$V_A = V_{1+A} - V_1$

$= 2281 - 673$

$= 1608$ VPH

$V_B = V_R - V_1$

$= 3917 - 1608 = 2309$

$V_B (pcph) = 2309/(.98)(.95) = 2480$ LOS F

2. CALCULATE LOS USING COMPUTER PROGRAM USING $V_A = 1608$ & $V_f = 6218 - 2309 = 3909$ VPH

3. RAMP B VOLUMES EXCEED THE LOS E CAPACITY OF ONE FREEWAY LAN

Form No. GI002-87

****

FACILITY LOCATION... I 75 & SR 54 (OLD) NO BUILD.
ANALYST..... MLP
TIME OF ANALYSIS.... 2010 PEAK HOUR
DATE OF ANALYSIS.... 12/19/88
OTHER INFORMATION... NB OFF RAMP

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 3 (Typical - 200 #/HP)
PEAK HOUR FACTOR..... .95
HIGHWAY DESIGN SPEED (mph)..... 70
(BUSES AND RV'S ARE CONSIDERED AS TRUCKS)

LEVEL TERRAIN

B) INPUT INFORMATION

NO. OF LANES ON FREEWAY : 3 (per direction)

ANALYSIS RAMP CHARACTERISTICS:
****
(1) RIGHT-HAND RAMP.
(2) ONE LANE RAMP.

	UPSTREAM RAMP	FREEWAY	ANALYSIS RAMP	DOWNSTREAM RAMP
	********	*******	********	**********
VOLUME	N.A.	3909	1608	N.A.
% TRUCKS	N.A.	3	3	N.A.
RAMP TYPE	N.A.	N.A.	OFF	N.A.
DISTANCE	N.A.	N.A.	N.A.	N.A.

****

C) RAMP ANALYSIS RESULTS

TRUCK PRESENCE IN LANE 1: 51 % OF FREEWAY TRUCKS

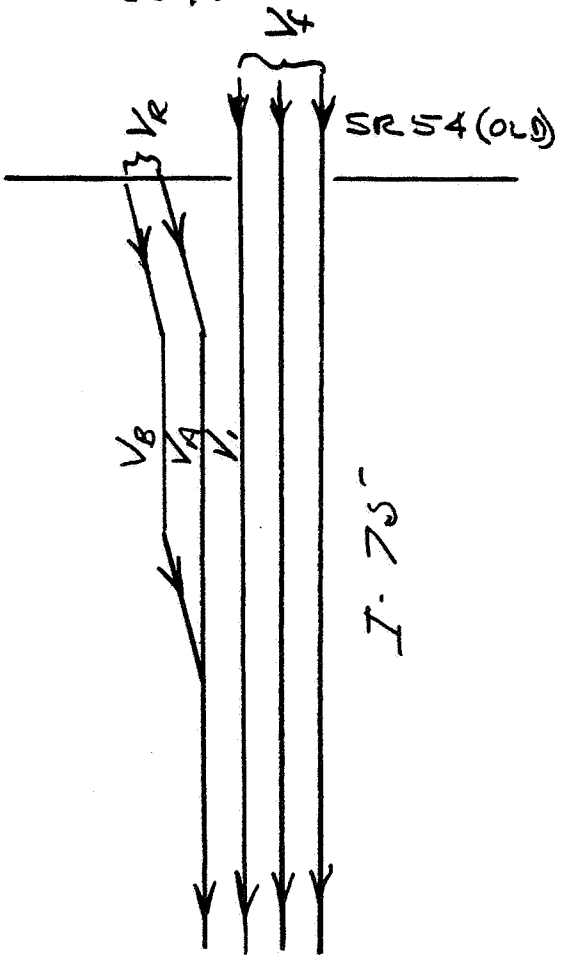
RAMP ANALYZED ALONE USING FIGURE I.5- 7

	V1	Vr	Vf
	****	****	*****
VPH	1760	1608	3909
ET	1.7	1.7	1.7
Fhv	0.98	0.98	0.98
PHF	0.95	0.95	0.95
PCPH	1890	1727	4199

CHECKPOINT	VOLUME	LOS
**********	******	***
FREEWAY:	4199	C
DIVERGE:	1890	~~E~~ D

Greiner, Inc.

JOB I-75 & SR 54 JTR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) S. BOUND RAMP - RAMP ANALYSIS. W/O SR54 (NEW) & W/O CO LINE RD. 2010
COMPUTED BY VC DATE 12/19/88
CHECKED BY ___ DATE ___



1. CALCULATE V_A & V_B USING FIG I.5-11

$V_1 = 54 + .07 V_f + .049 V_R$

WHERE $V_f = 2301$ & $V_R = 3917$

$V_1 = 54 + .07(2300) + .049(3917)$

$= 407$ VPH

$V_{1+A} = -205 + .287 V_f + .575 V_R$

$= -205 + .287(2301) + .575(3917)$

$= 2707$

$V_A = V_{1+A} - V_1 = 2707 - 407$

$= 2300$ VPH

$V_B = V_R - V_A = 3917 - 2300$

$= 1617$ VPH

2. CALCULATE LOS OF V_B MERGING INTO V_A

$V_A = 2300/(.98)(.95) = 2470$ PCPH

$V_B = 1617/(.98)(.95) = 1737$ PCPH

$V_M = V_A + V_B = 4207$ PCPH

MERGE CRITERIA FROM T.I.S ESTABLISHES V_M LOS AT F

NOTE; THIS MERGE FLOW RATE IS 1.91 TIMES LOS

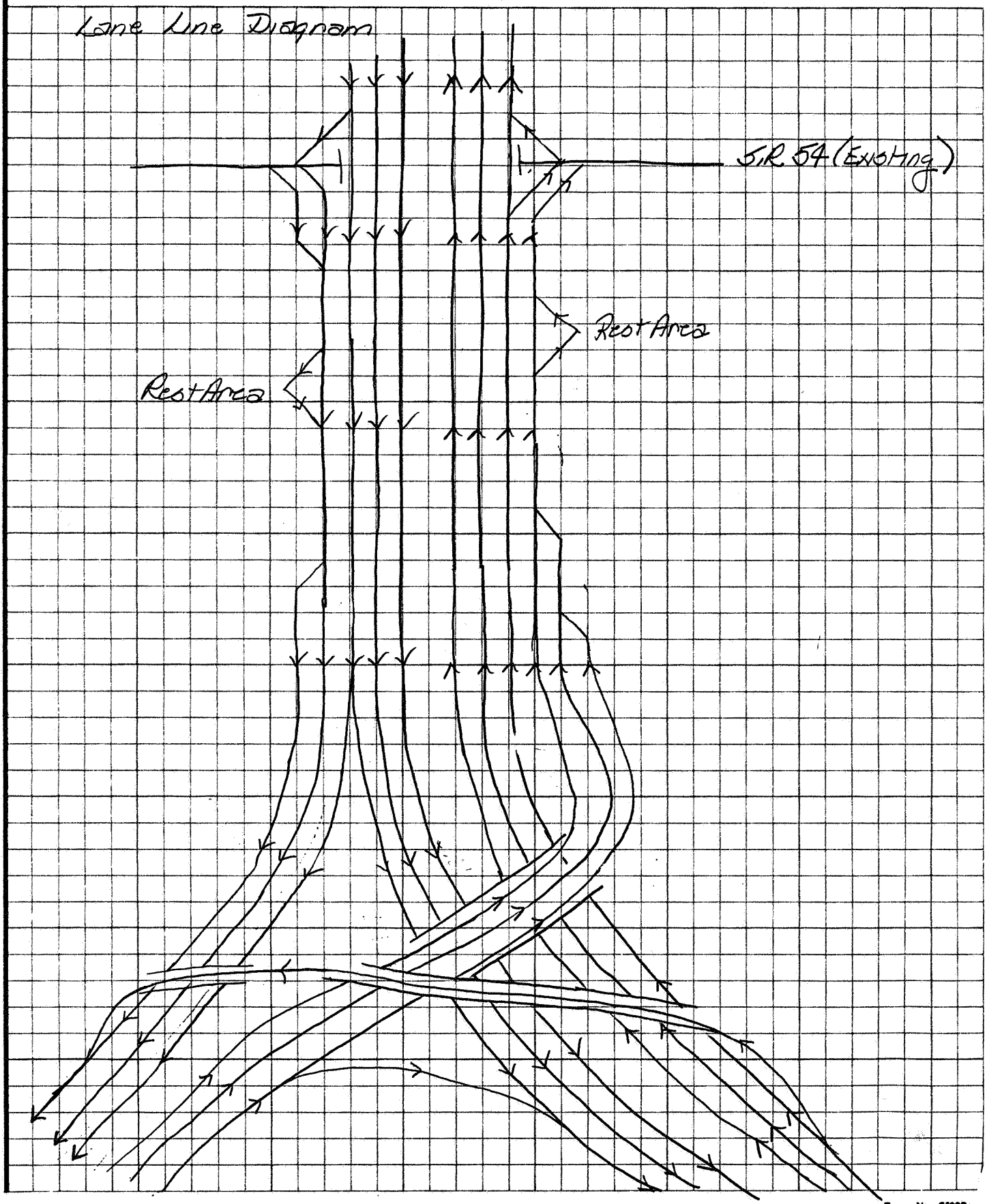
Greiner, Inc.

JOB I-75 & SR 54 IJR SHEET ___ OF ___ PROJ. NO. ___
DESCRIPTION I-75 & SR 54 (OLD) S. BOUND RAMP - RAMP ANALYSIS, W/O SR 54 (NEW) & W/O CO LINE RD. 2010 COMPUTED BY VG DATE 12/19/98
CHECKED BY ___ DATE ___

E MERGE VOLUME.

Greiner, Inc.

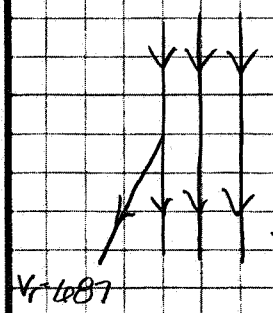
JOB S.R.54 (New)/I-75 NR. SHEET 1 OF 7 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 COMPUTED BY MJE DATE 11/2/89
CHECKED BY _____ DATE _____



Greiner, Inc.

JOB S.R.54 (New) / I-75 NR SHEET 2 OF 7 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 COMPUTED BY MJE DATE 11/2/89
CHECKED BY _____ DATE _____

Southbound Off-ramp to S.R. 54 (old)



Using Fig I.5-7

$V_1 = 94 + 0.231 V_f + 0.473 V_r + 2.5$ Vm/Dm

$= 94 + 0.231(2988) + 0.473(687) + 2$

$= 1111$ vph

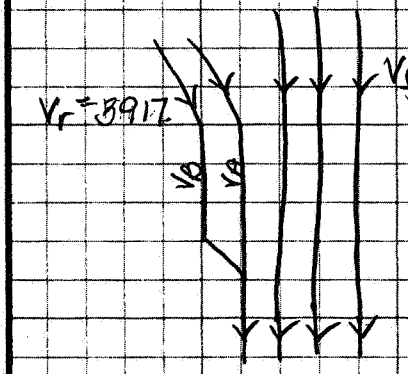
Trucks in lane 1 = $(0.49)(0.03)(2988) = 44$ trucks

$P_T = 44/1111 = 0.0396$ $f_{HV} = 1/1+(1.7-1)(0.0396) = 0.97$

$V_d = 1111/0.973\,(0.95) = 1202$ pcph

LOS C

Southbound on-ramp from S.R. 54 (old)



Use Fig I.5-11 to calc V_A & V_B

$V_1 = 54 + 0.07 V_f + 0.49 V_r$

$= 54 + 0.07(2301) + 0.49(3917)$

$= 2134$ vph

$V_{1+A} = -205 + 0.287 V_f + 0.575 V_r$

$= -205 + 0.287(2301) + 0.575(3917)$

$= 2708$ vph

$V_A = V_{1+A} - V_1 = 2708 - 2134 = 574$ vph

$V_B = V_r - V_A = 3917 - 574 = 3343$ vph

V_B exceeds lane capacity

Set V_A = 1925 pcph (LOS D maximum)

$1925\,(0.98)\,(0.95) = 1792$ vph

$V_B = 3917 - 1792 = 2125$ vph - exceeds lane capacity

Set V_A = 2200 pcph (LOS E maximum)

(2200 pcph)(0.95)(0.98) = 2048 vph

V_B = 3917 - 2048 = 1869 vph

1869/0.98(0.95) = 2068 pcph

With two add lanes Level of Service E

to merge V_B into V_A

if L = 4000' $V_1 = 0.10(V_A)$

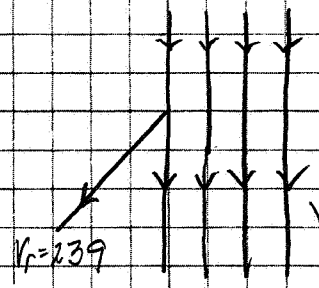
if V_A = 2200 pcph

V_1 = 0.10(2200) = 220 pcph LOS E

V_B = 2008 pcph

V_m = 2008 pcph + 220 pcph = 2228 pcph LOS F

Southbound off-ramp to rest area



Approximate using Table 5-3

V_1 = 0.10(5979) + 239

= 837 vph

Trucks in Lane 1 = 0.57(0.03)(6218) = 106

P_T = 106/837 = 12.7%

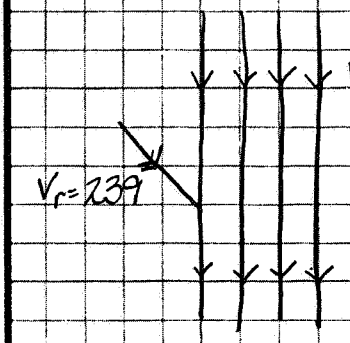
f_{HV} = 1/1 + (1.7-1)(0.127) = 0.918

$V_d = V_1$ = 837/0.918(0.95) = 960 pcph LOS B

Greiner, Inc.

JOB S.R.54 (New) / I-75 NR SHEET 4 OF 7 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 COMPUTED BY MJE DATE 11/2/89
CHECKED BY _____ DATE _____

Southbound on-ramp from rest area



Approximate using Table 5-3

$V_1 = 0.10(5979) = 598$

Trucks in lane 1 = $0.55(0.03)(5979) = 99$

$P_T = 99/598 = 0.166$

$f_{HV} = 1/1+(1.7-1)(0.166) = 0.896$

$V_1 = 598/0.896(0.95) = 703$ pcph

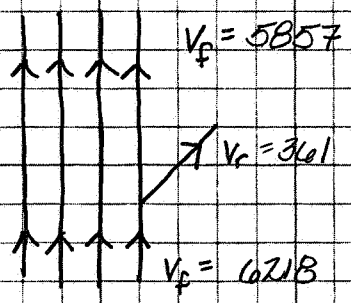
$V_r = 239/0.98(0.95) = 257$ pcph

$V_m = 703 + 257 = 960$ pcph LOS B

I-75/I-275 diverge southbound
no change from 2010 Build Alternative

I-75/I-275 merge northbound
no change from 2010 Build Alternative

Northbound off-ramp to Rest Area



Approximate using Table 5-3

$V_1 = 0.10(5857) + 361 = 947$

Trucks in lane 1 = $(0.03)(0.57)(6218) = 106$

$P_T = 106/947 = 0.112$

$f_{HV} = 1/1+(1.7-1)(0.112) = 0.927$

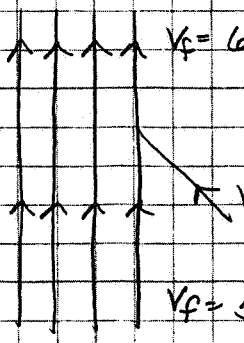
$V_d = V_1 = 947/(0.927)(0.95) = 1075$ pcph

LOS B

Greiner, Inc.

JOB S.R.54 (New) / I-75 NB SHEET 5 OF 7 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 COMPUTED BY HJE DATE 11/2/89
CHECKED BY _____ DATE _____

Northbound on-ramp from Rest Area



Approximate using Table 5-3

$V_1 = 0.10\,(5857) = 586$ vph

Trucks in lane 1 = $(0.03)(0.55)(5857) = 97$

$P_T = 97/586 = 0.166$

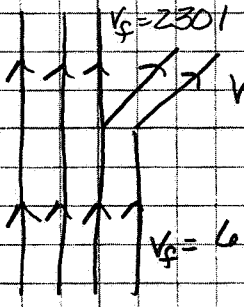
$f_{HV} = 1/1+(1.7-1)(0.166) = 0.896$

$V_1 = 586/0.896\,(0.95) = 688$ pcph

$V_r = 361/0.98\,(0.95) = 388$ pcph

$V_m = 688 + 388 = 1076$ pcph LOS B

Northbound off-ramp to SR 54 (old)



Calculate V_A & V_B using Fig I.5-12

$V_{1+A} = -158 + 0.035 V_c + 0.567 V_r$

$= -158 + 0.035(6218) + 0.567(3917)$

$= 2281$ vph

$V_1 = 18 + 0.06 V_c + 0.072 V_R$

$= 18 + 0.06(6218) + 0.072(3917)$

$= 673$ vph

$V_A = V_{1+A} - V_1 = 2281 - 673 = 1608$ vph

$V_B = V_r - V_A = 3917 - 1608 = 2309$ vph

$V_{d_1} = V_B = 2309/0.98\,(0.95) = 2480$ pcph LOS F

Diverge lane - Using Fig I.5-7

$V_1 = 94 + 0.231 V_f + 0.473 V_r + 215^{V_R/D_R}$

Greiner, Inc.

JOB S.R.54(New)/I-75 NR SHEET 6 OF 7 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 COMPUTED BY MJE DATE 11/2/89
CHECKED BY _____ DATE _____

$V_f = 6218 - 2309 = 3909$

$V_r = V_A = 1608$

$V_1 = 94 + 0.231(3909) + 0.473(1608) + 2$

$= 1760$ vph

Trucks in lane 1 = $(0.03)(0.50)(3909) = 59$ trucks

$P_{T_1} = 59/1760 = 0.034$ $f_{HV} = 1/1+(1.7-1)(0.034) = 0.977$

$V_{d_2} = 1760/0.977(0.95) = 1896$ pcph LOS D

Ramp lanes will reach equilibrium

Assume $V_B = 2000$ vph

$V_{d_1} = 2000/0.95(0.98) = 2148$ pcph LOS E

Using Fig I.5-7

$V_1 = 94 + 0.231V_f + 0.473V_r + 25\ V_M/V_d$

$V_f = 6218 - 2000 = 4218$ vph

$V_R = 3917 - 2000 = 1917$ vph

$V_1 = 94(0.231)(4218) + 0.473(1917) + 2$

$= 1977$ vph

Trucks in lane 1 = $(0.03)(0.53)(4218) = 67$ trucks

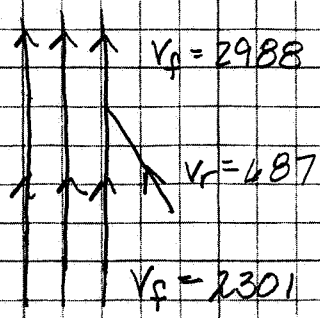
$P_{T_1} = 67/1977 = 0.034$ $f_{HV} = 1/(1.7-1)(0.034)+1 = 0.977$

$V_{d_2} = 1977/0.977(0.95) = 2130$ pcph LOS E

Greiner, Inc.

JOB S.R.54 (New)/I-75 LR — SHEET 1 OF 1 PROJ. NO. C1104.70
DESCRIPTION No Build Alternative with improved I-75 — COMPUTED BY HIE DATE 11/2/89
CHECKED BY _____ DATE _____

Northbound on-ramp from S.R. 54



Using Fig I.5-6

$V_1 = -121 + 0.244 V_f - 0.085 V_L + 640$ Vd/Dd

$V_1 = -121 + 0.244(2301) - 0.085(1977) + 5$

$= 277$ vph

Trucks in lane 1 $= (0.03)(0.51)(2301) = 35$

$P_{T_1} = 35/277 = 0.126$

$f_{HV} = 1/1 + (1.7-1)(0.126) = 0.919$

$V_1 = 277/0.919(0.95) = 317$ pcph

$V_r = 687/0.98(0.95) = 738$ pcph

$V_m = 317 + 738 = 1055$ pcph LOS B

APPENDIX I

NO-BUILD ALTERNATIVE RAMP TERMINAL INTERSECTION CAPACITY CALCULATIONS

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....AM PEAK HOUR
COMMENT.....1995 URBAN INTERCHANGE W/O SR 54(NEW) & W/O CO LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	180	1054	530	119	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	776	1092	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	647	98	863	220	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0	R	12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.457	0.133	37.0	D	30.6	D
	T	0.845	0.200	33.7	D		
	R	0.889	0.508	24.6	C		
WB	L	0.857	0.417	28.2	D	19.9	C
	T	0.492	0.483	13.7	B		
	R	0.086	0.792	1.8	A		
NB	L	0.582	0.308	27.2	D	25.0	C
	R	0.844	0.425	23.6	C		
SB	L	0.242	0.167	33.0	D	34.5	D
	R	0.686	0.133	35.2	D		

INTERSECTION: Delay = 25.1 (sec/veh) V/C = 0.612 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....PM PEAK HOUR
COMMENT.....1995 URBAN INTERCHANGE W/O SR 54(NEW) & W/O CO LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	220	863	647	98	:	L 12.0	L	12.0	L	12.0	L	12.0	
TH	1092	776	0	0	:	L 12.0	L	12.0	L	12.0	L	12.0	
RT	530	119	1054	180	:	T 12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	:	T 12.0	T	12.0	R	12.0	R	12.0	
					:	T 12.0	T	12.0		12.0		12.0	
					:	R 12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.568	0.125	39.0	D	26.0	D
	T	0.810	0.267	28.8	D		
	R	0.694	0.533	14.9	B		
WB	L	0.711	0.392	24.7	C	16.6	C
	T	0.288	0.533	10.0	B		
	R	0.104	0.800	1.7	A		
NB	L	0.783	0.267	34.3	D	33.4	D
	R	0.963	0.433	32.8	D		
SB	L	0.316	0.100	38.3	D	35.2	D
	R	0.570	0.125	33.4	D		

INTERSECTION: Delay = 25.8 (sec/veh) V/C = 0.569 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.....VG
DATE.....1/4/89
TIME.....2010 AM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/O SR 54(NEW) W/O CO. LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	295	2721	979	327	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	1429	2036	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	1197	268	2226	360	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0	R	12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	2.399	0.042	*	*	*	*
	T	1.697	0.183	*	*		
	R	2.447	0.342	*	*		
WB	L	1.580	0.583	*	*	*	*
	T	0.611	0.725	5.4	B		
	R	0.212	0.883	0.7	A		
NB	L	2.095	0.158	*	*	*	*
	R	1.442	0.642	*	*		
SB	L	1.108	0.100	119.0	F	*	*
	R	3.591	0.042	*	*		

INTERSECTION: Delay = * (sec/veh) V/C = 1.453 LOS = *

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..SR 54 (OLD)/I-75 RAMPS
AREA TYPE.....OTHER
ANALYST.......VG
DATE.....1/4/89
TIME.....2010 PM PEAK HOUR
COMMENT.....URBAN INTERCHANGE W/O SR 54(NEW) W/O CO. LINE RD.

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB		EB		WB		NB		SB	
LT	360	2226	1197	268	: L	12.0	L	12.0	L	12.0	L	12.0	
TH	2036	1429	0	0	: L	12.0	L	12.0	L	12.0	L	12.0	
RT	979	327	2721	295	: T	12.0	T	12.0	R	12.0	R	12.0	
RR	0	0	0	0	: T	12.0	T	12.0	R	12.0	R	12.0	
					: T	12.0	T	12.0		12.0		12.0	
					: R	12.0	R	12.0		12.0		12.0	

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
WB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
NB	0.00	3.00	N	0	0	0.95	0	N	0.0	3
SB	0.00	3.00	N	0	0	0.95	0	N	0.0	3

SIGNAL SETTINGS — CYCLE LENGTH = 120.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X				NB	LT	X	X		
	TH			X			TH				
	RT			X			RT		X		
	PD						PD				
WB	LT	X	X			SB	LT	X			
	TH		X	X			TH				
	RT		X	X			RT				
	PD						PD				

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	1.220	0.100	*	*	*	*
	T	2.216	0.200	*	*		
	R	1.323	0.517	*	*		
WB	L	1.534	0.492	*	*	*	*
	T	0.526	0.592	9.5	B		
	R	0.277	0.825	1.6	A		
NB	L	1.738	0.233	*	*	*	*
	R	1.885	0.600	*	*		
SB	L	0.726	0.125	42.8	E	*	*
	R	1.226	0.100	*	*		

INTERSECTION: Delay = * (sec/veh) V/C = 1.393 LOS = *