ENCLOSURE 7

Transportation And Traffic Engineering Study

Comanche Peak Steam Electric Station



De Shazo, Starek & Tang, Inc. 330 Union Station Dallas, Texas 75202

October 1987



TRANSPORTATION AND TRAFFIC ENGINEERING STUDY FOR THE COMANCHE PEAK STEAM ELECTRIC STATION

Prepared For:

Texas Utilities Generating Company

Prepared By:

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October 22, 1987

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DeShazo, Starek & Tang, Inc. Engineers • Planners

330 Union Station • Dallas, Texas 75202 • 214/748-6740

TECHNICAL MEMORANDUM

TO: Mr. Bill Crowe T.U. Electric

FROM: DeShazo, Starek & Tang, Inc.; BVDW

DATE: October 22, 1987

SUBJECT: Traffic Operations for the Comanche Peak Steam Electric Station; J87248

PURPOSE

The purpose of this study is to examine, evaluate and improve traffic operations associated with the internal street system at the Comanche Peak Steam Electric Station.

DATA COLLECTION

Manual turning movement counts were carried out by DS&T personnel on the evening of Wednesday, September 16, 1987 and the morning of Thursday, September 17, 1987. These counts were conducted at the two critical locations on the CPSES site, the intersection of the main access road with F.M. 56 and with the T.U. Engineering Building Driveway. These traffic volumes are depicted in Figures 1 and 2.

In addition to the manual counts, 24-hour machine counts were taken at seven locations in and around the site. The placement of these counters, as well as the values obtained, are described in Figure 3. A 24-hour profile of traffic entering and exiting the site is presented in Figure 4. From this figure, it can be seen that the peak traffic flow is spread out over a five hour time frame, indicating that a substantial amount of overtime had

occurred. This resulted in traffic volumes that were somewhat lower than if the entire work force arrived or left at their scheduled time.

DESIGN VOLUMES

In order to effectively consider a "worst case" scenario, a set of design volumes needed to be ascertained. Table 1 provides the total number of employees currently on-site and a series of monthly employment projections through June, 1989. From Figure 4 it has been determined that the majority of the traffic entering the site in the morning occurs between 4:00 a.m. and 9:00 a.m. equaling 3,710 vehicles. Knowing that there are currently 8,694 persons employed on-site allows the calculation of an auto-utilization factor of 2.34 persons/vehicle. This number includes elements such as absenteeism and late arrivals. The fact that this factor is relatively high is due to the large number of construction workers currently on-site (available data suggests a higher incidence of multiple riders for these workers than is normally encountered). Since this number is expected to drop as construction nears completion, a more conservative factor of 2.0 will be used in making traffic projections.

In order to more accurately determine future traffic volumes, the distribution of employees by parking lot and shift times was provided by Texas Utilities. This data is listed in Table 2. Figure 5 depicts the aforementioned parking lot locations.

By using the employment projections in conjunction with the autoutilization factor, a total number of vehicles on-site may be calculated for any given month. Using the parking lot distributions and shift times, a peak hour design volume may then be determined for each location in question.

Due to the time involved in implementing thoroughfare improvements, it was determined that January, 1988 would be the design date for recommendations. Design hour volumes for each roadway

TABLE 1

POPULATION AND EMPLOYMENT PROJECTIONS FOR THE COMANCHE PEAK STEAM ELECTRIC STATION

Group	Existing	Jan'88	Feb ' 88	Mar'88	Apr'88	May'88	Jun'88	Jul'88	Aug ' 88	Sep'88
ADMINISTRATION	103	50	49	49	49	49	49	49	49	46
CONSTRUCTION	2,993	2,693	2,566	2,366	2,148	1,868	1,724	1,563	1,344	1,182
ENGINEERING	2,840	1,244	1,200	954	950	862	777	674	671	666
NUCLEAR ENGINEERING	904	576	535	504	500	479	478	341	341	341
OPERATIONS	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
PROJECTS	471	429	420	389	383	370	359	348	343	336
SYSTEM SUPPORT	83	83	83	83	83	83	83	79	79	79
Total	8,694	6,375	6,153	5,645	5,413	5,011	4,770	4,354	4,127	3,950
Group		Oct'88	Nov'88	Dec'88	Jan!89	Feb'89	Mar'89	Apr'89	May'89	Jun'89
ADMINISTRATION		43	40	37	32	29	26	23	20	17
CONSTRUCTION		1,018	856	694	528	501	497	495	466	382
ENGINEERING		661	651	650	643	632	576	519	415	306
NUCLEAR ENGINEERING		-341	331	331	308	302	283	267	241	235
OPERATIONS		1,300	1,300	1,300	-1,300	1,300	1,300	1,300	1,300	1,300
PROJECTS		326	321	315	299	286	283	273	270	263
SYSTEM SUPPORT		75	75	75	71	- 71	71	65	65	65
Total		3,764	3,574	3,402	3,181	3,121	3,036	2,942	2,777	2,568

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during its respective peak hour is provided in Table 3 for each monthly projection (see Figure 5 for locations).

EMPLOYEE GROUP	PARKING LOT	DISTRIBUTION	WORK SHIFT
NEO Administration	A	50% of total	7:00 am-3:30 pm
	Engineering & NOSF	50% of total	7:30 am-4:00 pm
Construction	C	100	7:00 am-3:30 pm
$\sim 10^{-1}$ K $\sim 10^{-1}$	On-Site	162	7:00 am-3:30 pm
	A	Remainder of total	7:00 am-3:30 pm
Engineering	Engineering	250	7:30 am-4:00 pm
	<u> </u>	660	7:30 am-4:00 pm
	н н А	Remainder of total	7:30 am-4:00 pm
Nuclear Engineering	Operations	57	7:00 am-3:30 pm
	A	Remainder of total	7:00 am-3:30 pm
Plant Operations	Operations	529	8:00 am-4:30 pm
	NOSF	Remainder of total	8:00 am-4:30 pm
Projects	Α	A1 1	7:00 am-3:30 pm
Support Services	Support Services	50%~of total	7:00 am-3:30 pm
•	Support Services	50% of total	7:30 am-4:00 pm
		L	

TABLE 2 PARKING DISTRIBUTION

	LOCATION								
DESIGN DATE	TOTAL VEHICLES ON-SITE	LOT "A" ROAD	UNIT 2 ROAD	UNIT 1 ROAD	ENGINEERING DRIVEWAY				
Existing	3,806	3,001	562	293	325				
Jan '88	2,640	1,855	562	293	369				
Feb: '88	2,528	1,744	562	293	354				
Mar''88	2,274	1,490	562	293	352				
April '88	2,158	1,374	562	293	351				
May '88	1,957	1,211	524	293	350				
June '88	1,837	1,133	482	293	349				
July '88	1,629	979	428	293	348				
Aug '88	1,516	867	427	293	347				
Sep '88	1,428	782	424	293	346				
Oct '88	1,334	694	420	293	346				
Nov 188	1,239	605	415	293	345				
Dec '88	1,152	520	414	293	344				
Jan '89	1,041	416	409	293	344				
Feb '89	1,010	392	403	293	344				
Mar '89	980	379	375	293	343				
April '89	949	364	343	293	343				
May '89	896	334	291	293	341				
June '89	839	285	236	293	340				

TABLE 3 DESIGN HOUR VOLUMES

ANALYSIS

Analysis techniques used in this study are outlined in the 1985 <u>Highway Capacity Manual</u>, published by the Transportation Research Board. This publication contains procedures to determine the operational quality of a signalized and unsignalized intersection, given a specific set of traffic volumes and geometrics. The quality ranking system used is that of a series of Levels-of-Service (LOS) which range from "A" to "F". When an intersection operates at LOS "A", traffic flow is at an optimum, while LOS "F" represents a total breakdown of the system. A detailed explanation of each Level-of-Service may be found in the Appendix.

There are currently four critical road junction locations on the CPSES site. These locations are indicated on Figure 6. The goal of this investigation is to determine what improvements, if any, are needed for each intersection to operate at LOS "E" or better for the January, 1988 volumes. As a reference point, an examination of the existing situation has also been carried out. However, no improvements for the existing volumes were determined, as January, 1988 is the earliest time at which these improvements could feasibly be implemented.

The projected decrease in employee numbers will eventually cause vehicle numbers to drop to a point at which the recommended improvements will no longer be needed. An iterative analytical process was carried out without any improvements until the intersection was no longer at LOS "F". These analyses may be found in the Appendix. The results are listed in Table 4 for the locations indicated in Figure 6.

From Table 4 it is apparent that three of the four intersections being studied require some form of improvement to operate at acceptable levels by January, 1988. For greater clarity, each intersection will be addressed separately in the following sections:

	, ,	LEV OF-SE	EL- RVICE					
LOCATION	DATE	A.M.	P.M.	IMPROVEMENTS	OF IMPROVEMENTS			
F.M. 56/ CPSES	Existing	F	F	None Signalize &	•			
Access Rd.	Jan '88	D	D	Channelize Movements	\$335,688			
	Dec '88 Jan '89	F	D D	No Longer Needed				
T.U.	Existing	F	F	None				
Driveway/ CPSES Access Rd.	Jan '88	E	A	Add Driveway & Channelize Left Turn	\$299,536			
	Oct '88 Nov '88	E E	F E	No Longer Needed				
Pkg. Lot	Existing	F	F	None				
"A" Rd./ CPSES Access Rd.	Jan '88	В	С	Restripe EB Approach As Left-Through Through Lanes and Signalize	\$ 150			
	Dec '88 Jan '89	A A	F E	No Longer Needed				
Unit 2 Rd./ CPSES	Existing	, C	D					
Access Rd.	Jan '88	В	С					

TABLE 4ANALYSIS RESULTS

F.M. 56

As the only outside thoroughfare accessing the site, Farm-to-Market Road 56 (F.M. 56) represents the critical element of the CPSES transportation network. Due to the limited capability of this two-lane, undivided roadway to serve very high traffic volumes, additional lanes out of the site will only move the traffic bottleneck to this road. Through a series of on-site improvements and enhanced traffic control, some form of metering might

be developed on-site. This will result in a better distribution of delay throughout the network, providing a more favorable driver perception of the situation.

The intersection of F.M. 56 and the CPSES access road is currently operating at LOS "F" in both the morning and evening peak periods. If no improvements are made to the intersection, it will not operate at an acceptable LOS until January, 1989. By signalizing the intersection and providing some channelization of the movements, the intersection operates at LOS "D" by the design year; January, 1988. The geometric improvements recommended for this location are depicted in Figure 7. The estimated cost of these improvements is \$335,688. The design vehicle for the improvements at this location was determined to be the AASHTO designated WB-62TX. This represents the largest vehicle allowed or public thoroughfares without a special permit, and should adequately serve CPSES traffic.

T.U. Electric Driveway

The intersection of the T.U. Electric driveway and the CPSES access road is also operating at a current LOS of "F". November, 1988 is the earliest date at which existing geometrics will accommodate projected traffic volumes. However, the addition of another driveway to the east, along with channelization of conflicting movements, provides sufficient capacity by January, 1988 to operate at LOS "E". Figure 8 reveals the recommended improvements at this location at an estimated cost of \$299,536.

Parking Lot "A" Road

Heavy eastbound left-turning traffic in the morning and high merging volumes in the evening have the intersection of the parking lot "A" road and the CPSES road currently operating at LOS "F". Decreasing traffic volumes will not operate at acceptable levels until January, 1989. An alternative considered at this location is depicted in Figure 9. The reason for taking this option into account is the separation of heavy traffic volumes in the morning peak period. An unsignalized analysis revealed that traffic operations did improve in the morning, but that evening traffic flow deteriorates. The location requires a signal to be installed in order to accommodate left-turning vehicles from the re-directed Unit 1 Road in the evenings. Since the parking lot "A" traffic which this alignment benefits will eventually decline with time, this alternative was discarded. Instead, it was determined that installing a traffic signal at the existing intersection would better serve CPSES traffic in the future.

Signalizing the intersection must be accompanied by a re-striping of the eastbound approach before an acceptable LOS is attainable by January, 1988. This approach currently acts as a left-onlylane working in conjunction with a through-lane. By signalizing the intersection, the approach may now safely be restriped to operate in a left-only-lane and left-through lane as indicated in Figure 10. A decrease in left-turning traffic indicates that this can be altered to a left-through and through-only operation in October, 1988. Another recommendation at this location is the elimination of left-turns during the peak period. These vehicles must be forced to utilize the connecting roadway just north of the support services building. This movement may be facilitated by making the connector road a one-way road eastbound between 3:30 p.m. and 6:30 p.m.

Unit 2 Road

The intersection of the Unit 2 road and the CPSES access road is operating well during existing conditions. By January, 1988 this condition can only improve therefore, no enhancements are recommended at this location.

Pavement Marking Survey

As a guidance device, pavement markings must be kept consistent with driver expectancy. The <u>Manual on Uniform Traffic Control</u> <u>Devices</u> (MUTCD), published by the Federal Highway Administration, provides recommended pavement markings for all usual situations. The most common colors used in pavement markings is yellow and white. Yellow is considered as a prohibitive color and white is permissive. In general, white is used in circumstances where vehicles may cross the markings. In contrast, yellow lines delineate the separation of traffic flows and direct vehicles away from observations which must be passed to the right.

A survey of the CPSES site revealed a discrepancy between existing striping and MUTCD standards. The CPSES access road was delineated using yellow reflectorized buttons to separate all lanes, with a double line of these buttons used as a center stripe. Figure 11 shows proper striping for this roadway, including treatments for the on-site guardhouses. Other guidelines for pavement lettering and arrows are given in Figures 12 and 13. Figures 14, 15 and 16 show the recommended striping at the three intersections where improvements are needed.

With regard to the existing at-grade railroad crossing on the CPSES site, there are certain pavement markings recommended by the MUTCD. Figure 17 depicts these guidelines for pavement markings at railroad crossings.

Signing Review

Several key factors must be addressed in designing an efficient signing system. Size, shape, color and content are all important in conveying a desired message. Of equal importance is sign location and mounting. Guidelines for proper signing are found in the MUTCD.

One potential problem area regarding existing CPSES signing is the location and mounting of roadside signs. Existing signs are

mounted on a single steel post set in concrete bases. These signs vary in their distances from the traveled roadway. Some were found to have as little as 6 inches of lateral separation from the edge of pavement. Figure 18 gives some standard guidelines for the location of roadside signs.

In addition to being properly located, signs should have bases made of a breakaway design to reduce injury potential in case of accidents. A typical design for a breakaway sign base is shown in Figure 19. Due to the nature of the coupling, the threaded ends will strip, allowing the sign to give with minimum damage to the vehicle. Replacement of the fallen standard simply entails the rethreading of the pipe and collar before reinstalling the sign.

In keeping with the concept of driver perception, a sign's size, shape, color and content should also follow guidelines set forth in the MUTCD. Any signs designating a lane for a specific movement, or restricting certain traffic movements within a lane group should be regulatory in nature. Several signs on the eastbound approach to the Parking Lot "A" Road attempt to serve this purpose, but fail to meet MUTCD standards. Regulatory signs of the movement series are rectangular, with the longer dimension vertical, and have black legend on a white background. With regard to the CPSES Road, it is recommended that the plan in Figure 20 be followed. Figures 21, 22 and 23 give signing plans for each of the three intersections where improvements are recommended. The large guidance sign showing locations of the parking lots may remain, but the existing lane designation signs must be replaced. Recommended signing for the at-grade railroad crossing is provided in Figure 24. By maintaining uniformity in signing, a reduction in accidents due to driver confusion is possible.

CONCLUSIONS

The biggest constraint to the CPSES site from a traffic standpoint is F.M. 56. As a two-lane undivided thoroughfare, it has

limited capability in accommodating large traffic volumes. We recommend signalizing and channelizing this intersection to smooth traffic flow ingressing and egressing the site. A phasing pattern beneficial to CPSES traffic would be implemented during peak traffic periods. During off-peak traffic, the signal would operate on a demand actuated basis on the access road.

To accommodate left-turning vehicles out of the T.U. Engineering Building, it is recommended that an additional driveway be opened to the east. This, in conjunction with channelization of the vehicles turning left, allows traffic to operate at an acceptable level of service by January, 1988. If the improvements are not implemented, the existing driveway will not accommodate projected traffic volumes until November, 1988.

For a more cost effective design, the recommended concrete channelizing islands might be replaced with ceramic traffic buttons. Through a less effective form of traffic control, costs are 40 to 50 percent less. Total cost at F.M. 56 using traffic buttons has been estimated at \$201,594 and cost at the T.U. Electric driveway is reduced to \$151,522. A breakdown of all cost estimates is provided at the end of this report.

At the intersection of the Parking Lot "A" Road and the CPSES access road, signalization is necessary for tolerable operations by January, 1988. Unsignalized, this intersection does not work until January, 1989, at which time the traffic volumes are expected to reach 1,197 vehicles in the evening peak traffic period. The recommended improvements include a re-striping of the eastbound approach to accommodate the existing heavy leftturning volumes in the morning. In October, 1988 this approach can again be restriped due to the anticipated decrease in Parking Lot "A" traffic.

With regard to pavement markings and signing, it is recommended that the criteria set forth in the MUTCD be followed. By maintaining driver guidance that is consistent with these standards

both potential risk to drivers and the legal liability of CPSES is minimized. Some MUTCD guidelines have been outlined in this report for the CPSES site in particular.













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FIGURE 7











Pavement Marking Guidelines - Lettering Dimensions

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8'-0"



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ADVANCE WARNING PAVEMENT MARKING PLACEMENT TABLE 50(MIN) -- 90(USUAL) 70 -- 170 150 -- 250 236 -- 335 315 -- 416 315 -- UP (600 USUAL) DESIRABLE PLACEMENT DISTANCE "D" (FEET) STOP LINE SHOULD BE APPROXIMATELY D' FROM GATE (IF PRESENT). (SEE TABLE BELOW) APPROACH Speed (WPH) Variable. venucular trattisc approactiong, that probability visualities inside the SQL feed fthe distance from the suitstand convergation hang to faur fan two tare afgenach tynsateur or A three taur readway dowed be marked, with - 75: 0... according to the spaces and and the oght distance of AND DATE the sector On multi-late road epproach to a crun ACTUMA 0 X r'a fertig rula 'NO PE 9-9 26 OPTIONAL õe NO PASSING

Heter III Standard Alfalatur for flighwere and Markingg for RXH syndrofs instals

RXR syndarb deniki be used in earlist

Figure 17

Recommended Pavement Markings For At-Grade Railroad Crossings

DeShazo, Starek & Tang, Inc.















UNSTRUCTION COST ESTIMATES

PROJECT: T.U. Electric Drivewoys AT <u>(PSES Arress Pard-Alternative 1</u> (w/ concrete islands)

PROJ. NO. 87248 MADE BY BYDW CHECKED BY __

DATE 10:20.87

ITEM NO.	DESCRIPTION	UNIT	: UNIT PRICE	QTY.	AMOUNT
1,	BASE MATERIAL	C.Y.	^{\$} 5.45	1,893	י 10,317
ς.	ASPHALT	5,Y,	\$ 17,00	5,678	s 68,136
3.	6 CONCRETE ISLAND	5.7.	\$ 20.00	2,693	\$53,860
4.	6" CONCROTE INTEGRAL CURB	L.F.	\$`. 7.00	6,167	\$43,169
5.	4" PAINTED PAVEMENT MARKINGS	L.F.	.50	21,672	\$ 10,836
6,	MEDIAN SULN (R4.7) - 24"+ 30"	EA.	\$63.55	4	\$254
7.	ONE WAY SIGN (R6-2) - 18" x 24"	EA.	। 50.80	S	5 102
8	NO LEFT TURN SIGN (R3-2) 24"424"	EA,	3 62.90	I	⁸ 63
9.	DO NOT ENTER SIGN (RS-1) 30"x30"	EA.	5 69.65	Ζ	⁵ 139
10.	STOP SIGN (RI-1) 30", 30"	EA.	1 90.00	5	⁴ 450
11.	SPEED LIMIT SIGN (RZ-1) 24"130"	EA.	1 63.55	S	\$127
17.	JIGGLE BAR TILES	GÁ.	\$ 12:50	180	\$ 2,160
13	4" DBL. REFL TRAFFIC BUTTON	EA.	14,75	Ø	\$ Ø
14	LUMINAIRES	EA.	5 7,000	Φ	۴ D
15	DRAINAGE	L.5,	s 30 00 0	s 30,000	\$ 30,000
16	ENGINEERING	L.S.	30,000	4 30,000	\$ 30,000
	SUBTOTAL				\$ 249,613
	CONTINGENCY (70%)				49,923
	TOTAL				x 299,536
				· · · ·	
				;	

DeShazo, Starek & Tang, Inc.

UNSTHUCTION COST ESTIMATES

PROJECT: T.U. Electric Drivewoys AT (PSES Arress POAD - Alternative 2 (w/ Button traffic islands) PROJ. NO. 87248 MADE BY <u>BYDW</u> CHECKED BY DATE 10.20.87

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QTY.	AMOUNT 2
	BASE . MATERIAL	C.Y,	^{\$} 5:45	1,893	\$ 10,317
7.	ASPHALT	5.Y.	\$ 17.00	5,678	* 68,136
3.	6 CONCRETE ISLAND	5.7,	# 20.00	Φ	0
4.	6 CONCERTS INTEGRAL CURB	L.F.	\$ 7.00	Ø	¢
5.	4" PAINTED PAVEMENT MARKINGS	L.F.	.50	15,505	7,753
6.	MEDIAN SULN (R4-7) - 24"x 30"	EA.	4 63.55	\$	¢
7.	ONE WAY SIGN (R6-2) - 18"x 24"	EA,	\$ 50.80	Φ	
8	NO LEFT TURN SIGN (R3.2) 24"424"	EA,	67.90	φ	Ø
9.	DO NOT ENTER SIGN (RS-1) 30"130"	EA.	69.65	Φ	¢
10.	STOP SIGN (RI-1) 30", 30"	EA.	\$ 90.00	5	5 450 M
<u>11.</u>	SPEED LIMIT SIGN (RZ-1) 24"130"	EA,	* 63.55	Z	127
17.	JIGGLE BAR TILES	GA.	\$ 12.50	180	s 2,160
13	4" DBL. REFL TRAFFIC BUTTON	EA.	\$4,75	1,542	\$ 7,325
14	LUMINAIRES	EA.	\$ 7,000	Φ	* &
15	DRAINAGE	Ľ.5,	3 0,000	¢	s Ø
16	ENGINFERING	٤.5.	30,000	- 1	\$ 30,000
	SUBTOTAL			· · · · · · · · · · · · · · · · · · ·	126,268
	CONTINGENCY (70%)				25,254
	TOTAL				\$ 151,522

DeShazo, Starek & Tang, Inc.

CONSTRUCTION COST ESTIMATES

PROJECT:	F.M.	56	A+	CPSC5	Access	
POAD -	Alternat	ive 1	_(ω	1 Concrete	islands)	

PROJ. NO. <u>87248</u> MADE BY <u>BYDW</u> CHECKED BY _____ DATE <u>10.20.87</u>

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QTY.	AMOUNT
1,	BASE . MATERIAL	<u>(.</u>	\$5.A5	411	5 2,240
2.	ASPHALT	5.Y,	\$ 12.00	1,232	* 14,784
3.	OVERLAY	5.Y.	* 7.00	10,072	\$ 70,504
4	6" CONCRETE ISLAND	5.7.	* 20.**	2,380	\$ 47,600
5.	6" CONCEPTE INTEGRAL CURB	5.Y,	5 7.00	5,275	* 36,925
6.	4" PRINTED PAUEMENT MARKINGS	L.F.	.50	16,127	\$ 8,064
7.	MEDIAN SIGN (R4-7) - 24" x 30"	EA.	63.55	3	191
В.	LANE MUST TURN SILN (R3.7) - 30" + 30"	EA.	\$ 90.00	4	360
8.5. 9.	TURN OULY BIGN (R3-5) 30"x 36" LANG DROPSIGN (W4-2) 36" x 36"	EA EA	<u>5</u> 180.00 104.05	· 1	104 104
10	516NAL ANGAD 516N (W3-3) 36"x36"	EA	* 104.05	2	\$ 208
11	JILGLE BAR TILLS	CA.	\$ 17,50	205	* 2563
12	4" TRAFFIC BUTTONS	EA.	\$4.75	Ø.	Ø
13	LUMINAIROS	CA.	7.000	18	³ 36,000
14	DRAINACE	65.	1 30,000	$(\lambda_{1})_{1}^{2}$	30,000
15	FNGINGERING	2.5	s 30,000	1	\$ 30000
	SUBTOTAL				\$ 279,723
	Contingency (20%)				55,945
	Total				\$ 335,668
	NOTE: THIS NUMBER DOLS NOT INCLUDE THE				
	LOST OF ADDIFIONAL RIGHT-OF-WAY NEEDLD TO MEET SDAPT SAFETY REQUIREMENTS				
ľ		· ·			

DeShazo, Starek & Tang, Inc.

CUNSTHUCTION COST ESTIMATES

PROJECT: F.M. 56 At CPSCS Arress POAD - - - Alternative 2 - (Trathic button islands) PROJ. NO. <u>87248</u> MADE BY <u>BYDW</u> CHECKED BY _____ DATE <u>10,20,87</u>

ITEM NO.	DESCRIPTION	UNIT	UNIT PRICE	QTY.	AMOUNT
1,	BASE MATERIAL	<u>(.</u> ٢.	\$5.A5	411	\$ Z,240
2.	Азриалт	5.Y,	\$ 12.00	1,232	* 14,784
3.	OVERLAY	5.Y.	\$ 7.00	10,072	3 70,504
4,	6" CONTRETE ISLAND	5. ٢.	* 20.**	ø	4
5.	6" CONCRETE INITEGRAL CURB	5.Y,	5 7.00	Ф	х
6.	4" PRINTED PRUEMENT MARKINGS	L.F.	\$.50	\$ 10,852	\$ 5.426
7.	MEDIAN SIGN (R4-7) - 24" x 30"	EA.	F 63.55	Φ	• Φ
В.	LANE MUST TURN SIGN (R3-7) - 30" + 30"	EA.	5 90.00	φ.	\$ Q
9,	LANE DROP 5/6N (W4-2) 36" +36"	EA	3 104.05		\$ 104
10	SIGNAL AHGAD SIGN (W3-3) 36"x36"	EA	104.05	z	\$ 104
11	JUGLE BAR TILLS	CA.	\$ 17,50	205	\$ 2,563
12	4" TRAFFIC BUTTONS	EA.	^{\$} 4.75	1320	6,270
13	LUMINAIRES	CA.	₹ 7.000	15	4 30,5%2
14	DRAINACE	L.S.	5.30,000	Φ	*
15	FNGINGERING	2.3	5 30,000	l i	\$ 30,000
	SUBTUTAL				167,995
	CONTINCEMY (20!)				* 33,599
	TOTAL				\$ 201, 594
	NOTE: THIS NUMBER DUES NOT INCLUDE THE				
	COST OF ADDITIONAL RIGHT-OF-WAY NEEDLD. TO MEET SONAT SAFETY DEQUIREMENTS				

DeShazo, Starek & Tang, Inc.

APPENDIX

DeShazo, Starek & Tang, Inc

LEVEL OF SERVICE AT SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DESCRIPTION	DELAY IN SECONDS*
A	Free Flow - Volumes low enough not to restrict choices of speed and maneuverability. No queue would accumu- late at signalized intersections.	0 - 5
В	Stable Flow - Range of stable flow with speeds and maneuverability beginning to be influenced by traffic. Some queuing would occur at signalized intersections, but <u>all</u> cars would easily clear the signal.	5.1 - 15
C	Stable Flow - Also in stable range but speed and maneuverability are controlled by traffic volumes. Again, queues would develop, but <u>all</u> cars would easily clear the signal.	15.1 - 25
D	Approaching Unstable Flow - Volumes which cause unstable flow conditions at times and little maneuver- ability. Queues would form after each signal cycle. However, the last car to join the queue would clear the intersection each time.	25.1 - 40
Ε	Unstable Flow - Intersection operates at lower speeds. This LOS represents the highest capacity of the inter- section. The last cars to join a queue would probably not make the first signal cycle. Thus, over time queues might begin to build, then occasionally clear.	40.1 - 60
F	Forced Flow - The worst condition with forced flow at very low speeds. Volumes approaching the intersection exceed capacity. The last cars to join the queue would <u>not</u> clear the intersection in one cycle. A queue would build by a few cars each cycle. However, cars would be advancing through the intersection.	60.1 or greater

* Dependent on total cycle length.

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J 87248

UNSIGNALIZED	INTERSECTIONS
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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS								
LOCATION EM. 56 (CPSES ROAD				NAME BUDW				
	MES			VOL	UMES IN PC	PH		
		1	$\overline{}$			•••••		
Major S	treet: 1-1-1.56	(-			11 24	<u> </u>
N=[7]		V.5	3	8 v		V. <u>28</u> -	
Grade -			×	146	<u>2</u> V ₁	36		
<u> </u>	<u> </u>		ا≡[ک]	-		٦ÌÌÌÌ, v, v. Γ		.
		', V,						
Time Period: A.M	ExISTING		YIELD			104		
Average Running	s Speed: 45 N	=4		1		49		
	Sti	nor l						
PHF: <u>1.0</u> Gra	ade%	PSCS A	Poro					· .
VOLUME ADJL	JSTMENTS							
Movement No.		<u> </u>		3	4	5	.7	- 9
Volume (vph)	.	:38	14	162	2192	38	10:4	49
Vol. (pcph), see 1	Table 10-1							
STEP 1: RT from	n Minor Street					۲ ۷,		
Conflicting Flow	; V _			1/2	$V_1 + V_2 = \frac{73}{73}$	<u>31 + 38 =</u>	= <u>769</u> vph (′V_₀)
Critical Gap, T.,	and Potential Capa	city, c.		$T_{c} = 6.5$ sec (Table 10-2) $c_{cs} = 325$ pcph (Fig. 10-3)				
Actual Capacity.	Ċ			$c_{-0} = c_{-0} = \frac{325}{pcph}$				
STEP 2: LT From	n Major Street			V4				
Conflicting Flow	, V.		<u> </u>	V.+	$V_{1} = 1462 +$	- 10 = 14	72 vph (V.,)	
Critical Gap, T.,	and Potential Capa	city. c		τ=	5.5 sec (Tal	hle 10-2) c =	= 175 pcph	(Fig 10-3)
Percent of c Util	ized and Impedance	Factor (Fi	or 10−5)	$(y_{1}/c_{-1}) \times 100 = B41 / P = 1.0$				
Actual Capacity,	C_		6. 10 0)	c = c = 175 non				
STEP 3: LT From	n Minor Street			1 - m4	-p•	<u>بر میں</u> ۷٫		
Conflicting Flow	v		1/2 V -	-v +v 4	-v =731 ±	38 49	+2192-30	Queb (V)
Critical Gap T	and Potential Cana	rity c	r = 7.	8	(abla 10, 2) a	- O	$+ \underline{-} \underline{-} \underline{-} \underline{-} \underline{-} \underline{-} \underline{-} \underline{-}$	$\sum v pn(v_{c7})$
Actual Canadity	and rotenniar Capa	сту, ср	1, = <u>//</u>	<u> </u>		= - c	on (rig. 10-3)	
SHARED-I ANI	$c_{m_7} = c_{p_7} \times P_4 = \underline{\qquad} pcph$							
$v_7 + v_9$ if land is channel								
$SH = \frac{1}{(v_7/c_{m7}) + (v_9/c_{m9})}$								
Movement No.	v(pcph)	с _т (р	cph)	с _{sн}	(pcph)	C _R		LOS
7	104	0		·		-104		F
9	49	32	5			276		С
4	2192	17	5			-2017	7 _	F

A.M. Existing

UNSIGNALIZED INTERSECTIONS

WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATIONE	1 SL/CRSES	PD		NAM	F RVD	لما ه			
HOURLY VOLU	MES			VOL	JMES IN P	CPH			
Maian	EM 66	(-				·			
Major 5	treet: <u>c.rl</u> ; <u>50</u>	\	$\underline{\mathcal{I}}^{N}$	-	<u>. </u>		V. 21	-	
$N = \overline{2}$) V.		V, V	2	<u>7</u> V ₂		V, 🛲 🗉	3)	
% -	_ V ₃		N=2	-	<u> </u>		-	-	
		7, V,		• •		V , V ,			
Date of Counts:	FRISTING -		STOP			1120			
Average Running	g Speed: N	-4	HELD			Z 381		· .	
	l Mi Sti	nor reet:	,		• •	• .•			
PHF: <u>1.0</u> Gra	ade%	PSES A	<u>20</u> .		•				
VOLUME ADJU	JSTMENTS								
Movement No.		2		3	4	5	7	9	
Volume (vph)		S.	7 1	25	131	15	1120	2381	
Vol. (pcph), see T	Table 10-1								
STEP 1: RT from	n Minor Street				• :	<u>ب</u> ۷,			
Conflicting Flow	, V _c	. *	·	$1/2 V_3 + V_2 = \underline{62} + \underline{27} = \underline{89} vph(V_{co})$					
Critical Gap, T _c ,	and Potential Capa	city, c _p	,	$T_c = 6.5$ sec (Table 10-2) $c_{p9} = 830$ pcph (Fig. 10-3)					
Actual Capacity,	C _m			$c_{m9} = c_{p9} = \underline{830} pcph$					
STEP 2: LT From	n Major Street	- · ·		√ V ₄					
Conflicting Flow	, V _c	•	. '	V3+	$V_2 = \frac{125}{1}$	+ 27 = 15	<u>Z</u> vph (V ₄)		
Critical Gap, T _c ,	and Potential Capa	city, c _p	•	$T_c = \frac{5.5}{1000} \text{ sec (Table 10-2) } c_{p4} = \frac{940}{1000} \text{ pcph (Fig. 10-3)}$					
Percent of c _p Util	ized and Impedance	e Factor (Fi	g. 1 0-5)	$(v_4/c_{p4}) \times 100 = \frac{16}{2} P_4 = -9$					
Actual Capacity,	C _m			$c_{m4} = c_{p4} = \frac{940}{pcph}$					
STEP 3: LT From	n Minor Street				•.	$\supset V_{7}$			
Conflicting Flow,	, V _c		1/2 V,+	·V ₂ +V ₅ +	+ <u>50</u> = V-	15+22	+131 = 24	$\frac{1}{V}$ vph (V _c)	
Critical Gap, T _c ,	and Potential Capa	city, c _p	$T_{c} = \frac{7}{7}$	B_sec (1	fable 10-2) c	= .540 pc	ph (Fig. 10-3)		
Actual Capacity, $c_m = c_{n2} \times P_a = 540 \times \frac{9}{2} = \frac{486}{100} \text{ pcph}$									
SHARED-LANE CAPACITY									
$SH = \frac{v_7 + v_9}{(v_7/c_{-7}) + (v_9/c_{-6})}$ if lane is shared									
Movement No.	v(pcph)	с _т (р	cph)	CSH	(pcph)	C p		LOS	
7	1120	48	2			-634		F	
9	2381	B30				-1551		F	
4	3	940)			809		A .	

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1985 HCM: SIGNALIZED INTERSECTIONS *****

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IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET.....CPSES ROAD AREA TYPE.....OTHER NAME OF THE ANALYST......BDVDW TIME PERIOD ANALYZED.....EXISTING A.M.

OTHER INFORMATION: EXISTING GEOMETRICS

TRAFFIC VOLUMES

			· · · ·		*
	EB	WB	NB	SB	* .
LEFT	1	104	0	2192 •	
THRU	1	1	38	38	
RIGHT	1	49	1462	0	
RTOR	0	0	0	0	
· ·				•	

(RTOR volume must be less than or equal to RIGHT turn volumes.)

INTERSECTION GEOMETRY

NUMBER OF LANES PER DIRECTION INCLUDING TURN BAYS: EASTBOUND = 2WESTBOUND = 2 NORTHBOUND = 2 SOUTHBOUND = 2NB SB EΒ · WB TYPE WIDTH LANE TYPE WIDTH TYPE WIDTH TYPE WIDTH 12.0 12.0 12.0 1 LT 12.0 LT Т L 2 12.0 Т 12.0 TR TR 12.0 R 12.0 3 12.0 12.0 12.0 12.0 12.0 4 12.0 12.0 12.0 5 12.0 12.0 12.0 12.0 12.0 6 12.0 12.0 12.0 L - EXCLUSIVE LEFT LANE T - EXCLUSIVE THROUGH LANE LT - LEFT/THROUGH LANE TR - THROUGH/RIGHT LANE

R - EXCLUSIVE RIGHT LANE

LR - LEFT/RIGHT ONLY LANE

LTR - LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

PHF
1.00
1.00
1.00
1.00

Nm = number of parking maneuvers/hr; Nb = number of buses stopping/hr

	CONFLICTING FEDS (peds/hour)	PEDESTRI (Y/N)	(MIN BUTTON	ARRIVAL TYPE		
•						
EASTBOUND	0	N .	14.5	. 3		
WESTBOUND	0	N	14.5	3		
NORTHBOUND	O Í	.N	14.5	3		
SOUTHBOUND	O	· N	14.5	3		

min T = minimum green time for pedestrians

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SIGNAL SETTINGS JPERATIONAL ANALYSIS

Page-3

ACTUATED

LOST TIME/PHASE = 3.0

CYCLE LENGTH = 120.0

EAST/WEST PHASING

	PHASE-1	PHASE-2	PHASE-3	PHASE-4	
EASTBOUND LEFT THRU RIGHT PEDS	X X X		· · ·		
WESTBOUND LEFT THRU RIGHT PEDS		X X X			
NORTHBOUND RT SOUTHBOUND RT	X				
GREEN YELLOW + ALL REI	3.0 D 3.0	13.0 3.0	0.0	0.0	

NORTH/SOUTH PHASING

NORTHBOUND	PHASE-1	PHASE-2	PHASE-3	F'HASE-4	al 1640 alex call call for 600 y
LEFT THRU RIGHT PEDS	x x	X			
SOUTHBOUND LEFT THRU RIGHT PEDS	X	X X			: • •
EASTBOUND RT WESTBOUND RT		•			· · ·
GREEN YELLOW + ALL REI	90.0 D 3.0	2.0 3.0	0.0	0.0 0.0	

VOLUME ADJUSTMENT WORKSHEET

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===								= = = = = = = =		======		
						LANE		LANE		ADJ.		
		MVT.		ADJ.	LANE	GRP.	NO.	UTIL.	GROWTH	GRP.	PROP	PROP
		VOL.	PHF	VOL.	GRP.	VOL.	LN	FACT.	FACT.	VOL.	LT	RT.
			***** ***** **** ****									مەر بى مەن
EB		\		·	•			:				
	LT	1	1.00	1		_	-					
	тн	1	1.00	1	LTR	3	2	1.050	1.000	3	0.33	0.33
	RT	1	1.00	1						*		
WΒ						, *		, .				
	ĹТ	104	1.00	104	*1	104	1	1.000	1.000	104	1.00	0.00
	тн		1.00	1	TR	50	1	1.000	1.000	50	0.00	0.98
	RT	49	1.00	49			-					
NB										·		
			1.00									
	тн	38	1.00	- 38	Ŧ	38	1	1,000	1.000	- 38	0.00	0.00
	RT	1462	1.00	1462	R	1462	. 1	1.000	1.000	1462	0.00	1.00
			•						•		· .	
SB										·		
	LT	2192	1.00	2192	L	2192	1 -	1.000	1.000	2192	1.00	0.00
	ΤН	38	1.00	38	T	38	1	1.000	1.000	-38	0.00	0.00
	RT	0	1.00	0				•			1	

* Denotes a Defacto Left Turn Lane Group

Α7

5A' ==:		ION FL)W =====	JUSTM	JUSTMENT WORKSHEET) 	Page-5	
	•	IDEAĻ SAT. FLOW	NO. LNS	f	f HV	fG	f P	f BB	f A	f RT	f LT	ADJ. SAT. FLOW	
EB	•									· ·			
	LTR	1800	2	1.000	0.995	1.000	1.000	1.000	1.000	0.950	0.984	3347	
WB				~ .			· •	N					
	Ľ	1800	- 1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701	
	TR	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.853	1.000	1528	
NB				•							· ·	,	
	т	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791	
	R	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1522	
SB													
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701	
• •	Т	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791	

CAPACITY ANALYSIS WORKSHEET

	ADJ. FLOW RATE (v)	ADJ. SAT. FLOW RATE (5)	FLOW RATID (v/s)	GREEN RATIO	LANE GROUP CAPACITY	V/c RATIO
EB						
LTR	3	3347	0.001	0.025	. 84	0.038
WB						
L	104	1701	0.061	0.108	184	0.564 *
TR	50	1528	0.033	0.108	166	0.302
, NB	·			· · ·		
т	38	1791	0.021	0.750	1343	0.028 *
R	1462	1522	0.960	0.817	1243	1.176
SB			·			
L	2192	1701	1.288	0.017	28	%77.299 *
т	38	1791	0.021	0.792	1418	0.027
	· · ·				· · ·	

Cycle Length, C = 120.0 sec.Sum (ν /s) critical = 1.432Lost Time Per Cycle, L = 12.0 sec.X critical = 1.591

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LEVEL-OF-SERVICE JRKSHEET

			1.1						•		
	v/c RATIO	g/C RATIO	CYCLE LEN.	DELAY d 1	LANE GROUP CAP.	DELAY d 2	PROG. FACT.	LANE GRP. DELAY	LANE GRP. LOS	DELAY By APP.	LOS BY APP.
EB LTR	0.038	0.025	120.0	43.4	84	0.0	0.85	36.9	ם	36.9	D
้พย			·. ·							:	*
L	0.564 0.302	0.108 0.108	120.0 120.0	38.6 37.5	184 166	2.9 0.3	1.00 0.85	41.5 32.1	E D	38.5	D
NR										ļ	
T R	0.028 1.176	0.750 0.817	120.0 120.0	2.9 38.7	1343 1243	0.0 93.5	0.85 0.85	2.5 112.3	A F	109.5	F
GD .		•			,				· · ·		
L T	%77.2° 0.027	79 0.0 0.792	17 120. 120.0	.0 2.0	* 1418	28 ÷ 0.0	* 1.0 0.85	00 1.7	* * A		₩ *

Intersection Delay = * (sec/veh)

Intersection LOS = *

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* Delay and LOS not meaningful when any v/c is greater than 1.2

1985 HCM: SIGNALIZED INTERSECTIONS

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IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET.....CPSES ROAD NAME OF THE NORTH/SOUTH STREET....F.M. 56 AREA TYPE.....OTHER NAME OF THE ANALYST.....BDVDW DATE OF THE ANALYSIS.....9/28/87 TIME PERIOD ANALYZED....EXISTING P.M.

OTHER INFORMATION: EXISTING GEOMETRICS

TRAFFIC VOLUMES

			=======================================		= = = = = = = = = = = = = = = = = = =
	EB	WB	NB	SB	
LEFT	1	1120	0	131	
THRU	1	1	27	21	
RIGHT	. 1	2381	125	0	
RTOR	0	0	o	0	

(RTOR volume must be less than or equal to RIGHT turn volumes.)

INTERSECTION GEOMETRY

NUMBER EASTBO	OF LAN UND = 2	ES PER D WEST	IRECTIO BOUND =	N INCLUD 2 NO	ING TUR RTHBOUN	N BAYS: D = 2	SOUTHE	OUND = 2	
	E	B	W	в	N	B	S	B .	
LANE	TYPE	WIDTH	TYPE	WIDTH	TYFE	WIDTH	TYPE	WIDTH	
1	LT	12.0	LT	12.0	т	12.0	L	12.0	
2	TR	12.0	TR	12.0	R	12.0	Т	12.0	
3		12.0		12.0		12.0	`	12.0	
4		12.0	•	12.0	•	12.0		12.0	
5		12.0		12.0		12.0		12.0	
6		12.0		12.0		12.0		12.0	
L – LT –	EXCLUSI	VE LEFT IROUGH LA	LANE		T –	EXCLUSIV	E THROL	IGH LANE	

LR - LEFT/RIGHT ONLY LANE

LTR - LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

R - EXCLUSIVE RIGHT LANE

	GRADE (%)	HEAVY VEH. (%)	ADJAC Y/N	ENT PKG (Nm)	BUSES (Nb)	PHF
EASTBOUND	0.00	1.00	N	0	0	1.00
WESTBOUND	0.00	1.00	N	<u>`</u> 0	0	1.00
NORTHBOUND	0.00	1.00	N	0	. 0	1.00
SOUTHBOUND	0,00	1.00	N	0	0	1.00
						1

Nm = number of parking maneuvers/hr; Nb = number of buses stopping/hr

	CONFLICTING FEDS (peds/hour)	PEDESTRI (Y/N)	(min T)	ARRIVAL TYPE
EASTBOUND	0	N	14.5	3
WESTBOUND	O	N	14.5	3
NORTHBOUND	0	N	14.5	3
SOUTHBOUND	o	N	14.5	3

min T = minimum green time for pedestrians

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SIGNAL	SETTINGS	•	JPERATIONAL	ANALYSIS	Page-3
·		· · · · · ·			

ACTUATED

LOST TIME/PHASE = 3.0 CYCLE LENGTH = 120.0

EAST/WEST PHASING

	PHASE-1	PHASE-2	PHASE-3	PHASE-4		
LEFT THRU	X X		2	٠. ٩	•	
RIGHT PEDS	X	-				•
WESTBOUND LEFT THRU		X X			·	
RIGHT PEDS	· · · ·	X				
NORTHBOUND RT SOUTHBOUND RT	X		•			
GREEN YELLOW + ALL REI	1.0 3.0	96.0 3.0	0.0 0.0	0.0 0.0	<u>`</u>	

NORTH/SOUTH PHASING

NORTHBOUND	PHASE-1	PHASE-2	PHASE-3	PHASE-4
LEFT THRU RIGHT PEDS	X X	×		
SOUTHBOUND LEFT THRU RIGHT PEDS	×	X X		
EASTBOUND RT WESTBOUND RT	- · · · ·	· · · · ·		
GREEN YELLOW + ALL REI	2.0 3.0	9.0 3.0	0.0	0.0 0.0

VOLUME ADJUSTMENT WORKSHEET

			MVT. VOL.	PHF	ADJ. VOL.	LANE GRP.	LANE GRF. VOL.	ND. LN	LANE UTIL. FACT.	GROWTH FACT.	ADJ. GRF. VOL.	PROP LT	PROP RT
	EB			· .						•			
		LT	1	1.00	1		· ·		• ·			. •	
		ΤН	1	1.00	1	LTR	<u>,</u> 3	2	1.050	1.000	3	0.33	0.33
		RT	1	1.00	1								
	សាទ											· · ·	
		LT	1120	1.00	1120								2
		тн	1	1.00	1	LTR	3502	2	1.050	1.000	3677	0.32	0.68
		RT	2381	1.00	2381								
	NID					•				. '		•	
	- 14.5	1 T	0	1 00	·								
•		тн	.27	1.00	27	· T	27	1	1.000	1.000	77	0.00	0.00
		RT	125	1.00	125	Ŕ	125	1	1.000	1.000	125	0.00	1.00
								-					
	SB											•	
		LT	131	1.00	131	L	131	1	1.000	1.000	131	1.00	0.00
		тн	21	1.00	21	Т	21	1	1.000	1.000	21	0.00	0.00
		RT	Ó	1.00	0		•					•	

* Denotes a Defacto Left Turn Lane Group

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SATURATION FLOW , JUSTMENT WORKSHEET

Page-5

_

		IDEAL SAT. FLOW	ND. LNS	f W	f HV	f G	f . P	f BB	f	f RT	f LT	ADJ. SAT. FLOW
EB					· ·							
	LTR	1800	2	1.000	0.995	1.000	1.000	1.000	1.000	0.950	0.984	3347
WB	(.											
	LTR	1800	2	1.000	0.995	1.000	1.000	1.000	1.000	0.878	0.984	3166
NB									•			
	T	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791
		1800	1	1.000	0.773	1.000	1.000	1.000	1.000	0.850	1.000	1022
SB					· · ·		· · · ·					
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701
	Т	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791

CAPACITY ANALYSIS WORKSHEET

)

	ADJ. FLOW RATE (\)	ADJ. SAT. FLOW RATE (5)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUP CAPACITY (c)	√/c RATIO	•
EB LTR	3	3347	0.001	0.008	28	0.113	
WB LTR	. 3677	3166	1.161	0.800	2533	1.452	*
NB T R	27 125	1791 1522	0.015 0.082	0.017 0.125	30 190	0.905 0.657	*
SB L T	131 21	1701 1791	0.077 0.012	0.075 0.117	128 209	1.027 0.101	*

Cycle Length, C = 120.0 sec.Sum (ν /s) criticalLost Time Per Cycle, L = 12.0 sec.X critical = 1.461

Sum (v/s) critical = 1.315

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LEVEL-OF-SERVICE JRKSHEET

Page-7

	√/c RATIO	g/C RATIO	CYCLE LEN.	DELAY d 1	LANE GROUP CAP.	DELAY d 2	FROG. FACT.	LANE GRP. DELAY	LANE GRP. LOS	DELAY BY APP.	LOS BY APP.	
EB LTR	0.113	0.008	120.0	44.9	28	0.1	0.85	38.2	• D	38.2	D.	
WB LTR	1.452	0.800	120.0	*	2533	*	0.85	*	*	*	*	
NB												
т	0.905	0.017	120.0	44.8	30	86.0	0.85	111.1	F	50.1	E	
R	0.657	0.125	120.0	38.0	190	5.4	0,85	36.9	D			
SB												
L	1.027	0.075	120.0	42:3	128	70.4	1.00	112.7	F	101.4	F	
Т	0.101	0.117	120.0	36.0	209	0.0	0.85	30.6	D			
						· · ·					ĩ	
Inter	section	n Dela	y = *	(sec/v	eh)	In	tersect	tion L	DS = ·	*		
* Delay and LOS not meaningful when any v/c is greater than 1.2												

1985 HCM: SIGNALIZED INTERSECTIONS Fage-1

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET.....CPSES ROAD NAME OF THE NORTH/SOUTH STREET.....F.M. 56 AREA TYPE.....OTHER NAME OF THE ANALYST.....BDVDW DATE OF THE ANALYSIS......9/28/87 TIME PERIOD ANALYZED.....JAN '88 - A.M. OTHER INFORMATION: EXISTING GEOMETRICS

TRAFFIC VOLUMES

` .	EB	WB	NB	SB
LEFT	1	72	. O	1521
THRU	1	. 1	26	. 26
RIGHT	1	34	1014	0
RTOR	o, Ö	0	0	0
·				

(RTOR volume must be less than or equal to RIGHT turn volumes.)

A18

INTERSECTION GEOMETRY

Page-2 _____

NUMBER OF LANES PER DIRECTION INCLUDING TURN BAYS: EASTBOUND = 2 WESTBOUND = 2 NORTHBOUND = 2 SOUTHBOUND = 2

							•		
	E	В	W	B	N	B	SB .		
LANE	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH	
1	LT	12.0	LT	12.0	T	12.0	Ľ	12.0	
2	TR	12.0	TR	12.0	R	12.0	Т	12.0	
3		12.0		12.0		12.0	· · · ·	12.0	
4	•	12.0		12.0		12.0		12.0	
5		12.0		12.0		12.0		12.0	
6	•	12.0		12.0		12.0		12.0	

L - EXCLUSIVE LEFT LANE

LT - LEFT/THROUGH LANE LR - LEFT/RIGHT ONLY LANE

LTR - LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

TR - THROUGH/RIGHT LANE R - EXCLUSIVE RIGHT LANE

T - EXCLUSIVE THROUGH LANE

	GRADE (%)	HEAVY VEH. (%)	ADJACENT Y/N	PKG (Nm)	BUSES (Nb)	PHF
EASTBOUND	0.00	1.00	N	0	Ο.	1.00
WESTBOUND	0.00	1.00	N	0	0	1.00
NORTHBOUND	0.00	1.00	N	0	0	1.00
SOUTHBOUND	0.00	1.00	N	, O	0	1.00

Nm = number of parking maneuvers/hr: Nb = number of buses stopping/hr

	CONFLICTING FEDS	PEDESTR	IAN BUTTON	
. •	(peds/hour)	(Y/N)	(min T)	ARRIVAL TYPE
EASTBOUND	0	Ň	14.5	
WESTBOUND	0	N	14.5	3
NORTHBOUND	O	N	14.5	3
SOUTHBOUND	• • • •	N N	14.5	3

min T = minimum green time for pedestrians

SIGNAL SETT	INGS -	OPERAT	IONAL ANALY	SIS			Page-3
ACTUATED	•••	LOST TI	ME/PHASE =	3.0 C)	CLE LENGTH	= 180.0	
					· · · · ·		
EAST/WEST P	HASING						
	P	HASE-1	PHASE-2	PHASE-3	PHASE-4		
EASTBOUND			1		•		
LEFT		X					•
THRU		X		· · · · ·	. · ·		
PEDS		X			· ·		
WESTBOLIND		· .		· .		· ·	•.
LEFT		x					
THRU		X	· · ·				
RIGHT		х					
PEDS .					•		
NORTHBOUND	RT	X					•
SOUTHBOUND	RT		·				
ODEEN		4 - 7	~ ^ ·	·		2 · · · ·	
	1	13.0	0.0	0.0	0.0		
YELLUW + AL	LKED	3.0	0.0	0.0	0.0		
NORTH/SOUTH	FHASI	NG	· .				
	P	HASE-1	PHASE-2	PHASE-3	FHASE-4		
NORTHBOUND		· •					
LEFT				•			
THRU		X	i .				
RIGHI		X	X				
FEDS				· · ·			. •
SOUTHBOUND				• •			
LEFT		· · ·	X				
THRU		X	x				
RIGHT						•	•
FEDS			• . •	· .			
EASTBOUND R	Т						
WESTBOUND R	T.		. ·			•	,
1		·	· · · · ·				
UREEN		3.0	155.0	0.0	0.0		
YELLOW + AL	L RED	3.0	3.0	0.0	0.0		
х. х. 1		· .	· ·		•		· .

VOL		E ADJL	ISTMENT	WORKS	HEET			=======			P =======	age-4
		MVT. Vol.	PHF	ADJ. VOL.	LANE GRP.	LANE GRF. VOL.	NO. LN	LANE UTIL. FACT.	GROWTH FACT.	ADJ. GRP. VOL.	PROP LT	PROP RT
EB												
	LT	1	1.00	1		· `.				*		
	TH	1	1.00	1	LTR	3	2	1.050	1.000	3	0.33	0.33
	RT	. 1	1.00	1				· ·	·			
WB			<i>,</i> •		• .							
	LT	72	1.00	72	¥L.	. 72	1	1.000	1.000	72	1.00	0.00
	TH.	1	1.00	1	TR	35	1	1.000	1.000	35	0.00	0.97
	\mathbf{RT}	34	1.00	34								
N 197		• •										
NB					•							
		_0	1.00	0	_					·		
	⊡H ⊡	26	1.00	26	T	26	1	1.000	1.000	26	0.00	0.00
	RT	1014	1.00	1014	R	1014	1	1,000	1.000	1014	0.00	1.00
SB												•
	LT	1521	1.00	1521	L	1521	1	1.000	1.000	1521	1.00	0.00
	ΤН	26	1.00	26 -	т	26	1	1.000	1.000	26	0.00	0,00
	RT	0	1.00	0								

* Denotes a Defacto Left Turn Lane Group

SATUR	SATURATION FLOW ADJUSTMENT WORKSHEET P												
	IDEAL SAT. FLOW	NO. LNS	f. W	f HV	f G	f P	f BB	f A	f RT	f LT	ADJ. SAT. FLOW		
EB			· · · · · · · · · · · · · · · · · · ·										
L1	FR 1800	2	1,000	0.995	1.000	1,000	1.000	1.000	0.950	0.967	3291		
WB													
L	1800	1	1.000	0.995	1.000	1,000	1.000	1.000	1.000	1.000	1791		
ŤF	R 1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.854	1.000	1530		
NB													
т	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791		
R	1800	1	1,000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1522		
SB								· · ·					
L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701		
Т	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791		
				14 - A									
				4	•	. :							
-----------	--------------------------	-------------------------------	------------------------	---	-------------------------------	------------------							
· · ·	ADJ. FLOW RATE (v)	ADJ. SAT. FLOW RATE (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUP CAPACITY (c)	√/c RATIO							
EB LTR	3	3291	0.001	0.072	238	0.013							
WB	· .			• · · · · · · · · · · · · · · · · · · ·	10 a. A								
L TR	72 35	1791 1530	0.040	0.072	129 111	0.557 *							
NB			<u> </u>		1								
T R	26 1014	1791 1522	0.015 0.666	0.017 0.967	30 1472	0.871 * 0.689							
SB				•									
L T	1521 26	1701 1791	0.894 0.015	0.861 0.894	1465 1602	1.038 * 0.015							

Cycle Length, C = 180.0 sec.Sum (ν /s) critical = 0.949Lost Time Per Cycle, L = 9.0 sec.X critical = 0.999

$\begin{array}{c} \begin{array}{c} \ \ \ \ \ \ \ \ \ \ \ \ \ $		-OF-SEF	RVICE N	WORKSHE	EET ======		11.000 km až an an a	 .		*****		⁹ age-7
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		√/c RATIO	g/C RATIO	CYCLE LEN.	DELAY d 1	LANE GROUP CAP.	DELAY d 2	PROG. FACT.	LANE GRP. DELAY	LANE GRP. LOS	DELAY BY APP	LOS BY AFF.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	EB LTR	0.013	0.072	180.0	58.9	238	0.0	0.85	50.1	E	50.1	E
NB T 0.871 0.017 180.0 67.1 30 74.3 0.85 120.2 F 4.0 A R 0.689 0.967 180.0 0.2 1472 1.0 0.85 1.0 A SB L 1.038 0.861 180.0 12.4 1465 28.2 1.00 40.6 E 40.0 D T 0.016 0.894 180.0 0.8 1602 0.0 0.85 0.7 A	WB L TR	0.557 0.317	0.072 0.072	180.0 180.0	61.3 60.3	129 111	3.9 0.6	1.00 0.85	65.2 51.7	F E	6° . 8	F
SB L 1.038 0.861 1 180.0 12.4 1465 28.2 1.00 40.6 E 40.0 D T 0.016 0.894 180.0 0.8 1602 0.0 0.85 0.7 A	NB T R	0.871 0.689	0.017 0.967	180.0 180.0	67.1 0.2	30 1472	74.3 1.0	0.85 0.85	120.2	F A	4.0	A
	SB L T	1.038 0.016	0.861 0.894	/180.0 180.0	12.4 0.8	1465 1602	28.2 0.0	1.00 0.85	40.6 0.7	E A	40.0	D

Intersection Delay = 26.9 (sec/veh)

Intersection LOS = D

IDENTIFYING INFORMATION

NAME	OF	THE	EAST/WEST STREETCPSES	ROA	D
NAME	OF	THE	NORTH/SOUTH STREETF.M.	56	
AREA	ΤYF	Έ	OTHER	:	
NAME	OF	THE	ANALYSTBDVDW	J .	
DATE	OF	THE	ANALYSIS	87	
TIME	PEF	RIOD	ANALYZEDJAN.	' 8 8	P.M.
OTHER EXIS	R IN Fing	NFORM G GEC	1ATION: DMETRICS	•	

TRAFFIC VOLUMES

	**********	=======================================	= = = = = = = = = = = = = = = = = = =		= == == == ==
	EB	WB	NB	SB	
LEFT	1	777	Ō	71	· · · · · ·
THRU	1	1 - 1 - 1 - 1 - 1	19	15	
RIGHT	1	1652	87	O	
RTOR	0	0	0	e o	•

(RTOR volume must be less than or equal to RIGHT turn volumes.)

INTERSECTION GEOMETRY

Page-2

NUMBER OF LANES PER DIRECTION INCLUDING TURN BAYS: EASTBOUND = 2 WESTBOUND = 2 NORTHBOUND = 2 SOUTHBOUND = 2

	E	В	. W	в	N	IB .	SB		
LANE	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH	
1	LT	12.0	LT	12.0	T	12.0	L	12.0	
2	TR	12.0	TR	12.0	R	12.0	т	12.0	
3		12.0		12.0		12.0		12.0	
4	•	12.0	•	12.0		12.0		12.0	
5	, ·	12.0		12.0		12.0		12.0	
6		12.0		12.0		12.0	• •	12.0	
· . • .	ÉVOLUET		ANE		Ŧ				

- L- EXCLUSIVE LEFT LANET- EXCLUSIVE THROUGH LANELT- LEFT/THROUGH LANETR- THROUGH/RIGHT LANELR- LEFT/RIGHT ONLY LANER- EXCLUSIVE RIGHT LANE
- LTR LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

	GRADE (%)	HEAVY VEH. (%)	ADJACENT Y/N	PKG (Nm)	BUSES (Nb)	FHF
EASTBOUND	0.00	1.00	N	0	0	1.00
WESTBOUND	0.00	14.00	N	0	Ó	1.00
NORTHBOUND	0.00	1.00	N	0	0	1.00
SOUTHBOUND	0.00	1.00	N	0	Ο,	14.00

Nm = number of parking maneuvers/hr: Nb = number of buses stopping/hr

-	CONFLICTING PEDS		PEDESTRI	AN BUTTON	•		TVEE
						PRATIVAL	
EASTBOUND	o		N	17.8		3	
WESTBOUND	\mathbf{O} and \mathbf{O}		N	19.8		3	
NORTHBOUND	0		N	11.3		3	
SOUTHBOUND	Ó .	÷	N	11.3			

min T = minimum green time for pedestrians

SIGNAL SETTINGS - OPERATIONAL ANALYSIS.

Page-3 _____

LOST TIME/PHASE = 3.0 ACTUATED CYCLE LENGTH = 120.0

.

EAST/WEST PHASING

THRU

RIGHT PEDS

GREEN

EASTBOUND RT WESTBOUND RT

YELLOW + ALL RED

F	'HASE-1	PHASE-2	PHASE-3	PHASE-4	
EASTBOUND LEFT THRU RIGHT PEDS	X X X				
WESTBOUND LEFT THRU RIGHT PEDS	X X X X				
NORTHBOUND RT SOUTHBOUND RT	X				
GREEN YELLOW + ALL RED	98.0 3.0	0.0	0.0	0.0	· · · ·
NORTH/SOUTH PHASI	NG		· _		
F NORTHEOUND LEFT THRU RIGHT PEDS	HASE-1 X X	PHASE-2 X	PHASE-3	PHASE-4	
SOUTHBOUND LEFT		×	· .		

X

Х

10.0

3.0

0.0

0.0

0 . O

Ö.O

X

3.0

3.0

VOL!		E ADJU =====	STMENT	WORKS	HEET						P ======	age-4 =====
		MVT. VOL.	PHF	ADJ. Vol.	LANE GRP	LANE GRF. VOL.	ND. LN	LANE UTIL. FACT.	GROWTH FACT.	ADJ GRP VOL	PROP LT	PROP RT
EB	LT	1	1.00	1	¥L	1	1	1.000	1.000	1	1.00	0,00
	TH RT	1	1.00	1 1	TR	2	1	1.000	1.000	2	0.00	0.50
WB										ù		·
	LT TH RT	777 1 1652	1.00 1.00 1.00	777 1 1652	LTR	2430	. 2	1.050	1.000	2552	0.32	0.68
NB				_		•				,		
	LT TH RT	0 19 87	1.00 1.00 1.00	0 1 19 187	T R	19 87	1	1.000	1.000 1.000	19 87	0.00	0.00 1.00
SB			· · ·				•					
	LT TH RT	91 15 0	1.00 1.00 1.00	91 15 0	T	91 15	1 1	1.000	1.000 1.000	91 15	1.00 0.00	0.00

* Denotes a Defacto Left Turn Lane Group

SA	TURAT	ION FL		JUSTM	ENT WOR	RKSHEE	Γ	ý.				Page-5
		IDEAL SAT. FLOW	NO. LNS	f W	f HV	fG	f P	f BB	f	f RT	f LT	ADJ. SAT. FLOW
EB					· · · ·							· · ·
	L.	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	ò.041	74
÷	TR	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.925	1.000	1657
WB				•								. *
	LTR	1800	2	1.000	0.795	1.000	1.000	1.000	1.000	0.878	0.936	3012
NB		•				*				•		
	T	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791
	R	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1522
SB												
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701
	Τ'	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791

CAPACITY	ANALYSIS WO	RKSHEET				Page-6
	ADJ. FLOW RATE (v)	ADJ. SAT. Flow Rate (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUP CAPACITY (c)	v/c RATIO
EB L TR	1 2	74 1657	0.014	0.817 0.817	60 1353	0.017
WB LTR	2552	3012	0.847	0.817	2460	1.037 *
NB T R	19 87	1791 1522	0.011 0.057	0.025 0.950	45 1446	0.424 * 0.060
SB L T	91 15	1701 1791	0.053 0.008	0.083 0.133	142 239	0.642 * 0.063

Cycle Length, C = 120.0 sec. Lost Time Per Cycle, L = 9.0 sec.

Sum (v/s) critical = 0.911 X critical = 0.985

	LEVEL-OF-SERVICE WORKSHEET Page-7											
	v∕⊂ RATIO	g/C RATIO	CYCLE LEN.	DELAY d 1	LANE GROUP CAP.	DELAY d 2	PROG. FACT.	LANE GRP. DELAY	LANE GRP. LOS	DELAY BY APP.	LOS BY APF	
EB L TR	0.017 0.001	0.817 0.817	120.0 120.0	1.6	60 1353	0.0	1.00 0.85	1.6 1.3	A A	1.4	A	
WB LTR	1.037	0.817	120.0	10.0	2460	23.7	0.85	28.7	D	28.7	D	
NB T R	0.424	0.025	120.0 120.0	43.8 0.1	45 1446	3.7 0.0	0.85 0.85	40.4 0.1	E A	7.3	B	
SB L T	0.642	0.083 0.133	120.0 120.0	40.5 34.5	142 239	6.4 0.0	1.00 0.85	46.9 29.4	E D	44.4	E	

Intersection Delay = 28.4 (sec/veh)

Intersection LOS = D

	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATIONI F	M. 56/ CPS	ES PO		NAM	F. BVDU	J .	· ·			
HOURLY VOLU	MES			VOL	JMES IN PC	 ГРН				
		· C								
Major S	treet: 	C	<u>)</u> N	-			V 12	- · ·		
N = 2]	V,	_		z v.		V. 664	-		
Grade -	V	V.		44	<u>z</u> v <u>,</u>		► .	-		
				· -	· · ·	¥ v, v.				
Date of Counts:	DEC'88		TOP	1	•		. .			
Time Period:	A.M		TELD			31				
Average Running	g Speed: 45 N	=4				15	·			
	Str	reet:				- - -		·		
PHF: <u>I'D</u> Gra	ide%_{	SES KO	<u> </u>							
VOLUME ADJU				·	-					
Movement No.	Movement No. 2				4	5		9		
Volume (vph)				442	664	12	31	15		
Vol. (pcph), see I										
STEP 1: RT from Minor Street										
Conflicting Flow,	, V,			1/2	$V_3 + N_2 = \frac{27}{27}$	<u>- 12 + 12</u>	= <u>233</u> vph ((V _e)		
Critical Gap, T _c ,	and Potential Capa	city, c _p		T _c =	6.5 sec (Ta	ble 10-2) c _e =	= 690 pcph	(Fig. 10-3)		
Actual Capacity,	- د_			C_m9 ==	c _{n9} = <u>690</u>	pcph	•			
STEP 2: LT From	Major Street	• • •		f V.						
Conflicting Flow,	, V.			$V_3 + V_2 = 442 + 12 = 454 \text{ vph}(V_{ci})$						
Critical Gap, T, ,	and Potential Capa	city, c		T.=	<u>5.5</u> sec (Ta	ble 10-2) c _{od} =	= 640 pcpt	(Fig. 10-3)		
Percent of c_ Util	ized and Impedance	e Factor (Fig.	10-5)	(v,/c	(100 = 100)	>/P =C	3			
Actual Capacity,	с_			C_4 =	c_ = 640	pcph	κ.			
STEP 3: LT From	n Minor Street	· · · · · · · · · · · · · · · · · · ·	. <u></u> _,	1		<u>, ,</u> V.				
Conflicting Flow	. V .		/2 V		-V. = 221 +	12 + 12	664 = 909	7 vph (V_)		
Critical Gap, T	and Potential Capa	city, c.	r = 7	8 sec (1	Table 10-2) c	= 160 pcr	oh (Fig. 10-3)	- r		
Actual Capacity.	с.,		_, = c.	,×P/=	160 × 0		ph	. *		
SHARED-LANE CAPACITY										
$SH = \frac{v_{x} + v_{y}}{(v_{x}/(c_{x}) + (v_{y}))}$					lane 15 share	d .		·		
Movement No	V(ncnh)	$(v_{2}/c_{m2}) + (v_{q}/c_{m2})$			(pcph)		· · · · · · · ·	105		
7	31		c _m (pcpn)		(PSPii)	- 31		F		
9	15	690	·	<u>+</u>		675	· · · · · · · · · · · · · · · · · · ·	A		
4	664	640	>			-24		F		

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DR. - P.M. EASTING GEONETRICS

	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS								
LOCATION E	m-561 -P	585 6	20	NAM	Έ.				
HOURLY VOLU	MES			VOL	JMES IN PO	СРН	<u> </u>		
		. (.	\square			 · ·		-	
Major S	treet: F.IN. OF	($\underline{\mathbb{Z}}^{\mathbb{N}}$	-		V	6		
$N = \mathbf{Z}$	} v.		V, V	$\frac{8}{39}$ V ₂ V ₄ $\frac{1}{40}$ V					
Ľ»			N=2						
	DEC.	′, V,	· ·			V, V,			
Date of Counts:			STOP			339	•	· .	
Average Running	Speed: 10 N	- 🖪 🕺	HELD			721	,		
	Mi Str	nor eet:		[
PHF: <u>1.0</u> Gra	ide%	PSES 1	0						
VOLUME ADJL	VOLUME ADJUSTMENTS								
Movement No.	Movement No. 2					5	7	9.	
Volume (vph)	Volume (vph)					6 3	39	721	
Vol. (pcph), see T									
STEP 1: RT from	n Minor Street					~ V₀			
Conflicting Flow	, V _c			1/2	$v_3 + v_2 = \bot$	9_+8_=2-	7. vph (V	'a)	
Critical Gap, T _c ,	and Potential Capa	city, c _p	÷,	T,=4		able 10-2) $c_{p9} = \frac{90}{20}$	2_pcph(Fig. 10-3)	
Actual Capacity,	c _m	- 		C _{m9} =	$c_{p9} = -900$	pcph			
STEP 2: LT From	n Major Street					f v.	· · · · · · · · · · · · · · · · · · ·		
Conflicting Flow	, V,			$V_3 + V_2 = 38 + 8 = 46$ vph (V _{c1})					
Critical Gap, T _c ,	and Potential Capa	city, c _p		$T_c = 2$	5.5_ sec (Ta	able 10-2) c _{p4} =/00	2_pcph (Fig. 10-3)	
Percent of c _p Util	lized and Impedance	Factor (Fi	g. 10-5)	$(v_4/c_{p4}) \times 100 = 4.6.7 P_4 =$					
Actual Capacity,	C _m			c _{m4} =	$c_{p4} = /000$	pcph			
STEP 3: LT From	n Minor Street					$\supset V_7$	• •		
Conflicting Flow	, V _c		1/2 V ₃ +	-V ₂ +V ₅ +	-V ₄ = <u>19</u> +	8 + 6 + 40	<u>=73</u>	_ vph (V _{c7})	
Critical Gap, T _c ,	and Potential Capa	city, c _p	$T_c = 7$	8 sec (1	able 10-2) c	$_{p7} = 500$ pcph (Fi	g. 10-3)		
Actual Capacity,	C _m		$c_{m7} = c_p$	$, \times P_4 =$	<u> 500 × .98</u>	$=$ $\frac{490}{\text{pcph}}$	· .		
SHARED-LANI	ECAPACITY						·	• . •	
·	SI	$d = \frac{1}{(v_{2}/c)}$	$(v_7 + v_9)$ $(v_2) + (v_2)$	if l /c)	lane is share	d			
Movement No.	nent No. v(pcph) c _m (pcph)				(pcph)	C.	1	los	
7	339	4 90				/51	5	>	
9	721	900)			179	2		
4	40	1000				960	1	A	

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	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
	M & /CDSA	rs 20	,	TA M	F•					
	IMES			/OLU	IMES IN PO	CPH				
	5 5 5 E						••••••••	. '		
Major S	treet:				<u> </u>		V. 10			
] v		-	10	2 v		V. 690 _	-		
%		N=		400	<u> </u>			-		
		, v,	-			♥ V, V,	· ·			
Date of Counts:	TAN '89	C ST	OP			28	•	····		
Average Running	Speed: 45 N	= [4]	LD		2	13				
	l Mi Sti	inor reet:				1 <u> </u>				
PHF: /10 Gra	ade%	1565 Rd.								
VOLUME ADJU	JSTMENTS							Ĩ		
Movement No.		2	3		4	· 5	7	. 9		
Volume (vph)	Volume (vph)) O					10	28	13		
Vol. (pcph), see I										
STEP 1: RT from	n Minor Street			·		_م ۷ م				
Conflicting Flow	, V ,		1	/2 V	,+V,= <u>7</u> 9	<u>+ 10</u>	- 210 vph	(V _e)		
Critical Gap, T _c ,	and Potential Capa	city, c _p		; = <u>(</u>	.5 sec (Ta	ble 10-2) c _{p9}	= <u>700</u> pcpt	n (Fig. 10-3)		
Actual Capacity,	C _m	•		m9 ==	c _{p9} = <u>700</u>	pcph .		4		
STEP 2: LT From	n Major Street	•		f v.						
Conflicting Flow	, V ,		•	/,+'	V,= <u>400</u> -	+ 10 = 4	10 vph (V,)			
Critical Gap, T _c ,	and Potential Capa	city, c _p		[_= _	5.5 sec (Ta	ble 10-2) c _{r4}	= <u>690</u> pcpt	n (Fig. 10-3)		
Percent of c _p Util	lized and Impedance	e Factor (Fig. 1)-5) (v₄/c _r	(100 = 100)	87 P. = .	15			
Actual Capacity,	C _m	·	Ċ		c _{p4} = 690	pcph	 			
STEP 3: LT From	n Minor Street					⊃ v'-	•			
Conflicting Flow	, v ,	1/	2 [`] V ₃ +V ₂ -	⊦v,+	V. = 200 ·	10 .10	+600 = 82	• vph (V)		
Critical Gap, T,	and Potential Capa	city, c _p T	- 7.8	iec (T	able 10-2) c	ZOS pc	ph (Fig. 10-3))		
Actual Capacity,	C _m	C m	$= c_{p}, \times$	P. =	205 x 115	= 31 pc	ph			
SHARED-LAN	E CAPACITY	···				······	· · · · · · · · · · · · · · · · · · ·	······		
· .	SI	$d = \frac{v_{-}}{(v_{-}/c_{-})}$	+ v, + (v,/c,	if 1 .)	anëus sharë	d ().		•.		
Movement No.	v(pcph)	c _m (pcph)	с _{5н} ((pcph)	с — С.		1.05		
7	28	31				3		E		
9	13	700		<u> </u>		687		4		
4	600	690	•			90	E			

WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATION T/	Electric Dave	ICPSES PD	NAM	τ.			•		
HOURLY VOLUN	MES	<u></u>	VOLU	JMES IN PC	CPH				
	COSES DE					-			
Major Str	eet: CF3C3_F3		-	·····		V. 122			
N = 4	V.	V,	3642 V. V. 23						
%		N=4	-	V		-			
		7, V,		· · ·	V, V,				
Date of Counts:	ERISTING -			-	z3 -	•			
Average Running	Speed: 45 N	=2		· · ·	128				
	I Mi Str	nor l reet:			•				
PHF: Grad	le%								
VOLUME ADJUS	VOLUME ADJUSTMENTS					r			
Movement No.		2 ~ .	3	4	5	7	9		
Volume (vph)	Volume (vph) 3642				155	23	128		
Vol. (pcph), see Ta	ible 10-1								
STEP 1: RT from	Minor Street				~ V,				
Conflicting Flow,	V,		1/2 \	$v_3 + v_2 =7$	5 + 342	= <u>3</u> vph	(V _c)		
Critical Gap, T _c , a	and Potential Capa	city, c _p	$T_c = 1$	6.0_sec (Ta	ble 10-2) c _{p9} =	=_0 pcpl	n (Fig. 10-3)		
Actual Capacity, c	m		с _{т9} =	C _{p9} =	pcph				
STEP 2: LT From	Major Street				€ V4	· · ·			
Conflicting Flow,	V,		V ₃ +	$V_2 = \frac{151}{1}$	+ <u>364</u> 2 = 37	<u>793</u> vph (V,)			
Critical Gap, T _c , a	and Potential Capa	city, c _p	T,=	5.5sec (Ta	ible 10-2) c _{p4} =		n (Fig. 10-3)		
Percent of c _p Utili:	zed and Impedance	Factor (Fig. 10-5)	(v4/c	(100 = 100)	$\gamma P_{i} = \frac{1}{1}$	<u>o</u>			
Actual Capacity, c			C _{m4} =	$c_{p4} = O$	pcph	· · · · · ·			
STEP 3: LT From	Minor Street				⊃ V ₇ .				
Conflicting Flow,	V _c	1/2 V,	+V ₂ +V ₅ +	$V_{4} = \frac{75}{15} +$	3642+122	+2 <u>3 = 38</u>	62vph (V.,)		
Critical Gap, T _c , a	and Potential Capa	city, c_p $T_c = 7$	8 sec (1	able 10-2) c	, = <u>0</u> pc	ph (Fig. 10-3)		
Actual Capacity, c	` m	c _{m7} = c	$_{\rm P7} \times \rm P_4 =$	<u> </u>	_= pc]	ph	.		
SHARED-LANE	SHARED-LANE CAPACITY								
	SI	$H = \frac{v_7 + v_6}{(v_7/c_{m_7}) + (v_{m_7})}$	if	lane is share	d	· ·	:		
Movement No.	Movement No. v(pcph) c _m (pcph)				$c_{\rm esc}$ (pcph) $c_{\rm esc}$ LOS				
7	7 73 0				-23		F		
9	128	0			-128	1	c		
4	23	· 0			-23	F			

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	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATIONI T	D. Electra Dru	e Irai	SOJ	NAM	τ.					
HOURLY VOLU	MES	<u> </u>	57.0	VOLU	JMES IN P	СРН				
		. (
Major S	treet: CP3C3 E			-			V 3606	-		
N = [4 Grade - %	- V ₂	, V,	√, √, √=4	$ \begin{vmatrix} \frac{143}{3} & V_2 \\ 3 \\ \hline & V_3 \\ \hline & V_7 & V_9 \end{vmatrix} $				_		
Date of Counts:_ Time Period: <i>L.A</i> Average Running	Date of Counts: Image: Stop Time Period: $\underline{P.M.}$ Average Running Speed: N = [2] Minor Street: PHE: Grade				14	124	· · ·			
PHF: Gra	ide% <u>T</u>	UE Drive	inter y		•		• •			
VOLUME ADJU	VOLUME ADJUSTMENTS						<u>-</u>			
Movement No.	<u></u>	2		3	4	5	7	9		
Volume (vph) 143				3	36	3606	124	12		
Vol. (pcph), see T										
STEP 1: RT from	n Minor Street	, ,			· · · · ·	· ∼ V,				
Conflicting Flow	, V _c			1/2 V	$V_3 + V_2 = -$	2 + 143=	· Hes vph	(V ₀)		
Critical Gap, T _c ,	and Potential Capa	city, c _p		T,=1	<u>e. 0</u> sec (Ta	able 10-2) c _{p9} =	- <u>050</u> pcpl	h (Fig. 10-3)		
Actual Capacity,	C _m	· · · · ·		C _{m9} ==	$c_{p9} = 850$	pcph				
STEP 2: LT From	n Major Street					• V4				
Conflicting Flow	, V _c	•		$V_3 + V_2 = 3 + 143 = 146 \text{ vph}(V_{c4})$						
Critical Gap, T _c ,	and Potential Capa	city, c _p		Ţ, = .	<u>5.6.</u> sec (Ta	able 10-2) c _{p4} =	= <u>950</u> pcpl	h (Fig. 10-3)		
Percent of c _p Util	ized and Impedance	e Factor (Fi	g. 10-5)	$(v_4/c_{P4}) \times 100 = \frac{15!}{P_4} = \frac{.9}{.9}$						
Actual Capacity,	C _m			$c_{m4} = c_{p4} = \underline{950}$ pcph						
STEP 3: LT From	n Minor Street					$\supset V_{i}$	•			
Conflicting Flow	, V _c	•	1/2 V ₃ +	·V ₂ +V ₅ +	V_ = _2 +	+ 143 + 3606 +	+36 = 37	<u>87</u> vph (V _{c7})		
Critical Gap, T _c ,	and Potential Capa	city, c _p	T, =7.8	3 sec (1	able 10-2) c	$r_{p7} = 2$ pcp	h (Fig. 10-3) •		
Actual Capacity,	C _m		C _{m7} ⁼⁼ C _p	$, \times P_4 =$	<u>0 × .9</u>)_=pcp	h			
SHARED-LAN	Ε CAPACITY				· 6					
	SI	$H = \frac{1}{(v_7/c_7)^2}$	$(v_7 + v_9)$ $(v_7) + (v_9)$	if /c _{m9})	lane is share	ed				
Movement No.	wement No. v(pcph) c _m (pcph)				(pcph)	C _R		LOS		
7	124	0	ı			-184	-	F		
9	51	850)			838		Α		
4	36	950		· ·		914	•	A		

...

· .	WORKSHE	ET FOR ANAI	YSIS OF T-INTE	RSECTIONS				
LOCATION: TH	Flactor Devenia	× =1	NAME		· · ·			
HOURLY VOLU	JMES		VOLUMES IN	РСРН				
	CORES O			 				
Major S	treet: CTSES Ka		N	- V.	0			
N = 4		V _s	249 <u>6</u> V,		<u>o</u>			
e%		N=4	13 <u>8</u> V,					
)	v, v,			10 E. T.			
Date of Counts:	JAN '88	STOP			hannelized L.T.			
Time Period: _A	z Speed: N			21 11 1	007			
	M	inor		1				
PHF: 1.0 Grade 0 %								
VOLUME ADJU	JSTMENTS							
Movement No.	· · · · · · · · · · · · · · · · · · ·	2	3 4	5	7 9			
Volume (vph)		2476	138 0	0.7	21 117			
Vol. (pcph), see Table 10-1								
STEP 1: RT from	n Minor Street			~ V,				
Conflicting Flow	, V ,	2	$1/2V_3 + V_2 = 1$	$\frac{138}{2} + \frac{2476}{1} = 13$	$\frac{17}{2}$ vph (V _e)			
Critical Gap, T _c ,	and Potential Capa	city, c _p	$T_c = \underline{6.0}$ sec (Table 10-2) c _{p9} = <u> 1</u>	5 pcph (Fig. 10-3)			
Actual Capacity,	C _m		$c_{m9} = c_{p9} = \frac{17}{17}$	<u>5</u> pcph				
STEP 2: LT From	n Major Street	5 5 .	f v.					
Conflicting Flow	, V,		$V_3 + V_2 = 138 + 7496 = 2634$ vph (V_{c4})					
Critical Gap, T _c ,	and Potential Capa	city, c _p	$T_{c} = \frac{5.5}{5} \sec($	Table 10-2) c _{p4} =	pcph (Fig. 10-3)			
Percent of cp Util	ized and Impedance	e Factor (Fig. 10-5)	$(v_4/c_{p4}) \times 100 = P_4 = \frac{70}{100}$					
Actual Capacity,	C _m	· .	$c_{m4} = c_{p4} = _ _ _ _ pcph$					
STEP 3: LT From	n Minor Street			$\supset V_7$				
Conflicting Flow	V.	1/2 V	$+V_{1}+V_{2}+V_{3}=\frac{3}{2}$	+2496+ 0 +0	$= 2565 \text{ vnh}(V_{-})$			
Critical Gap, T.	and Potential Capa	city, c T =	7.5 sec (Table 10-2)	c = 0 nmh/F	ing 10-3)			
Actual Capacity.	C	C_,=	$\sum_{n=1}^{\infty} \sum_{n=1}^{\infty} \sum_{n$	$r_{p7} = \dots pcph (r$	-0. 10 <i>0</i> /			
SHARED-LANE	E CAPACITY		Pr •	<u>P-P</u>	:			
· , ·	$SH = \frac{v_7 + v_9}{1}$ if lane is shared							
		$(v_7/c_{m7}) + (v_{m7})$	(° / C ^m ")	· · · · · · · · · · · · · · · · · · ·				
Movement No.	$\frac{vement No.}{7}$ $v(pcph)$ $c_m(pcph)$			CR	LOS			
9		175	+	58	E			
4	0				N/A			

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	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS								
LOCATION T	D. Electric Driv	e dz		NAM	E				
HOURLY VOLU	MES			VOL	JMES IN P	CPH			
Maior Ch		a (M N			• •		4 . •	
Major St			$\underline{\nabla}$	V, <u>84</u>					
N = 4 Grade - %	,,,,,,_,,_,,,,,,,,	V,	/s /	$\begin{array}{c c} 2613 & V_{1} \\ \hline \\ $					
Date of Counts:						00			
PHF: 1.0 Grade 0 % TUE # 2				<u> </u>					
VOLUME ADJU	STMENTS			<u> </u>	<u></u>	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Movement No.		2		3	. 4	5	7	9	
Volume (vph)		261	3	38	16	84	0	0	
Vol. (pcph), see Ta	able 10-1								
STEP 1: RT from	Minor Street				- <u>-</u>	<u>، ۷</u> ,			
Conflicting Flow,	V,			1/2 \	$V_{3} + V_{2} = -$	+=	= vph	(V _e)	
Critical Gap, T _c ,	and Potential Capa	city, c _p		T. = .	sec (Ta	able 10-2) c _{p9} =	= pcp	h (Fig. 10-3)	
Actual Capacity,	c _m	•	•	$c_{m9} = c_{p9} = _\pcph$					
STEP 2: LT From	Major Street	•		ξ v.					
Conflicting Flow,	V.		•	V,+	V, = <u>138</u>	+268 -27	<u>کر</u> vph (۷)	
Critical Gap, T _c ,	and Potential Capac	ity, c,		T.=.	25. sec (Ta	able 10-2) c _{p4} =	= <u></u> pcp	h (Fig. 10-3)	
Percent of c, Utili	ized and Impedance	Factor (Fig	z. 10-5)	$(v_4/c_{red}) \times 100 = P_4 =$					
Actual Capacity,	C _m	•		C _{m4} ==	с _{р4} ==	pcph		-	
STEP 3: LT From	Minor Street			•		$\supset \mathbf{v}_{7}$			
Conflicting Flow,	V _c		1/2 V ₃ +	-V ₂ +V ₅ +	·V, = +	+·	+=	vph (V _{c7})	
Critical Gap, T _c ,	and Potential Capa	city, c _p	T, =	sec (1	able 10-2) c	_{p7} = pcj	oh (Fig. 10-3) . · · · · · · · · · · · · · · · · · ·	
Actual Capacity,	c _m		c _{m7} = c _p	$, \times P_4 =$	×	_ = pq	oh		
SHARED-LANE CAPACITY									
· · · · ·	$SH = \frac{v_7 + v_7}{(v_7/c_{m_7}) + (v_7/c_{m_7})}$				lane is share	d	.* •.		
Movement No.	Aovement No. v(pcph) c _m (pcph)			C _{SH}	(pcph)	C _R		LOS	
7	7 0						-	V.A.	
9	0							V.A .	
4	16	0		<u> </u>				F	

	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS								
	U. Electric David	r #	,	NIAN	۲ ۲ ۰		· · · ·		
HOURLY VOL	JMES			VOL	UMES IN P	СРН			
		. (A).						
Major S	street: LDCS ED			V. 0					
N = ⊿ Grade %	∃		v, v, v 	$\begin{array}{c c} - & 98 \\ \hline & 2 \\ \hline & 2 \\ \hline \end{array}$					
Date of Counts: Time Period: <u></u> Average Runnin	Date of Counts: $TAN'BS$ Time Period: <u>P.A.</u> Average Running Speed: <u>AO</u> N = Z Minor <u>Street:</u>						• • •		
PHF: <u>/.0</u> Gr	ade%	Т.U.Б.	<u> </u>			-			
VOLUME ADJ	USTMENTS				-				
Movement No.	<u>,</u>	2		3	4	5	7	9	
Volume (vph)		0	6	0	113	. 11			
Vol. (pcph), see	Vol. (pcph), see Table 10-1						· . ·		
STEP 1: RT from	n Minor Street					· ~ V,	•	,	
Conflicting Flow	, V _c		•	1/2 \	/, + V, = _	0 + 49 =	= <u>+9</u> vph	(V _{c9})	
Critical Gap, T.	, and Potential Capa	city, c _p		T,=.	6.0 sec (T	able 10-2) cp9 =	= <u>950</u> pcpł	(Fig. 10-3)	
Actual Capacity,	, C _m		* * .	с _{m9} =	cp= = 950	. pcph			
STEP 2: LT From	n Major Street	•	·	f v.					
Conflicting Flow	, V _c		•	V,+	V,=	+ <u>98 = 9</u>	50 vph (V_)	- :	
Critical Gap, T.	, and Potential Capa	city, c_	1940 - S.A.	$T_c = \frac{4.5}{5} \sec (\text{Table 10-2}) c_{rel} = \frac{1000}{5} \text{ pcph (Fig. 10-3)}$				(Fig. 10-3)	
Percent of c, Uti	lized and Impedanc	e Factor (Fig	g. 10-5)	(v./c	, × 100 = .	P_ =			
Actual Capacity,	C _m			$c_{m4} \equiv c_{p4} \equiv \dots pcph$					
STEP 3: LT From	n Minor Street					⊃v,	<u> </u>		
Conflicting Flow	, V,		1/2 V.+	Ý,+V.+	V. = 0 +	28+0	+ 0 = 9	f yph (V)	
Critical Gap, T,	and Potential Capa	city, c	T.=2	<u>5</u> sec (Т	able 10-2) c	= 700 pm	oh (Fig. 10-3)		
Actual Capacity,	C _m	- P	C _{m7} = C _n ,	×P.=	×	p/ PCP = DCD	sh		
SHARED-LAN	SHARED-LANE CAPACITY								
	* SI	$H = \frac{1}{(v_7/c_1)}$	$v_{7} + v_{9}$ $(v_{0}) + (v_{0})$	if 1 /c)	ane is share	ed .			
Movement No.	Movement Na. v(pcph) c _m (pcph)			Csu	(pcph)	C.		LOS	
7	7 /13 700					<u>P</u>			
9	9 11 950							1	
4	0	·					N	/٨	

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[WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
					-		_			
	U BIATIR VII	R C		NAM		Срц				
HOUKLY VOL	MES		× ·		JWES IN L					
Major S	treet: CPSES		УN	_		•	1 - 47	-		
$N = \boxed{4}$ $V_{2} = V_{4} = V$				$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\$						
PHF: 1.0 Gr	ade%	TOB 22				·.				
VOLUME ADJU				· · · · · · · · · · · · · · · · · · ·						
Movement Na	<u></u>	2		3	4	5	7	9		
Volume (vph) / 09				2	25	2 471	0	0		
Vol. (pcph), see]					· .					
STEP 1: RT from Minor Street										
Conflicting Flow Critical Gap, T _c , Actual Capacity,	, V _c and Potential Capa c _m	city, c _p		$\frac{1/2}{T_c} = \frac{1}{2}$	$V_3 + V_2 = -$ sec (Ta $c_{p9} =$	+ = _ able 10-2) c _{p0} = . pcph	vph (pcph	V _{c9}) (Fig. 10-3)		
STEP 2: LT From	n Major Street		·							
Conflicting Flow	, V _c			V,+	V2=	+ 109 = 111	_ vph (V _{c4})			
Critical Gap, T _c ,	and Potential Capa	city, c		T, = 2	5.5 sec (Ta	able 10-2) c., =	1000 pcph	(Fig. 10-3)		
Percent of c. Util	ized and Impedance	e Factor (Fig.	IO-5)	(v,/c)×100 =	$\underline{} = \underline{I \cdot O}$	_			
Actual Capacity,	с		•	c=	C_, =	pcph				
STEP 3: LT From	Minor Street	*		1	<u>r</u>	<u>، ک</u>				
Conflicting Flow, Critical Gap, T _c ,	Conflicting Flow, V_c $1/2 V$ Critical Gap, T_c , and Potential Capacity, c_p $T_c = -$				-V ₄ = + Table 10-2) c	+ + + = pcph	=	vph (V _{c7})		
Actual Capacity, $c_m \qquad c_{m7} = c_{p7} \times P_4 = _$						= pcph	<u> </u>			
JRAKED-LANI	SI	$I = \frac{v}{(v_7/c_{m7})}$, + v ₉ + (v ₉	if /c _{m9})	ane is share	rd .				
Movement No.	Movement Na. v(pcph) c _m (pcph)				(pcph)	C _R		LOS		
7	Ð						5	2*		
9	0						N.	1A		
4	2.5	1000						4		

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS										
LOCATION TO	J. ELECTRIC F	DRIVEWI	14	NAM	E:		· · · · · · · · · · · · · · · · · · ·			
HOURLY VOLU	MES			VOLI	JMES IN PO	PH				
	- 01	- (2							
Major St	reet: CPS85 PT		D N	_			40	- [
N = 4]	V,		119	3 v .		V. <u>8</u>			
Grade -	V_2	v.		163 V,						
<u> </u>	<u> </u>		= [4 _]	-		┓ᢧᢆᢧ᠅ᢩᢆᡣ᠋		-		
	V V	7 V.	÷				-			
Date of Counts:	<u>x 88</u>			P zo -						
Average Running	Speed: 40 N	=[2]	IELD	116						
, O Ļ	/ Mi	nor								
PHF: <u>1.0</u> Gra	de% <u>T.</u>	U. Drive			EKISTI	NG GEO	METRIC	S		
VOLUME ADJU	STMENTS						• .			
Movement No.		. 2		3	4	5	7	9		
Volume (vph)	Volume (vph) 1193					40	20	116		
Vol. (pcph), see T					·• .					
STEP 1: RT from	Minor Street					<u>←</u> ۷,				
Conflicting Flow	V			1/21	/, + v, = 8	2 + 1 =	= <u>597</u> vph	(V)		
Critical Gap T	and Potential Canad	city.c		T =	6.0 sec (Ta	ble 10-2) c =	= 185 pcpt	(Fig. 10-3)		
Actual Capacity	c c c c c c c c c c c c c c c c c c c				=185	ncoh	F -F.	(
STEP 2. IT Esse	Maior Chart			$\int \nabla V$						
STEF 2. LI FIUL		· · · · · · · · · · · · · · · · · · ·				V V4				
Conflicting Flow,	V _e			.v ₃ +	V ₂ = <u>163</u> - 	+ 1173 = 131	2_/vph (V_)			
Critical Gap, T _c ,	and Potential Capa	city, c _p		$T_c = 3.3 \text{ sec (Table 10-2) } c_{p4} = \frac{200}{99} \text{ pcph (Fig. 10)}$						
Percent of c _p Util	ized and Impedance	e Factor (Fig.	10-5)) $(v_4/c_{P4}) \times 100 = 4 P_4 =98$						
Actual Capacity,	с _т .	· · · · · · · · · · · · · · · · · · ·	· · · ·	C _{m4} =	c _{p4} = 200	pcph				
STEP 3: LT From	n Minor Street					$\sum V_{\tau}$		·		
Conflicting Flow,	, V _c		1/2 V ₃ -	+V,+V,-	+ V, =82 +	1193+ 40	+ 8 = 13	2.3vph (V)		
Critical Gap, T _c ,	and Potential Capa	city, c _p	T, = 7	<u>5</u> sec (Table 10-2) c	"= 95 _{. рст}	oh (Fig. 10-3)) .		
Actual Capacity,	Actual Capacity, c_m $c_{m2} = c_{n2} \times P_4 = 95 \times .98 = 93$ pcph									
SHARED-LAN	E CAPACITY						· · ·			
	SI	H=	$\frac{v_{\tau} + v_{\phi}}{v_{\tau}}$	if	lane is share	ન્ત		. i		
	(v ₇ /c _{m2}) + (v					· · · · ·	·····			
Movement No.	v(pcph)		ph)	C.511	(pcph)					
	20	73		_		73	· · · · · · · · · · · · · · · · · · ·	<u>t</u> E		
4	8	700		+		67				
		0.00		1	· · · ·	192		V ·		

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
	PTU Claster	Dure		- 15. B.10	(.)		2.2		
	IMES			IMES IN PO	Срн				
HOOREI VÖL						•			
Major S	Street: CP3C5 R.								
N=E]	V,	- .	$\frac{47}{V_2} = \frac{V_1 \frac{12}{L}}{V_1 \frac{12}{L}}$					
Grade	$- \frac{V_2}{V}$			⊥ v,	310				
<u> </u>			└╜│	,] 				
Date of Counts:	OCT '88		- P	• •					
Time Period:f	r.m. –			¢	$\left -\frac{1}{u} \right $		-		
Average Runnin	g Speed: <u>40</u> N		112						
10	<u></u>	reet:	THETING (FOMETRIC						
PHF: <u>10</u> Gr	ade%	TU Gleetine	Inse Er			URCES	`		
VOLUME ADJUSTMENTS									
Movement No.		2	3	4	5	7	9		
Volume (vph)		47	1	. 12	1181	112	11.2		
Vol. (pcph), see	Table 10-1								
STEP 1: RT from	n Minor Street				<u>ر ۷.</u>				
Conflicting Flow	, V _c	. '	1/2	$V_{3} + V_{2} = -$	<u>1 + 47</u> =	- 12 75 vph ((V _{c9})		
Critical Gap, T _c	, and Potential Capa	city, c _p	T, =	6.0 sec (Ta	ء e 10-2) ديم =	- <u>950</u> pcph	(Fig. 10-3)		
Actual Capacity,	C _m	·	C _{m9} =	= c _{p9} =	pcph				
STEP 2: LT From	n Major Street			€ V.					
Conflicting Flow	, V ,		V ₃ +	$V_3 + V_7 = 1 + 47 = 48 \text{ vph}(V_{cl})$					
Critical Gap, T _c ,	and Potential Capa	city, c _p	T,=	5.5 sec (Ta	ble 10-2) c _{e4} =	-/ <u>@</u> pcph	(Fig. 10-3)		
Percent of c, Uti	lized and Impedance	e Factor (Fig. 10)-5) (v ₄ /0	: _{p4}) × 100 = _	P_ = <u>/.</u>	<u>e</u>			
Actual Capacity,	C _m	* .	C _{m4} =	= c _{p1} ≠ <i>2</i> 02	pcph				
STEP 3: LT From	n Minor Street				<u>ر</u>				
Conflicting Flow	, V,	1/2	2 V,+V,+V,·	+V, = <u> </u>	47: 1181+	+ 12 = 12	1 vph (V)		
Critical Gap, T _c ,	and Potential Capa	city, c _p T,	= <u>7.5</u> sec (Table 10-2) c	, = 105 pcp	h (Fig. 10-3)			
Actual Capacity, $c_m = c_{n2} \times P_4 = \frac{105}{100} \times \frac{1}{100} = \frac{105}{100}$									
SHARED-LAN	E CAPACITY	<u> </u>		<u> </u>					
	S	$H = \frac{v_7}{(v_7/c_{m_7})}$	+ v _g if + (v _g /c _{mu})	lane is share	d				
Movement No.	Movement No. v(pcph) c _m (pcph)				с		LOS		
7	7 112 105				-7		F		
9	И	950			939		A		
4	12	1000		•	988		A		

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	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATION TU.	Cleatin D	Fivente	4	NAM	· E:					
HOURLY VOLUME	<u> </u>	· · · · · · · · · · · · · · · · · · ·	a	VOL	JMES IN PC	PH				
	Cours D.	. (•	· ,			
Major Street	<u>CP303 No</u>	····· \	$\underline{\nabla}$	- 1			V. 37	_		
	,		V, V.	109	9 V	<u> </u>	V. <u>7</u>	·		
<u>Q</u> [*] <u>v</u>	·		v = (
		, v, [н. 		
Date of Counts: Nov	. '88	1 3	STOP				· .			
Time Period: <u>A.</u>	n	- [] - []	YIELD			115				
i i i i i i i i i i i i i i i i i i i	Min	nor	•							
PHF: 1.0 Grade	<u>0_%</u>	<u>v. G.</u> P	Prive		EKISTIN	601	METRIC	S		
VOLUME ADJUSTMENTS										
Movement No.		2		3	4	5	7	9		
Volume (vph)	35	7	37	20	115					
Vol. (pcph), see Table						r.				
STEP 1: RT from Min	nor Street				· · · · · · · · · · · · · · · · · · ·	~ V.	· · · ·			
Conflicting Flow, V _c		•		1/2	$V_3 + V_2 = 68$	<u>+ * * =</u>	618 vph ((V _c ,)		
Critical Gap, T _c , and	Potential Capac	ity, c _p		T _c =	6.0 sec (Tab	ole 10-2) c _{p9} =	- 430 pcph	(Fig. 10-3)		
Actual Capacity, c _m				c _{m9} ==	cp, 430	pcph	· · ·			
STEP 2: LT From Ma	jor Street	•				<pre></pre>				
Conflicting Flow, V	· · · ·			v,+	V, = <u>/35</u> +	1099 = 12	34vph (V.,)			
Critical Gap, T _c , and	Potential Capac	ity, c		$T_c = 5.5 \text{ sec} (Table 10-2) c_{-1} = 230 \text{ pcph (Fig. 10)}$						
Percent of c _p Utilized	and Impedance	Factor (Fi	g. 10-5)	(v,/c) × 100 =	3_P,=_	99	- ·		
Actual Capacity, c _m			-	C _{m4} =	cp4 = 230	ocph				
STEP 3: LT From Min	nor Street	-				$\supset v_{\tau}$				
Conflicting Flow, V,		· · ·	1/2 V,-	+V,+V,+	-v, = 68 +1	019 + 37	+ 7 = 12	/ vph (V)		
Critical Gap, T _c , and	Potential Capac	ity, c _p	T, = <u>7</u>	.5 sec (1	[able 10-2) c _p	105 pq	ph (Fig. 10-3)			
Actual Capacity, c _m		· • •	c _{m7} = c	,,×P,=	105 × .9	= 104 pc	ph			
SHARED-LANE CAPACITY										
	$\frac{\mathbf{v}_{-}+\mathbf{v}_{0}}{(\mathbf{m}_{7})+(\mathbf{v}_{0})}$	if	lane is shared	1						
Movement No. v(pcph) c _m (pcph)			C511	(pcph)	۰ دير	······································	LOS			
7	20	104			I	84		ε		
9	115	43	2			315		B		
4	7	23	2			223		C		

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS											
LOCATION. T.U. ELECTRIC	DRIVEWAY	NAN	E BVD	J.							
HOURLY VOLUMES		VOL	UMES IN P	Срн							
Major Street: CPSES	d	N									
			43 V. 1089								
Grade V ₂		_	$\begin{array}{c} 43 V_2 \\ L V_3 \\ \end{array}$								
<u>• %</u> V,	N=L	€」 · -	· · · · · · · · · · · · · · · · · · ·	<u></u>]},`,`,[· ·	-					
Date of Counts: Nov. '88		P	•			•					
Time Period: PM -		D		h i	•••••••						
Average Running Speed. <u></u>	inor										
 PHF: Grade%	TU.E. Drive	Ĕ	KISTIN	6 GEON	ETRICS						
VOLUME ADJUSTMENTS	······································										
Movement No.	2	3	4	5	7	9					
Volume (vph)	43	1	11	1088	//(11					
Vol. (pcph), see Table 10-1			· · · ·								
STEP 1: RT from Minor Street	· · · · · · · · · · · · · · · · · · ·			~ V,							
Conflicting Flow, V		1/2	$V_{3} + V_{2} = -$	<u> + 43/2 =</u>	<u>23</u> vph (۷ _م)					
Critical Gap, T _c , and Potential Capa	city, c _p	$T_c = 0$	sec (Ta	able 10-2) c _{p9} =	= <u>950</u> pcph	(Fig. 10-3)					
Actual Capacity, c _m		c _{m9} =	c _p = <u>930</u>	pcph							
STEP 2: LT From Major Street			∮ V,								
Conflicting Flow, V _c		V3+	$V_2 = ___$	+ 43 = 4	4 vph (V _{c4})						
Critical Gap, T _c , and Potential Capa	city, c _p	T, =	5.5 sec (Ta	able 10-2) c _{p4} =	-1000 pcph	(Fig. 10-3)					
Percent of c _p Utilized and Impedance	e Factor (Fig. 10-	5) (v ₄ /c	$_{P4}) \times 100 =$	$P_{i} = \underline{I}_{i}$	0						
Actual Capacity, c _m		C _{m4} =	c _{p4} = <u>1000</u>	pcph		<i>I</i> .					
STEP 3: LT From Minor Street				$\sum V_{\tau}$							
Conflicting Flow, V	1/2	V ₃ +V ₂ +V ₅ +	$-V_4 = 1 +$	43 . 1088.	+11. =114.	3 vph (V ₁₇)					
Critical Gap, T, , and Potential Capa	city, $c_p = T_c =$	7.) sec (1	able 10-2) c	p== 120 pcf	oh (Fig 10-3)	ð.,					
Actual Capacity, cm	C _{m7} =	$= c_{p_7} \times P_4 =$	1 <u>20 × 1</u>	= /20 pcp	»h						
CHARLO-LAINE CARACITY	v, +	<u>V.</u> if	lane is share	-d	- 						
S 	$(v_{7}/c_{m7}) +$	(V _v /C _{mv})		· · · · · · · · · · · · · · · · · · ·							
Movement No. v(pcph)	c _m (pcph)	C _{SH}	(pcph)	<u>.</u> .		LOS					
9 11	120			9	<u>-</u>	· · · · · · · · · ·					
	1000				A A						

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	WORKSHEE	T FOR	ANAL	'SIS OF	T-INTER	SECTIONS	5 ·			
	SES RA / PHO	(o1 "A"	RJ	NAM	ī.		•			
HOURLY VOLU	MES			VOLUMES IN PCPH						
		($\mathcal{D}_{\cdot\cdot}$							
Major S	treet: CP363 ICA	<u> </u>	<u> </u>	V. <u>855</u>						
N=4]		V, 855	$\frac{8}{2}$ V ₂ V ₂ V ₃ $\frac{1}{200}$ V ₁						
Grade -	$\overline{\mathcal{O}}$ V ₃		v = [4]							
		, v. [•	¥ V, V,				
Date of Counts:	EXISTING		STOP				• •			
Time Period: A./	Speed: 40	119 U = 201	YIELD			1 19				
Average Automig	Min Star	nor		· .			`			
PHF: <u>1.0</u> Gra	ide%/	Pkg Lot	A'Rd	Ex	STING	GEOMETI	Rics			
VOLUME ADJU	ISTMENTS		``			•				
Movement No.	· · · · · · · · · · · · · · · · · · ·	2		3	4	5	7	9		
Volume (vph)	· · · ·	B		0	3001	855	1	119		
Vol. (pcph), see T	fable 10-1									
STEP 1: RT from	n Minor Street					~ V,				
Conflicting Flow,	, V _c			1/2	$V_{3} + V_{2} = -C_{3}$	2_+=	= <u>8</u> vph (V. ₉)		
Critical Gap, T _c ,	and Potential Capac	ity, c		T,=	5.0 sec (Ta	ble 10-2) c _{p9} =	= <u>1100</u> pcph	(Fig. 10-3)		
Actual Capacity,	C _m			$c_{m9} = c_{p9} = \underline{1.02} \text{ pcph}$						
STEP 2: LT From	n Major Street			€ V.						
Conflicting Flow,	, V,	· · ·		V,+	$V_2 = _O_+$	+ <u>8_</u> =8	vph (V_4)	· · · · · · · · · · · · · · · · · · ·		
Critical Gap, T _c ,	and Potential Capac	ity, c _p		T,=4		ble 10-2) c _{p4} =	= <u>//@_</u> pcph	(Fig. 10-3)		
Percent of cp Util	lized and Impedance	Factor (Fi	g. 10-5)	(v,/c	$_{\rm P4}) \times 100 = -$	P_ =	<u>></u> ``			
Actual Capacity,	C _m	· .		c _{m4} =	c _{p4} =	pcph				
STEP 3: LT From	n Minor Street			••••••		$\supset V_{7}$	^	2 - 1		
Conflicting Flow,	, V,		$1/2 V_{1}$ -	⊦V,+V,I	$-V_A = \frac{O}{A} + \frac{O}{A}$	8 +855.	+3001 = 38	56vph (V_7)		
Critical Gap, T _c ,	and Potential Capac	ity, c _p	$T_c = \underline{6}.$	5(1	[able 10-2) c	$_{7} = \{pcr}$	oh (Fig. 10-3)	•		
Actual Capacity,	C _m		c _{m7} = c _p	$_{7} \times P_{4} =$	X	_=pcr	ph			
SHARED-LAN	E CAPACITY	· · · ·								
	$SH = \frac{v_7 + v_9}{(v_7/c_{-7}) + (v_9/c_{-9})}$ if lane is shared									
Movement No.	v(pcph)	c _m (p	cph)	Ссян	(pcph)			LOS		
7	1	0				0		F		
9	1.00		9	· · ·		981		A		
4	3001	1100)	<u> </u>		- 1800	<u>a .</u>	F		

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	WORKSHEE	T FOR A	NALY	SIS OF	T-INTER	SECTIONS	5			
LOCATION! (F	PSES Rd - Ph	a Lot "A"	Rd		F BYD	eu .				
HOURLY VOLU	MES	A		VOLUMES IN PCPH						
			À							
Major 5	reet: CP303 M		<u>v</u> N	V, <u>12</u>						
N = 4]		. .	846 V V. 108						
Grade -			- -	9.	V,		• 	_		
)∳ ∿				V , V,		· · · · · · ·			
Date of Counts:	-KISTING	TOP								
Time Period:	Speed 40 N	IELD		• •	2971					
Twenage Ruthung	Mi	nor				1 . 1				
PHF: <u>1.0</u> Gra	nde%_ <u>Pr</u>	19 Lor "A"	RL	E	KISTING	GEOM	GTRICS			
VOLUME ADJU	STMENTS		<u>.</u>							
Movement No.		2		3	4	5	7	9		
Volume (vph)		846	, <u> </u>	9 108 12 30 297						
Vol. (pcph), see T	Table 10-1							, N		
STEP 1: RT from	Minor Street					~ V,				
Conflicting Flow,	, V _c		·	1/2	$v_{3} + v_{2} = 5$	+ <u></u> =	= 428 vph ((V _{c9})		
Critical Gap, T _c ,	and Potential Capac	city, c _p	· • ,	T, =	5.0 sec (Ta	ble 10-2) c _{p9} =	= <u>600.</u> pcph	(Fig. 10-3)		
Actual Capacity,	C _m			$c_{m9} = c_{p9} = 600$ pcph						
STEP 2: LT From	n Major Street			f v.						
Conflicting Flow,	, V,			V,+	$V_2 = -9$	- 846 = <u>8</u>	55 vph (V _c ,)			
Critical Gap, T _c ,	and Potential Capad	city, c _p		$T_c = 0$	e e sec (Ta	ble 10-2) c _{p4} =	= <u>330</u> pcpł	n (Fig. 10-3)		
Percent of c _p Util	lized and Impedance	Factor (Fig.	10-5)	(v./c	$_{p4}) \times 100 = 1$	<u>33</u> P, = ·	7			
Actual Capacity,	C _m			°c _{m4} =	c _{p4} = 330	pcph				
STEP 3: LT From	n Minor Street			·		$\supset V_{2}$				
Conflicting Flow,	. V,	1	/2 V,+	+V,+V,+	+V, = 5 +	846, 12	+108 = 97	5 vph (V -)		
Critical Gap, T _c ,	and Potential Capa	city, c _p	r, = <u>6</u> .	5 sec (Table 10-2) c	-240 pc	ph (Fig. 10-3)).		
Actual Capacity,	C _m	c	m7 = Cp	$_{7} \times P_{4} =$	240 × • 7	= 168 pc	ph			
SHARED-LAN	E CAPACITY				· · ·					
	$SH = \frac{v_2 + v_4}{(v_2/c_{m_2}) + (v_4/c_{m_3})}$ if lane is shared									
Movement No.	v(pcph)	c _m (pcp	C _{SH}	(pcph)	с С _К е	······································	LOS			
7	30				138		P			
9	2971	600			+	-2371		F		
4	108	330) ··	L		222		<u>C</u>		

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EXISTING GEOMETRICS

TRAFFIC VOLUMES

======= 		=======================================		t == == == == == == == == == == == == ==				
	EB	WE	NB	SB				
LEFT	1855	0	1	1		· •		
THRU	855	8	1	1	· ·			
RIGHT	0	0	- 1	73	:			
RTOR	0	о С	Q	Ű,	-			
(RTOR	volume must	be less tha	n or equal t	o RIGHT turn	volumes.)		

INTERSECTION GEOMETRY

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NUMBER OF LANES PER DIRECTION INCLUDING TURN BAYS: EASTBOUND = 2WESTBOUND = 2 NORTHBOUND = 2 SOUTHBOUND = 2EB WB NB SB LANE TYPE WIDTH TYPE WIDTH TYPE WIDTH TYPE WIDTH 1 LT 6 12.0 Т 12.0 LT 12.0 LTR 12.0 2 T LT 12.0 TR 12.0 TR 12.0 R 12.0 3 12.0 12.0 12.0 12.0 4 12.0 12.0 12.0 12.0 5.1 12.0 12.0 12.0 -12.0 ය 12.0 12.0 12.0 12.0

 .	-	EXCLUSIVE LEFT LANE	T	-	EXCLUSIVE THROUGH LANE
_T		LEFT/THROUGH LANE	ΤŔ		THROUGH/RIGHT LANE
_R	****	LEFT/RIGHT ONLY LANE	R		EXCLUSIVE RIGHT LANE

LTR - LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

	GRADE (%)	HEAVY VEH. (%)	ADJACENT Y/N	PKG (Nm)	BUSES	PHF
EASTBOUND	0.00	1.00	 N	਼	0	1.00
WESTBOUND	0.00	1.00	N	Ó	•	1.00
NORTHBOUND	0.00	1.00	N	O -	Ó	1.00
SOUTHBOUND	0.00	1.00	N	O`	<u>,</u> 0	1.00

Nm = number of parking maneuvers/hr; Nb = number of buses stopping/hr

	CONFLICTING P (peds/hour)	EDS	PEDESTR (Y/N)	(MIN T)	ARRIVAL TYPE
EASTBOUND	0		N	14.5	3
WESTBOUND	O .	. ⁻	N	14.5	3
NORTHBOUND	O		N	14.5	3
SOUTHBOUND	0		N	14.5	3. 1

min T = minimum green time for pedestrians

SIGNAL SETTINGS - OPERATIONAL ANALYSIS

Page-3

ACTUATED

LOST TIME/PHASE = 3.0 CYCLE LENGTH = 120.0

EAST/WEST PHASING

	PHASE-1	PHASE-2	PHASE-3	FHASE-4	
EASTBOUND LEFT THRU RIGHT FEDS	X X	×		•	
WESTBOUND LEFT THRÚ RIGHT FEDS		X X		· · ·	
NORTHBOUND RT SOUTHBOUND RT	•	•	· · ·		
GREEN YELLOW + ALL R	101.0 ED 3.0	5.0 3.0	0.0	0.0 0.0	
NORTH/SOUTH PH	ASING		· .		
NORTHBOUND LEFT THRU RIGHT PEDS	FHASE-1 X X X	PHASE-2	PHASE-3	PHASE-4	
SOUTHBOUND LEFT	X	•	· · · ·	·.	

THRU X RIGHT PEDS

EASTBOUND RT WESTBOUND RT

				and the second second				
GREEN				5.0	Ò.O	· .	0.0	0.0
YELLOW	+	ALL	RED	3.0	0.0		0.0	. 0.0
							· · · ·	

VOLUME ADJUSTMENT WORKSHEET

Page-4

LANE LANE ADJ. PROP PROP MVT. ADJ. LANE GRP. NO. UTIL. GROWTH GRF. FACT. VOL. VOL. PHF VOL. GRF . VOL. LN FACT. LT RŤ ---------EB 1.00 1855 1 1.000 1.000 1855 1.00 0.00 LT 1855 1855 ×L 855 1 1.000 1.000 TH 855 1.00 855 т 855 0.00 0.00 RT 0 1.00 0 WB Ŏ LT 1.00 Ō 8 2 1.050 1.000 8 0.00 0.00 TH 8 1.00 . 8 TR RT 0 1.00 Ο. NB · LT 1.00 1 1 тн 1 1.00 LTR 3 2 1.050 1.000 3 0.33 0.33 1 1 1.00 RT 1 SB LT 1 1.00 1 TH 39 1 1.000 1.000 39 0.01 0.95 1 1.00 LTR 1 36 1 1.000 1.000 36 0.00 1.00 RT · 73 1.00 73 R

* Denotes a Defacto Left Turn Lane Group

		IDEAL SAT. FLOW	NO. LNS	÷ W	f H∨	f G	f P	f BB	f .A	f RT	f LT	ADJ. SAT. FLOW
EB						, <u></u>						
	L	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1891
	. T	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1990
1B		•		,							•	
	TR	2000	2	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	3980
NB	і тр	2000	7	1 000	0.005	1 000	1 000	1 000	1 000	A 950	0 001	7400
			· ~	1.000	0.773	1.000	1.000	1.000	1.000	0.700	`w'⊎ 7 ⊐≟.d.	
ЗB			~									
	LTR	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	0.858	1.000	1707
	R -	2000	1	1.000	0.995	1.000	i. 000	1.000	1.000	0.850	1.000	1692
					· ·	1 - A - A - A - A - A - A - A - A - A -		•				

1%

CAPACITY ANALYSIS WORKSHEET

• • •	ADJ. FLOW RATE (v)	ADJ. SAT. FLOW RATE (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUF CAPACITY (c)	v/c RATIO	
EB L T	1855 855	1 891 1990	0.981 0.430	0.842 0.908	1591 1808	1.166 0.473	¥
WB TR	8	3980	01002	0.042	166	0.051	• *
NB LTR	3,	3482	0.001	0.042	145	0.022	
SB LTR R	39 36	1707 1692	0.023 0.021	0.042 0.042	71 70	0.548 0.511	*

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Cycle Length, C = 120.0 sec.Sum (v/s) critical = 1.006Lost Time Per Cycle, L = 9.0 sec.X critical = 1.088

LEVEL-OF-SERVICE WORKSHEET

.....

Fage-7

	v/c RAŤIO	g/Ç RATIO	CYCLE LEN.	DELAY d 1	LANE GROUP CAP	DELAY d 2	PROG. FACT.	LANE GRP. DELAY	LANE GRP. LOS	DELAY BY APP.	LOS BY APP	
EB L T	1.166 0.473	0.842 0.908	120.0 120.0	60.9 0.7	1591 1808	85.5	1.00	146.4	F A	100.4	F. <	
WB TR	0.051	0.042	120.0	42.0	166	0.0	0.85	35.7	۵	35.7	ם ב ביים ביים	
NB LTR	0.022	0.042	120.0	41.9	145	0.0	0.85	35.6	ם	35.6	D	
SB LTR R	0.548 0.511	0.042 0.042	120.0 120.0	42.9 42.8	71 70	6.3 4.8	0.85 0.85	41.8 40.5	E	41.1	E	

Intersection Delay = 98.6 (sec/veh) Intersection LOS = F

EXISTING GEOMETRICS

TRAFFIC VOLUMES ====================================										
	EB	WB	NB	SB	. .					
LEFT	67	0	1	19						
THRU	.7	846	1	1	· ·					
RIGHT	0	9	1	1836						
RTOR	0,	0	0	Ó,	· .					

(RTOR volume must be less than or equal to RIGHT turn volumes.)

INTERS	ECTION		Fage-2							
NUMBER	OF LAN	ES PER DI WESTE	RECTIO	IN INCLUD 2 NO	ING TUR RTHBOUN	N BAYS: ID = 2	SOUTHE	OUND = 2	-	
LANE	EB TYFE WIDTH		W TYFE	IB WIDTH	N TYPE	B WIDTH	S TYPE	B WIDTH	н	
1	LT	12.0	Т	12.0	LT	12.0	LTR	12.0	,	
2	Т	12.0	TR	12.0	TR	12.0	R	12.0		
3		12.0		12.0		12.0		12.0		
4		12.0	. ,	12.0		12.0		12.0		
5		12.0		12.0		12.0		12.0		
6		12.0		12.0		12.0		12.0	· .	
L. – LT –	EXCLUSI	VE LEFT L IROUGH LAN			T - TR - R -	EXCLUSIV THROUGH/	YE THROU RIGHT L	JGH LANE ANE	J	

LTR - LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

==	====	= == ==	===	===	=	 ====	== :	=:	==	== =	:==	== :	==	== =	= :	

	GRADE (%)	HEAVY VEH. (%)	ADJACENT Y/N	PKG (Nm)	BUSES (Nb)	PHF
EASTBOUND	0.00	1.00	N ;	0	Ō	1.00
WESTBOUND	0.00	1.00	N	. ° O	Ö	1.00
NORTHBOUND	0.00	1.00	N	0	0	1.00
SOUTHBOUND	0.00	1.00	N '	0	0	1.00

Nm = number of parking maneuvers/hr; Nb = number of buses stopping/hr

	CONFLICTING PEDS (peds/hour)	FEDESTRIA (Y/N)	N BUTTON (min T)	ARRIVAL TYPE
EASTBOUND	0	N	14.5	1997 - 3 99 - 1997
WESTROUND	0	'N	14.5	3
NORTHBOUND	0	N -	14.5	3
SOUTHBOUND	Ō	Ν	14.5	3

min T = minimum green time for pedestrians

SIGNAL SETTINGS - OPERATIONAL ANALYSIS

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.

ACTUATED LOST TIME/PHASE = 3.0 CYCLE LENGTH = 120.0

EAST/WEST PHASING

,	PHASE-1	PHASE-2	PHASE-3	PHASE-4	,
EASTBOUND					
LEFT	X				
THRU	X	X			
RIGHT		-		χ.	
WESTBOUND					
THRU		X	· · ·		
FEDS	· .	X	•		
		•			
NORTHBOUND RT		•			
					··· •
GREEN	7.0	30.0	0.0	0.0	
YELLOW + ALL REI	0 310	3.0	0.0	0.0	

NORTH/SOUTH PHASING

	PHASE-1	PHASE-2 PHASE-3	PHASE-4
NORTHBOUND			· · ·
LEFT	х	· · · ·	
THRU	Х		
RIGHT	X		•
PEDS	•		
SOUTHBOUND			
LEFT	x		
THRU	X.	• • • • •	
RIGHT	X		·
PEDS			
·	2		
EASTBOUND RT			• •
WESTBOUND RT			
	• •		
GREEN	74.0	0.0 0.0	0.0
YELLOW + ALL RED	3.0	0.0	0.0

VOL		E ADJU	STMENT	WORKS	HEET =====			******			۲ =====	age-4 =====
		MVT. VOL.	PHF	ADJ. VOL.	LANE GRP.	LANE GRP. VOL.	NO. LN	LANE UTIL. FACT.	GROWTH FACT	ADJ. GRP. VOL.	PROP LT	PROP RT
EB		_			. '		÷					
	LT	67	1.00	67	*L	67	1	1.000	1.000	67	1.00	0.00
	ΤН	7	1.00	7	Т	. 7	1	1.000	1.000	. 7	0.00	0.00
•	RT	0	1.00	, O					, , ,			•
WB									•	•		
	LT	0	1.00	0								
	TH	846	1.00	846	TR	855	2	1.050	1.000	878	0.00	0.01
	RT	9	1.00	9				,	• •			· •
NB		· .			· .	· .		1 000	1 000	1	1 00	0.00
		. 1	1.00	1	*	. 1	+	1.000	1 000	· • •	0.00	0.50
	IH OT	. 1	1.00	1: -	L PC	<u>∠</u>	1 .	1.000	1	÷	~.~~	0.00
	RI	· 1	1.00	1								
съ	•							•	•	•		
36	ιт	19	1 00	107						· ·		
	- т-н	- 1	1 00	1		938	1	1.000	1.000	938	0.01	0.98
	- 111 - 121	1834	1.00	1834	R	918	1	1.000	1.000	718	0.00	1.00
÷.,	13.1	race,		1000		, . U	-			· ··· /		

* Denotes a Defacto Left Turn Lane Group

SA	SATURATION FLOW ADJUSTMENT WORKSHEET											Page-5		
		IDEAL SAT. FLOW	NO. LNS	÷ω	f HV	f G	f	f BB	f	f RT	f LT	ADJ. SAT. FLOW		
EB								,,,,,,,,			· .			
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1701		
	T	1800	1	1,000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1791		
WB														
	TR	1800	2	1.000	0.995	1.000	1.000	1.000	1.000	0.998	1.000	3576		
NB												•		
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.054	97		
	TR	1800	1	1.000	0.995	1,000	1.000	1.000	1.000	0.925	1.000	1657		
SB			<i>.</i> .									÷ .		
•	LTR	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.853	1.000	1528		
	R	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1522		
						1. A.								
CAPACITY ANALYSIS WORKSHEET

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	ADJ. FLOW RATE (V)	ADJ. SAT. FLOW RATE (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUF CAPACITY (c)	∨/c RATIO	
EB L T	67 7	1701 1791	0.039 0.004	0.058 0.333	99 597	0.675	*
WB TR	878	3576	0.251	0.250	894	1.004	*
NB L TR	1 2	97 1657	0.010	0.617 0.617	60 1022	0.017	
SB LTR R	938 918	1528 1522	0.614 0.603	0.617 0.617	942 939	0.995 0.978	×

Cycle Length, C = 120.0 sec.Sum (v/s) critical = 0.904Lost Time Per Cycle, L = 9.0 sec.X critical = 0.978

LEVEL-OF-SERVICE WORKSHEET

	RATIO	RATIO	CYCLE LEN.	DELAY	LANE GROUP CAP	DELAY d 2	PROG. FACT.	LANE GRF DELAY	LANE GRF LOS	DELAY BY APP.	LOS BY AFF.
EB L . T	0.675	0.058 0.333	120.0 120.0	42.1	99 597	10.9	1.00	53.0 17.3	E C	49.6	 Е
WB TR	1.004	0.250	120.0	34.2	894	24.1	0.85	49.6	E	49.6	E
NB L TR	0.017 0.002	0.617	120.0 120.0	6.9 6.7	60 1022	0.0 0.0	1.00 0.85	6.8 5.7	B B	6.1	B
SB LTR R	0.995 0.978	0.617 0.617	120.0 120.0	17.4 16.9	942 939	21.5 18.0	0.85 0.85	33.0 29.7	D D	31.4	D

Intersection Delay = 37.6 (sec/veh)

Intersection LOS = D

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IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET.....CPSES MAIN ROAD NAME OF THE NORTH/SOUTH STREET....PARKING LOT "A" ROAD AREA TYPE.....OTHER NAME OF THE ANALYST.....BDVDW DATE OF THE ANALYSIS......9/29/87 TIME PERIOD ANALYZED....JAN '88 - A.M.

OTHER INFORMATION:

ELIMINATE SB L.T. & ADD EB L.T. LANE (RESTRIPE)

TRAFFIC VOLUMES

	EB	θWB	NB	SB	
LEFT	1855		1	1	
THRU	855	8	1.	1	· · ·
RIGHT	0	o .	1	73	
RTOR	0	0	0	Ō	

(RTOR volume must be less than or equal to, RIGHT turn volumes.)

INTERSE	ECTION (GEOMETRY	•	· .				Fa	ge-2
*****	H ha az az az a irt:	= = = = = = = = = = =							
NUMBER EASTBOI	OF LAN 3 = CINL	ES PER DI WESTI	IRECTIO BOUND =	N INCLUD 2 NO	ING TUR RTHBOUN	N BAYS: D = 2	SOUTHB	0UND = 2	•
LANE	EI TYPE	B WIDTH	W TYPE	в WIDTH	N TYPE	B WIDTH	S TYPE	B WIDTH	
1	. L	11.0	Τ	12.0	LT	12.0	LTR	12.0	
2	LT	11.0	TR	12.0	TR	12.0	R	12.0	÷
3	T,	11.0		12.0		12.0		12.0	
. 4		12.0		12.0		12.0		12.0	
. 5		12.0		12.0		12.0		12.0	
6	· .	12.0		12.0		12.0	· ·,	12.0	,
L	EXCLUSI LEFT/THI LEFT/RI	VE LEFT L ROUGH LAN GHT ONLY	LANE NE LANE	. •	T - TR - R -	EXCLUSIN THROUGH/ EXCLUSIN	YE THROU YRIGHT L YE RIGHT	IGH LANE ANE LANE	•

- LR LEFT/RIGHT ONLY LANE
 - LTR LEFT/THROUGH/RIGHT LANE

ADJUSTMENT FACTORS

. · · ·	GRADE (%)	HEAVY VEH. (%)	ADJACENT Y/N	PKG (Nm)	BUSES (Nb)	PHF
			··-···			
EASTBOUND	0.00	1.00	N	0	0	1.00
WESTBOUND	0.00	1.00	N	o '	0	1.00
NORTHBOUND	0.00	1.00	N	0	Ō	i.00
SOUTHBOUND	0.00	1.00	N	0	Ö	1.00

Nm = number of perking maneuvers/hr; Nb = number of buses stopping/hr

	CONFLICTING PEDS (peds/hour)	PEDESTRI (Y/N)	AN BUTTON (min T)	ARRIVAL TYPE
EASTBOUND	• • • • • • • •	N	14.5	3
WESTBOUND	0	N	14.5	3
NORTHBOUND	о	N	14.5	. 3
SOUTHBOUND	0	N	14.5	3

min T = minimum green time for pedestrians

SIGNAL SETTINGS - OPERATIONAL ANALYSIS

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•

ACTUATED

LOST TIME/PHASE = 3.0 CYCLE LENGTH = 120.0

EAST/WEST PHASING

	PHASE-1	PHASE-2	FHASE-3	PHASE-4
EASTBOUND LEFT THRU	X X	X	· · ·	
RIGHT PEDS	· ·			
WESTBOUND LEFT			·	
THRU RIGHT PEDS		X		
NORTHBOUND RT SOUTHBOUND RT				
GREEN YELLOW + ALL REI	101.0 3.0	5.0 3.0	0.0	0.0 0.0
NORTH/SOUTH PHAS	6INĠ			
	PHASE-1	PHASE-2	PHASE-3	FHASE-4
NORTHBOUND LEFT THRU RIGHT	X X X	· · · ·		
PEDS	· · · · ·		· ·	
SOUTHBOUND	X	· ·		
THRU RIGHT PEDS	X	•	•	
EASTEOUND RT WESTEOUND RT				
GREEN YELLOW + ALL REI	5.0) 3.0	0.0	0.0	0.0

		E ADJU	STMENT	WORKS	HEET						P	age-4
		MVT. Vol.	PHF	ADJ. VOL.	LANE GRP.	LANE GRP. VOL	NO. LN	LANE UTIL. Fact.	GROWTH FACT.	ADJ. GRP. VOL.	PROP LT	FROP RT
EB	LT TH RT	1855 855 0	1.00 1.00 1.00	1855 855 0	*L T	1855 855	2 1	1.050 1.000	1.000 1.000	1948 855	1.00	0.00 0.00
WΒ	LT TH RT	0 8 0	1.00 1.00 1.00	0 8 0	ΤR	8	2	1.050	1.000	. 8	0.00	0.00
NB	LT TH RT	1 1 1	1.00 1.00 1.00	1 1 1	LTR	3	2	1.050	1.000		0.33	0.33
SB	LT T <u>H</u> RT	1 1 73	1.00 1.00 1.00	1 1 73	LTR R	39 36	1	1.000 1.000	1.000	39 36	0.01	0.95 1.00

* Denotes a Defacto Left Turn Lane Group

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SAT		ION FLO			ENT WOR	KSHEET	「 =========		n az ja ja az ja u		. f	°age-5
-		IDEAL SAT. FLOW	NO. LNS	fW	f HV	fG	f	f BB	f A	f RT	f LT	ADJ. SAT. FLOW
EB												
	L	1800	2	0.970	0.995	1.000	1.000	1,000	1.000	1.000	0.920	3197
	Т	1800	1	0.970	0.995	1.000	1.000	1.000	1.000	1.000	1.000	1737
LU B									•.			
VV L.	TR	2000	2	1.000	0.995	1.000	1.000	1.000	1.000	1.000	1.000	3980
		,		ł .		1	•				_	,
NB			_									-
	LIK	2000	-	1.000	0.995	1.000	1.000	1.000	1.000	0.950	0.921	0482
		•										
.00	ITE	2000	1	1 000	0 905	1 000	1 000	1. 000	1 000	0 959	1 000	1707
·	R	2000	4	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1692
	••		*									

CAPACITY ANALYSIS WORKSHEET ______

ADJ.

LANE GROUP FLOW RATE FLOW RATE RATIO GREEN RATIO CAPACITY v/c

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	(v)	(5)	(v/s)	(g/C)	(c)	RATIO
EB L	1948	3197	0.609	0.842	2690	0.724 *
Т	855	1737	0.492	0.908	1578	0.542
WB TR	8	3980	0.002	0.042	166	0.051 *
NB LTR	3	3482	0.001	0.042	145	0.022
SB LTR R	39 36	1707 1692	0.023 0.021	0.042 0.042	71 70	0.548 * 0.511

FLOW

ADJ. SAT.

Cycle Length, C = 120.0 sec.Sum (ν/s) critical = 0.634Lost Time Per Cycle, L = 9.0 sec.X critical = 0.686

LEVEL-OF-SERVICE WORKSHEET

LANE LANE DELAY LOS DELAY LANE DELAY V/C g/C CYCLE d GROUP d PROG. GRP. GRP. BY BY RATIO RATIO LEN. 1 CAP. 2 FACT. DELAY LOS APP. APP. ΕB 0.724 0.842 120.0 2.9 2690 0.7 1.00 0.542 0.908 120.0 0.8 1578 0.3 0.85 2.8 A L 3.6 A Т 0.9 A WB -TR 0.051 0.042 120.0 42.0 35.7 D 166 0.0 0.85 35.7 D NB LTR 0.022 0.042 120.0 41.9 145 0.0 0.85 35.6 D 35.6 D SB LTR 0.548 0.042 120.0 42.9 71 6.3 0.85 41.8 E R 0.511 0.042 120.0 42.8 70 4.8 0.85 40.5 E 41.1 E

Intersection Delay = 3.9 (sec/veh) Intersection LOS = A

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1985 HCM: SIGNALIZED INTRASECTIONS

Page-1 IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET CPSES NAME OF THE NORTH/SOUTH STREET LOT "A" AREA TYPE.....OTHER NAME OF THE ANALYST BDVDW

OTHER INFORMATION: RESTRIPE EB APPROACH - L LT

TRAFFIC VOLUMES

EB WB NB SB	
_EFT 1855 0 1 1 THRU 855 8 1 1 FLGHT 0 0 1 73	
THRU 855 8 1 1	
RTOR O O O	

(RTOR volume must be less than or equal to RIGHT turn volumes.)

a	E	B	W	B	N	B	Ś	B
	1 YPE	WIDTH	I Y P'E	W1D1H	1 Y P'E	WIDIH	1 YFE	WIDTH
1	L	12.0	T	12.0	ĹT	12.0	LTR	12.0
2	LT	12.0	TR	12.0	TR	12.0	R	12.0
3		12.0	•	12.0		12.0	•	12,0
4		12.0	•	12.0	·	12.0		12.0
5		12.0	•	12.0		12.0	•	12.0
6		12.0		12.Ò		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HEAVY VEH. (%)	ADJACEN Y/N	T PKG (Nm)	BUSES (Nb)	PHF
EASTBOUND	0.00	1.00	N	Ó	[°] O	1.00
WESTBOUND	0.00	1.00	N	ò	0	1.00
NORTHBOUND	0.00	1.00	N	Ō	0	1.00
SOUTHBOUND	0.00	1.00	Ň	о ⁻	0	1.00

Nm =	number	Οf	parking	maneuvers/hr;	Nb =	number	Оŕ	buses	.stopping/	/hr
------	--------	----	---------	---------------	------	--------	----	-------	------------	-----

•	CONFLICTING PEDS	Э ·	PEDESTR	AN BUTTON	
	(peds/hour)	. '	(YZN)	(min T)	ARRIVAL TYPE
				and and the barry time take many again prove takes	······
EASTBOUND	O 1.	· •	N	19.8	3
WESTBOUND	O		. N	19.8	
NORTHBOUND	Ō		N ·	17.8	3
SOUTHBOUND	0	. '	N	17.8	3

min T = minimum green time for pedestrians

SIGNAL	SETTINGS	 OPERATIONAL	ANALYSIS			Page-

-3

LOST TIME/PHASE = 3.0 CYCLE LENGTH = 120.0 ACTUATED

· -		· · ·	, ··		
EAST/WEST PHASIN	NG ·			· · ·	- · ·
	PHASE-1	PHASE-2	PHASE-3	PHASE-4	
LEFT THRU RIGHT	X X	X	· · · · · · · · · · · · · · · · · · ·		
PEDS		• • • •			
WESTBOUND LEFT THRU		X	· · ·		- 1
RIGHT PEDS		X .			
NORTHBOUND RT SOUTHBOUND RT					
GREEN YELLOW + ALL RED	101.0 D 3.0	5.0 3.0	0.0	0.0 0.0	
NORTH/SOUTH PHA	SING				
	51100F				

	PHASE-1	PHASE-2	PHASE-3	PHASE-4	-
NORTHBOUND LEFT THRU RIGHT PEDS	x x x				
SOUTHBOUND LEFT THRU RIGHT PEDS	X X X				
EASTBOUND RT WESTBOUND RT		• • •		,	
GREEN YELLOW + ALL RE	5.0 D 3.0	0.0	0.0	0.0	

VOLUME ADJUSTMENT WORKSHEET

Fage-4

ЕВ	•	MVT. Vol.	PHF	ADJ. VOL.	LANE GRP.	LANE GRF. VOL.	ND. LN	LANE UTIL. FACT.	GROWTH FACT.	ADJ. GRP. VOL.	PROP LT	PROP RT
	LT TH RT	1855 855 0	1.00 1.00 1.00	1855 855 0	L LT	1336 1374	1 1	1.000	1.000	1336 1374	1.00 0.38	0.00
WB												
	LT	0	1.00	0			_			_		
	TH RT	8 0	1.00	8	TR	. 8	2	1.050	1.000	8	0.00	0.00
NIT)			1	•				• .				
ЦD	LТ	1	1.00	· 1		i						
	TH	1	1.00	.1	LTR	3	2	1.050	1.000	. 3	0.33	0.33
	RI		1.00	1				. · ·				
SB												
•	TH	1	1.00	, 1 1	LTR	39	1	i.000	1.000	39	0.01	0.95
	RT	73	1.00	73	R	36	1	1.000	1.000	36	0.00	1.00

* Denotes a Defacto Left Turn Lane Group

5A1	TURAT	ION FL	OW AI)JUSTMI	ENT WOR	RKSHEE'	T =======		= 511 55 55 66 55 5	= = = = = = .		Page5
		IDEAL SAT. FLOW	NO. LNS	÷ω	f HV	f G	f	f BB	f	f RT	f LT	ADJ. SAT. FLOW
EB												
	L	2000	· 1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.950	1891
	LT	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	°. 981	1953
WB							. '					. ,
	TR	2000	2	1.000	0.995	1.000	1.000	1.000	1.000	1,000	1.000	3980
NB									•••			
	LTR	2000	Ź	1.000	0.995	1.000	1,000	1.000	1,000	0.950	0.921	3482
SB												
	LTR	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	0.858	1.000	1707
	R	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1692

CAPACITY ANALYSIS WORKSHEET

Page-6

. •	ADJ. FLOW RATE (V)	ADJ. SAT. FLOW RATE (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUP CAPACITY (c)	v/c RATIO	• .
EB							
- L	1336	1871	0.706	0.842	1591	0.839	×
LT	1374	1953	0.704	0.908	1774	0.775	
WB							
TR	8	3980	0.002	0.042	166 -	0.051	₩
NB						•	
LTR	3	3482	0.001	0.042	145	0.022	
SB				•			
LTR	39	1707	0.023	0.042	. 71	0.548	¥
R	36	1692	0.021	0.042	70	0.511	

Cycle Length, C = 120.0 sec. Lost Time Per Cycle, L = 9.0 sec. Sum (v/s) critical = 0.731X critical = 0.791

LEVEL-OF-SERVICE WORKSHEET

•	v∕c RATIO	g/C RATIO	CYCLE LEN.	DELAY d 1	LANE GROUF CAP	DELAY d 2	PROG. FACT.	LANE GRP. DELAY	LANE GRF LOS	DELAY BY APP.	LOS BY APP.
EBL	0.839	0.842	120.0	3.9	1591	3.0	1.00	 6.9 7 4	B	. 4. 6	· A
WB TR	0.051	0.042	120.0	42.0	166	0.0	0.85	35.7	D.	35.7	, a
	0.022	0.042	120.0	41.7	145	0.0	0.85	35.6	D	35.6	י D `
SB LTR	0.548	0.042	120.0	42.7	71	6.3	0.85	41.8	E	41.1	E
R	0.511	0.042	120.Ò	42.8	70	4, 8	0.85	40.5	E		

Intersection Delay = 5.7 (sec/veh) Intersection LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS

Page-1

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET.....CPSES NAME OF THE NORTH/SOUTH STREET....LOT "A" AREA TYPE.....OTHER NAME OF THE ANALYST.....BDVDW DATE OF THE ANALYSIS.....9/27/87 TIME PERIOD ANALYZED....JAN '88 - P.M.

OTHER INFORMATION: RESTRIPE EB APPROACH - L LT

TRAFFIC VOLUMES

		= = = = = = = = = = = =			=======================================
	EB	WE	NB	SB	
LEFT	67	0	1	19	
THRU	7	846	1	1	
RIGHT	o	9	1	1836	, '
RTOR	0	o	0	0	

(RTOR volume must be less than or equal to RIGHT turn volumes.)

INTERSECTION GEOMETRY

	Ē	в	ы	B	N	B	ç	B
ANE	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH	TYPE	WIDTH
1	L	12.0	T	12.0	LT	12.0	LTR	12.0
2	LT	12.0	TR	12.0	TR	12.0	R	12.0
3		12.0		12.0		12.0 ₁		12.0
4		12.0		12.0	·. · ·	12.0	· · · · · · · · · · · · · · · · · · ·	12.0
5		12.0		12.0	· · ·	12.0	1 	12.0
6		12.0		12.0		12.0	÷	12.0
LT - L LR - L I R - L ADJUSTN	_EFT/TH _EFT/RI _EFT/TH MENT FA	ROUGH LA GHT ONLY ROUGH/RI CTORS	NE LANE GHT LAN	E	TR - R -	THROUGH/ EXCLUSIV	RIGHT L E RIGHŢ	ANE LANE
LT - L LR - L TR - L	_EFT/TH _EFT/RI _EFT/TH MENT FA	GHT ONLY GHT ONLY ROUGH/RI CTORS GRADE (%)	NE LANE GHT LAN HEAVY V (%)	IE 	TR - R - 	THROUGH/ EXCLUSIV ======== G BUSES (Nb)	RIGHT L E RIGHT =======	ANE LANE
LT - L LR - L I R - L ADJUSTN	_EFT/TH _EFT/RI _EFT/TH MENT FA	GRADE	NE LANE GHT LAN HEAVY V (%) 1.00	E EH. ADJA Y/N	TR - R - ACENT PK (Nm 	THROUGH/ EXCLUSIV G BUSES () (Nb)	RIGHT L E RIGHT PHF 1.00	ANE LANE
LT - L LR - L TR - L TJUSTR EASTBOL I STBOL	LEFT/TH LEFT/RI LEFT/TH MENT FA	GHT ONLY GHT ONLY ROUGH/RI CTORS GRADE (%) 0.00 0.00	NE LANE GHT LAN HEAVY V (%) 1.00 1.00	E H. ADJA Y/N N N	TR - R - ACENT PK (Nm 0 0	THROUGH/ EXCLUSIV G BUSES () (Nb) O	RIGHT L E RIGHT 	ANE LANE
LT - L LR - L ADJUSTN EASTBOL I STBOL I STBOL	LEFT/TH LEFT/RI LEFT/TH MENT FA JND JND JND JUND	GRADE	NE LANE GHT LAN HEAVY V (%) 1.00 1.00	E H. ADJA Y/N N N	TR - R - ACENT PK (Nm 0 0 0	THROUGH/ EXCLUSIV G BUSES (Nb) O O	FIGHT L E RIGHT PHF 1.00 1.00 1.00	ANE LANE
LA - L LR - L ADJUSTN EASTBOU I ISTBOU I ISTBOU SOUTHBO	LEFT/TH LEFT/RI LEFT/TH MENT FA JND JND JND JND JUND JUND	GRADE (%) 0.00 0.00 0.00 0.00 0.00	NE LANE GHT LAN HEAVY V (%) 1.00 1.00 1.00 1.00	IE YEH. ADJA Y/N N N N N	TR - R - ACENT PK (Nm 0 0 0 0 0 0	THROUGH/ EXCLUSIV G BUSES () (Nb) O O O O O O O	RIGHT L E RIGHT PHF 1.00 1.00 1.00 1.00	
LA - L LR - L ADJUSTH ADJUSTH STROL I STROL SOUTHEO SOUTHEO	LEFT/TH LEFT/RI LEFT/TH MENT FA MENT FA JND JND JND JUND JUND JUND	GRADE (%) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	NE LANE GHT LAN HEAVY V (%) 1.00 1.00 1.00 1.00 g maneu	EH. ADJA Y/N N N N N N	TR - R - ACENT PK (Nm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	THROUGH/ EXCLUSIV (Nb) (Nb) 0 0 0 0 0 0 0 0 0 0 0 0 0	RIGHT L E RIGHT PHF 1.00 1.00 1.00 1.00 f buses	ANE LANE
LI - L LR - L I R - L ADJUSTH COJUSTH EASTBOL I STBOL I STBOL SOUTHBO SOUTHBO	LEFT/TH LEFT/RI LEFT/TH MENT FA MENT FA JND JND JND JUND JUND JUND	ROUGH LA GHT ONLY ROUGH/RI ACTORS GRADE (%) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	NE LANE GHT LAN HEAVY V (%) 1.00 1.00 1.00 1.00 g maneu ING PED hour)	EH. ADJA Y/N N N N N N N N N N N N	TR - R - R - ACENT PK (Nm 	THROUGH/ EXCLUSIV G BUSES (Nb) O O O O O O O O O O O O O O O O O O O	RIGHT L E RIGHT 	ANE LANE stopping/h ARRIVAL TYF
LATEOL COJUSTI COJUSTI COJUSTI COJUSTI COJUSTI COUTHEC COUTHEC COUTHEC	LEFT/TH LEFT/RI LEFT/TH MENT FA JND JND JND JUND JUND JND	GRADE (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)	NE LANE GHT LAN HEAVY V (%) 1.00 1.00 1.00 1.00 g maneu ING PED hour)	IE IEH. ADJA Y/N N N N N N N N N N N N N N N N N N N	TR - R - R - ACENT PK (Nm 	THROUGH/ EXCLUSIV G BUSES (Nb) O O O O O O O O O O O O O O O O O O O	RIGHT L E RIGHT 	ANE LANE stopping/h ARRIVAL TYF
LA - L LR - L LR - L ADJUSTN CDJUSTN CDJUSTN CDJUSTNOL CSTBOL CSTBOL CSTBOL CSTBOL	LEFT/TH LEFT/RI LEFT/TH MENT FA MENT FA JND JND JUND JUND JUND JND JND JND JND	GRADE (%) GRADE (%) O.00 O.00 O.00 O.00 O.00 O.00 O.00 O.0	NE LANE GHT LAN HEAVY V (%) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0 0 0	IE 	TR - R - R - ACENT PK (Nm 0 0 0 0 0 0 0 0 0 0 0 0 0	THROUGH/ EXCLUSIV G BUSES () (Nb) O O O O O O O O O O O O O O O O O O O	RIGHT L E RIGHT 	ANE LANE / stopping/h ARRIVAL TYF

: GNAL SETTINGS -	OPERATIONAL ANALYSIS	ور المراجع	Page-3
, CTUATED	LOST TIME/PHASE = 3.0	CYCLE LENGTH	= 120.0
1 AST/WEST PHASING			
F ()STEOUND	HASE-1 PHASE-2 PHA	SE-3 PHASE-4	
I IFT THRU PIGHT	X X X		
I IDS WESTBOUND			
LIFT IRU RIGHT FIDS	X X		
NORTHBOUND RT SOUTHBOUND RT	e		
GREEN YELLOW + ALL RED	3.0 34.0 3.0 3.0	0.0 0.0 0.0 0.0	
NORTH/SOUTH PHASI	NG		
F NORTHBOUND LEFT IRU NIGHT PEDS	'HASE-1 PHASE-2 PHA X X X X	NSE-3 PHASE-4	
CUTHBOUND LEFT T'IRU I GHT FLDS	X X X		
I STROUND RT V_STROUND RT			
CTEEN > LLOW + ALL RED	74.0 0.0 3.0 0.0	0.0 0.0 0.0 0.0	
· .			

A77

.

50		E ADJU	ISTMENT	WORKS	HEET						P	age-4
		MVT. Vol.	PHF	ADJ. Vol.	LANE GRP.	LANE GRP. VOL.	NO. LN	LANE UTIL. FACT.	GROWTH FACT.	ADJ. GRP. VOL.	PROP LT	PROF RT
Еġ	LT TH RT	67 7 0	1.00 1.00 1.00	67 7 0	L LT	37 37	.1 1	1.000 1.000	1.000	37 37	1.00 0.81	0.00 0.00
U'B	LT TH RT	0 846 9	1.00 1.00 1.00	0 846 9	TR	855	2	1.050	1.000	898	0.00	0.01
hud	LT TH RT	1 1 1	1.00 1.00 1.00	1 1 1	*L TR	1 2	1 1	1.000 1.000	1.000	1 2	1.00	0.00 0.50
÷.2	LT TH RT	17 1 1836	1.00 1.00 1.00	19 1 1836	LTR R	938 918	1	1.000 1.000	1.000 1.000	938 918	0.01	0.98

* Denotes a Defacto Left Turn Lane Group

ડ.) ===		ION FL	OW A1		ENT WOR	RKSHEE"	r =======	r == 13 34 32 22 3		= 22 12 02 22 23 3	} = == == == == == ==	² age-5 =====
		IDEAL SAT. FLOW	NO. LNS	f W	f HV	f G	f P	f BB	f A	f • RT	f L.T	ADJ. SAT. Flow
Lď						· · · · · · · · · · · · ·		· · · ·	سم عد دي بلاد وله			was men erest field
	. L	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0,950	1891
	LT	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.961	1912
WΒ		· · · · ·							•			
	TR	2000	2	1.000	0.995	1.000	1,000	1.000	1.000	0.998	1.000	3974
NB										*		
	L	1800	1	1.000	0.995	1.000	1.000	1.000	1.000	1.000	0.054	97
	TR	2000	_1	1.000	0.995	1.000	1.000	1.000	1.000	0.925	1.000	1841
SB						•			· · ·			
	LTR	2000	1	1.000	0.995	1.000	1.000	1.000	1.000	0.853	1.000	1698
	R	2000	. 1	1.000	0.995	1.000	1.000	1.000	1.000	0.850	1.000	1692

C PACITY ANALYSIS WORKSHEET

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· · .	•	ADJ. FLOW RATE (v)	ADJ. SAT. FLOW RATE (s)	FLOW RATIO (v/s)	GREEN RATIO (g/C)	LANE GROUP CAPACITY (c)	v/c RATIO	
					ning and a constant same and the same same same and	, 7 , 7		
L L L		37 37	1891 1912	0.019 0.019	0.025 0.333	47 637	0.780 0.058	¥
шв					×	· ·		
TR	٠	898	3974	0.226	0.283	1126	0.797	¥
NB					,			
. L		1	97	0.010	0.617	60	0.017	
TR		2	1841	0.001	0.617	1135	0.002	
SB ·			-	· · ·	* *			
LTR		938	1698	0.552	0.617	1047 :	0.896	¥
R		918	1692	0.543	0.617	1043	0.880	

C cle Length, C = 120.0 sec. L st Time Per Cycle, L = 7.0 sec. X critical = 0.798

1 IVEL-OF-SERVICE WORKSHEET DELAY LANE DELAY LANE LANE DELAY LOS v/c g/C CYCLE d GROUP d PROG.GRP.GRP.BY BY RATIO RATIO LEN. 1 CAP. 2 FACT. DELAY LOS APP. APP. LЗ L 0.780 0.025 120.0 44.2 47 35.6 1.00 79.8 F LT 0.058 0.333 120.0 20.7 637 0.0 0.85 17.6 C L 48.6 E

WB TR 0.797 0.283 120.0 30.3 1126 2.9 0.85 28.2 D 28.2 D NB L 0.017 0.617 120.0 6.8 60 0.0 1.00 TR 0.002 0.617 120.0 6.7 1135 0.0 0.85 6.3 B 6.1 B 0.0 0.85 5.7 B SB LTR 0.896 0.617 120.0 15.0 1047 7.3 0.85 18.9 C 18.4 C R 0.880 0.617 120.0 14.7 1043 6.3 0.85 17.8 C

tersection Delay = 22.3 (sec/veh) Intersection LOS = C

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS										
LOCATIONI /	acking Lot "A	" Rd		NAM	F.	· .				
HOURLY VOLU	IMES			VOL	JMES IN PO	CPH				
	COLSE BO	(\mathcal{T}							
Major S	treet: <u>C7365 EP;</u>	<u> </u>	<u> </u>	[.] –			V 707	-		
Grade V_2 V_3 V_4				- 2 -	7 V ₂	Ţ, v, ſ	V	 		
Date of Counts: Time Period: Average Running	STOP YIELD		· .			. <i>1</i>				
PHF: <u>/0</u> _Gra	20	l	EXISTING	GEOME	STRICS					
VOLUME ADJ	STMENTS				· ·					
Movement No.		2		3	4	5	7	- 9		
Volume (vph) 7				0	520	707	. 0	21		
Vol. (pcph), see 7	Table 10-1									
STEP 1: RT from	STEP 1: RT from Minor Street									
Conflicting Flow	, V _c		x.	1/2	$v_{3} + V_{2} = -4$	2+_7=	= vph	(V _e)		
Critical Gap, T _c ,	and Potential Capac	zity, c _p		T _c =.	<u>6.0</u> sec (Ta	ble 10-2) c _{p9} =	= <u>/000</u> pcpt	n (Fig. 10-3)		
Actual Capacity,	C _m	·		C ₀₁₉ ==	Cp9 = 1000	pcph				
STEP 2: LT From	n Major Street	•	· · ·			€ V4				
Conflicting Flow	, V _c	•		V,+	$V_2 = \underline{O}$	+	$\frac{7}{2}$ vph (V _{c1})	· ·		
Critical Gap, T _c ,	and Potential Capac	⊐ity, c _p		T,=:	5.5 sec (Ta	ible 10-2) c _{p4} =	= <u>1000</u> pcpł	n (Fig. 10-3)		
Percent of cp Util	ized and Impedance	Factor (Fi	g. 10-5)	(v₄/c	_{P4}) × 100 = _	P_ =	0			
Actual Capacity,	C _m	-		C _{m4} ==	c _{p4} = <u>/000</u>	pcph				
STEP 3: LT From	n Minor Street					⊃v,				
Conflicting Flow	, V _e		1/2 V,+	-V ₂ +V ₅ +	-V,= <u>0</u> +	7 + 520	+ <u>707= 12</u>	34 vph (V,,)		
Critical Gap, T _c ,	and Potential Capac	zity, c _p	T, = Z.	<u> 5</u> sec (1	Table 10-2) c,	,= 105 pc	ph (Fig. 10-3)) .		
Actual Capacity,	C _m		c _{m7} = c _p	,×P4=	×	- PG	ph			
SHARED-LAN	E CAPACITY		· · ·			· .				
	SI	$I = \frac{1}{(v_{7}/v_{7})}$	$\frac{v_7 + v_9}{c_{m7}} + (v_9)$	if /c _{m9})	lane is share	d	1			
Movement No.	v(pcph)	c _m (p	cph)	C _{SH}	(pcph)	C _R		LOS		
7	D	105	5	• • •		104		D		
9	21	21 1000			· · · · · · · · · · · · · · · · · · ·	. 979		4		
4	520	100 D				480		A		

10-37

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	WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS										
LOCATION: F	PARYING OT	"A" P.P	` .		BVD	w					
HOURLY VOLU	UMES	<u>_</u>		VOL	UMES IN PO	Срн	· · · · · · · · · · · · · · · · · · ·	. `			
Maior	Strants (05 5 5 P	o (• :				
				-	<u></u>		<u>v, z_</u>	 -			
N=4 Grade	V,	4	V, V,	700	V		V	- .			
0%	_ v;		N=4	- `	V	7		-			
	DEC 100	v, v,									
Date of Counts:. Time Period:	<u>P.M.</u> -) stop } yield			515					
Average Runnin	g Speed: 40 N	-			• .	5	· · · ·				
	St	reet:									
PHF: <u>/,0</u> Gr	ade <u>0%4</u>	<u> `A''</u>	ed.		· ·			· ·			
VOLUME ADJ	USTMENTS				, 	T					
Movement No.	······································	2		3	4	5	7	9			
Volume (vph)		~ 7	100	7	19	S	5	515			
Vol. (pcph), see	Table 10-1										
STEP 1: RT from	n Minor Street					<u>،</u> ۷,					
Conflicting Flow	, V _c			1/2	/ ₃ + V ₂ =	4 + 700 -	= vph (V.,)			
Critical Gap, T _c	, and Potential Capa	city, c _p		. T _c = 1	<u>6.0</u> sec (Ta	ble 10-2) c _{p9} -	= Ale_poph	(Fig. 10-3)			
Actual Capacity,	, C _m		•	C ₃₀₉ ==	cp=410	pcph		•			
STEP 2: LT From	n Major Street	•••				€ V4 -					
Conflicting Flow	, V _c			V,+	v,=_7	+ 700 = 70	$\frac{7}{2}$ vph (V _{c4})				
Critical Gap, T.	, and Potential Capa	city, c,		T. =.	5.5 sec (Ta	ble 10-2) c _{p4} =	- <u>490 p</u> cph	(Fig. 10-3)			
Percent of c _p Util	lized and Impedance	e Factor (F	ig. 10-5)	(v₄/c	_{p4}) × 100 = _	P, =	79				
Actual Capacity,	C _m	- ·	·.	c _{m4} =	$c_{p4} = \underline{490}$	pcph					
STEP 3: LT From	n Minor Street				<u>. </u>	$\supset \mathbf{v}_{7}$		· · · ·			
Conflicting Flow	; V.		1/2 V,+	-V,+V,+	·V, = ⁷ +	700 + Z	+ 19 = 736	L vph (V.,)			
Critical Gap, T, ,	and Potential Capa	city, c _p	$T_c = \frac{7}{2}$	<u>5</u> sec (1	able 10-2) c_	, = <u>270</u> pct	oh (Fig. 10-3)	• • • • • •			
Actual Capacity,	C _m	• •	$c_{m7} = c_p$,×P4=	270 × .99	$= \frac{767}{267}$ pc	oh				
SHARED-LAN	ECAPACITY		· · · · · ·		- 		<u>-</u> <u>.</u> .				
	SI	H =	$v_7 + v_9$	if_)	ane is share	d	· ·				
Movement No	V(pcph)	(V ₇ /	$\frac{\nabla m^{7}}{2} + \frac{\nabla \phi}{2}$	/ ^C m9)	(pcph)			1.05			
7	5	27	0		VC-PH)	765		2			
9	515	49	0			-25		F			
4	19	- 41	0			371		B			



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(

WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATION: PA	REKING LOT "A" MES	RD	` <u>`</u>	NAME: VOLUMES IN PCPH					
Major S	treet: CR565 R	<u> </u>) N						
Grade V_2 V_3 V_4				689 7 -	V ₂ V ₃	Ţ, v, v, [V, <u>2</u> V, <u>14</u>	-	
Date of Counts: TAN `69 I <td< td=""><td></td><td></td><td></td><td></td></td<>									
PHF:_ <u>1.</u> @Gra	nde% L <u>o</u>	T "A" Rog	d			(.			
VOLUME ADJU	STMENTS			_	F	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	
Movement No.		2		3	4	5	7	9	
Volume (vph)		689		7	14	S	4	388	
Vol. (pcph), see I	able 10-1								
STEP 1: RT from	Minor Street			ļ	·	۷ م			
Conflicting Flow,	, V _c			1/2	$V_{3} + V_{2} = -$	7 + 689 =	= <u>696</u> vph	(V _ဇ)	
Critical Gap, T _c ,	and Potential Capa	ity, c _p		T _c =.	6.0 sec (Ta	able 10-2) c _p , =	= <u>410</u> pcpł	n (Fig. 10-3)	
Actual Capacity,	C _m			C m9 ==	$c_{p9} = .410$. pcph			
STEP 2: LT From	Major Street	•			i	€ V4		• 	
Conflicting Flow,	, V _c	,		V,+	$V_2 = \frac{7}{2}$	+ <u>689 = 6</u>	³ 6 vph (V _{c4})	1	
Critical Gap, T _c ,	and Potential Capa	ty, c _p		T _c =:	2.5 sec (Ta	able 10-2) c _{p4} =	= <u>490</u> pcpl	n (Fig. 10-3)	
Percent of cp Util	ized and Impedance	Factor (Fig. 1	0-5)	$(v_4/c_{p4}) \times 100 = \frac{3}{2} P_4 = \frac{.99}{.99}$					
Actual Capacity,	C _m	· · · ·		C _{m4} =	$c_{pi} = \frac{490}{100}$	pcph	· ·		
STEP 3: LT From	1 Minor Street					$\supset v_{2}$			
Conflicting Flow,	, V _c	1	∕2 V,+	+V ₂ +V ₅ +	+V, = <u>7</u> -	+689+2	+ <u>/4_</u> = 71	2_ vph (V _{c7})	
Critical Gap, T _c ,	and Potential Capa	=ity, c _p T	= 7.	<u>5 sec (</u> 1	Table 10-2) c	e, = <u></u> pc]	ph (Fig. 10-3)	
Actual Capacity,	C _m	, c,	,,=`C	$_7 \times P_4 =$	<u>360 × .9</u>	<u>9 =???</u> .pcj	ph		
SHARED-LANE CAPACITY									
	SI	$I = \frac{v_1}{(v_7/c_m)}$	+ v _g + (v _g	if /c _{m9})	lane is shan	ed	-		
Movement No.	v(pcph)	c _m (pcpł	ı)	C _{SH}	(pcph)	.C _R		LOS	
7	14	523				•263	(<u></u>	
9	388	410	•	ļ		22		E	
4	14	490				476		A State	

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS										
LOCATION	NO LOT "A"	TERNAT	1.15	NIAN	RV	Did		•		
HOURLY VOL	UMES		<u>///0</u>	VOL	UMES IN I	РСРН		· · · · · · · · · · · · · · · · · · ·		
Major	Shank PYA (MT "A"	LOSAS					· · ·	•		
					· .		V	<i>,</i>		
N = 4 Grade	<u>+</u> v,		V,	28	<u>5</u> V ₂		V	-		
2%	_ v,		N=4	-				-		
Date of Counts: Time Period:	Time Period: <u>A</u> <u>M</u> <u>J</u>					50	· ·	-		
Average Runnir	ng Speed: <u>40</u> N	=4				[[
		reet:	4		-			-		
PHr: <u>//</u> G	rade%			AL	TERNATO	s coan	6719165	•		
VOLUME ADJ	USTMENTS		<u> </u>							
Volume (umb)			<u> </u>	3		5	/	9		
volume (vpn)	·····	28	' <i>5</i>	0	0		5	0		
Vol. (pcph), see	Table 10-1				,					
STEP 1: RT from	STEP 1: RT from Minor Street									
Conflicting Flow	v, V _c			1/2	$V_{3} + V_{2} = -$	<u>v</u> + ²⁸⁵ =	- <u>285</u> vph ((V ₀)		
Critical Gap, T _c	, and Potential Capa	icity, c _p		$T_c = \frac{5.5}{2} \sec (\text{Table 10-2}) c_{p9} = \frac{810}{2} \text{ pcph (Fig. 10-3)}$						
Actual Capacity	, C _m	·		c _{m9} ==	cp9 = 810	_ pcph	<u></u>	4		
STEP 2: LT From	n Major Street					€ V.	· .			
Conflicting Flow	v, V _e			V3+	V ₂ =	+=	vph (V _{c4})			
Critical Gap, T _c	, and Potential Capa	city, c _p		T,=_	sec (T	able 10-2) c _{p4} =	• pcph	(Fig. 10-3)		
Percent of cp Uti	lized and Impedanc	e Factor (F	ig. 10-5)	(v ₄ /c	→) × 100 =	P ₄ =				
Actual Capacity	, c _m	· .		c _{m4} =	C _{p4} =	pcph		ж		
STEP 3: LT From	n Minor Street		`		·······	⊃v,				
Conflicting Flow	<i>ι</i> , V _c		1/2 V ₃ +	V ₂ +V,+	$V_4 = \frac{\mathcal{O}}{\mathcal{O}}$	+785+11 +	4 = 30	으_ vph (V_,)		
Critical Gap, T	, and Potential Capa	city, c _p	$T_c = \frac{7}{2}$	sec (T	able 10-2) c	= 575 pcp	h (Fig. 10-3)	· · · ·		
Actual Capacity,	с _т		$c_{m7} = c_p$	$_{7} \times P_{4} =$	×	рср	h			
SHARED-LAN	ECAPACITY	. • .	v ±			1. Th				
	SI	$f = \frac{1}{(v_7/c_7)}$	$(v_7 + v_9) = (v_{a_1}) + (v_{a_2})$	if li /c)	ane is shari	ed in the second s	n e ^t i			
Movement No.	v(pcph)	(p	cph)	Ссн (pcph)	C		LOS		
7	575	5		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		570		A		
9										
4	I									

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS											
LOCATION: F	PRG LOT A" A	ALTE PNAT	100	NAM		DW					
HOURLY VOL	UMES			VOLUMES IN PCPH							
Major	Street.	(\mathcal{A}_{N}								
			$\underline{\checkmark}$	-		V	1, 334				
N≈[_ Grade	⊥		′s— ′4—		$\frac{z}{v}$ V ₂		/ <u> </u>				
%	_ V,							-			
	Ma- 89	V, V,									
Time Period:	P.M		YIELD			578					
Average Runnin	ng Speed: N				•	6					
	St	reet			AL TER						
	ade%		<u>.</u>	L	ALICKA	ATG GE	ombtk	2105			
VOLUME ADJUSTMENTS											
Movement No.	<u></u>				4			y			
volume (vph)		12		0	0	335	578	6			
Vol. (pcph), see	Vol. (pcph), see Table 10-1										
STEP 1: RT from Minor Street V,											
Conflicting Flow	v, V _c			1/2 V	$v_3 + v_2 = \underline{c}$	3_+_12_=	12 vph	(V _{c9})			
Critical Gap, T _c	, and Potential Capa	city, c _p		$T_c = \frac{5.5}{2} \sec (\text{Table 10-2}) c_{p9} = \frac{1000}{2} \text{ pcph (Fig. 10-3)}$							
Actual Capacity	, c _m			C _{m9} ==	с _{р9} =	. pcph					
STEP 2: LT From	n Major Street	: ·				<u> </u>	-				
Conflicting Flow	<i>י,</i> V _c			v ,+⁺	V ₂ =	+ =	. vph (V _{ct})				
Critical Gap, T _c	, and Potential Capa	city, c _p		$T_c = .$	sec (Ta	able 10-2) c _{p4} = _	pcpl	h (Fig. 10-3)			
Percent of c _p Uti	lized and Impedance	e Factor (Fig	;. 10-5)	(v₄/c	,) × 100 =	P =	-				
Actual Capacity,	C _m			C _{m4} =	c _{p4} =	pcph	<u> </u>				
STEP 3: LT From	n Minor Street	·			· .	⊃v,					
Conflicting Flow	<i>r</i> , V _c		1/2 V3+	V2+V,+	$\mathbf{V}_{4} = \underline{\mathbf{O}}^{1} \mathbf{H}$	- 12 + 334 +	<u>ر</u> =	<u></u> vph (V _{.7})			
Critical Gap, T _c	, and Potential Capa	city, c _p	$T_c = \frac{7}{2}$	osec (T	able 10-2) c	r = 550 pcph	(Fig. 10-3)			
Actual Capacity,	C _m		$C_{m7} = C_{p2}$,×P4=	×	pcph					
SHARED-LANE CAPACITY											
	SI	$d = \frac{1}{(v_{-}/c)}$	$\frac{v_7 + v_9}{v_1 + (v_2)}$	$\frac{1}{(c_1)}$ if 1	ane is share	rd .					
Movement No.	Movement No. v(pcph) c _m (pcph)					с.		105			
7	578		• <u> </u>	- 211	<u> </u>	- 58		F			
9	ia	1000				994		4			
4 .	. /			1	· 1	, .					

WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS											
LOCATION Pk	a Lor A" ALTE	PNATE		NAM	E BVD	w/					
HOURLY VOLU	IMES			VOL	JMES IN PO	CPH					
	in a second state	6									
Major S	treet: (1365 / 207	A (*	N	V 285							
N=4]		V,								
Grade -	V				v	310	-				
<u> </u>	<u> </u>		<u>=</u> [4]	-		┤)			-		
	(
Date of Counts:_ Time Period	YIELD			574			44				
Average Running	s Speed: N :	-•	11000			2					
	Mi Str		· .		• •						
PHF: 1,0 Gra	de 2 % UN	2	A	LTERNA	15 GEO	2~	STR	ics			
VOLUME ADJU	STMENTS								-		
Movement No.		3	4	5		7	9				
Volume (vph)		10	5.	٥	0	285	5	24	5 ·		
Vol. (pcph), see 1	Table 10-1										
STEP 1: RT from Minor Street											
Conflicting Flow	, V,		· ·	1/2	/, + V, =	0+5=	5	_ vph (V_)		
Critical Gap, T.	and Potential Capac	tity, c.		T. = :	<u>5,5</u> _sec (Ta	ible 10-2) c =	= / 00	2 pcph	(Fig. 10-3)		
Actual Capacity,	۰ ۲			, , =	· c_₀ =	pcph		• •			
STEP 2: LT From	n Major Street	-				f V.			· · · · · · · · · · · · · · · · · · ·		
Conflicting Flow	v	· · · · ·	<u> </u>	v. +	V. = -	+ =	VD	–––– h (V .)	· .		
Critical Gap. T	and Potential Canad	tity. c		T =	sec (Ta	ble 10-2) c =	— · r	ncoh	(Fig. 10-3)		
Percent of c Litil	ized and Impedance	Fictor (Fi	a 10-5)	$r_c = sec (1able 10-2) c_{pt} = pcpii (rig. 10-(v_c) × 100 = P =$							
Actual Capacity		- Tactor (11	ig. 10-37		p4) ^ 100	/ 4					
STEP 2. IT E	Cm Minne Chront	·····	1	Cm4	Cp4		·				
51 Li 5. Li 1104		• • • • • • • • • • • • • • • • • • • •	<u> </u>	<u> </u>		, ب ر					
Conflicting Flow,	, V _c		1/2 V ₃ -	-V ₂ +V ₅ +	-V, = <u>-</u> +	10 +225	+	=	<u>vph (۷٫-)</u>		
Critical Gap, T _c ,	and Potential Capac	city, c _p	$\mathbf{T}_{i} = \underline{\mathcal{T}}_{i}$	<u></u> sec (1	able 10-2) c _,	$p_{r} = \frac{580}{280}$ pc	oh (Fig	z. 10-3)			
Actual Capacity,	Actual Capacity, c_m $c_{m7} = c_{p7} \times P_4 = ___ pcph$										
SHARED-LAN	SHARED-LANE CAPACITY										
,	Sł	$f = \frac{1}{(y_1 - y_2)}$	$v_7 + v_9$ $r) + (v_1)$	if	lane is share	d.					
Movement No	v(nomh)	(*7/*	<u>-m7/ ' (*</u> 9	/ ⁵ m97	(ncnh)	·			105		
7	5-24		<u>~μψ</u>	- <u>CSH</u>	(pepii)	C _K			<u> </u>		
9	5	280	/)	<u> </u>		<u> </u>			4		
4	2	,000		<u> </u>			÷		~		

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS									
LOCATION	sis en lun	117 7 RI		ME					
HOURLY VOLU	JMES			LUMES IN P	Срн	······································			
Major	Street (PSIS P)	ρ (1)) N	,					
			-	~~~~~		V, 293			
Grade N =		V		$\sim V_2$		V			
%	<u> </u>	N=			7, , , , , , , , , , , , , , , , , , ,		-		
Date of Counts:)P		11				
Time Period: A.	M. ERISTING -		LD		0 22				
Average Runnun	g Speed: 42 N	inor							
PHF: <u>/.0</u> Gr	ade%/	VIZ RO							
VOLUME ADJ	USTMENTS				· .				
Movement No.		2	3	4	5	7	9		
Volume (vph)		3	0	562	293	0	22		
Vol. (pcph), see	Table 10-1								
STEP 1: RT from	n Minor Street				<u>۷</u> ,				
Conflicting Flow	<i>v,</i> V _c	· .	1/:	$V_3 + V_2 = -$	0+2=	- <u>Z</u> vph	(V _{c9})		
Critical Gap, T _c	, and Potential Capa	city, c _p	T	$= \frac{6.0}{1} \sec(1)$	able 10-2) c _{p9} =	= <u>/000</u> pcph	n (Fig. 10-3)		
Actual Capacity,	с _т		. C _m 9	$= c_{p9} = 1000$	_ pcph	· ·			
STEP 2: LT From	n Major Street	· · ·			€ V.				
Conflicting Flow	, V _c		V.3	$+V_2 = \frac{O}{1}$	+ <u>3</u> =	$\frac{3}{2}$ vph (V _{c4})			
Critical Gap, T _c ,	, and Potential Capa	city, c _p	T	= <u>7.Ø</u> sec (T	able 10-2) c _{p4} =	= <u>850</u> pcpł	n (Fig. 10-3)		
Percent of c _p Uti	lized and Impedance	e Factor (Fig. 10	-5) (v ₄	$(c_{p4}) \times 100 =$	$.3 P_4 = /.$	0			
Actual Capacity,	C _m	·····	C _{m4}	$= c_{p4} = 850$. pcph	· · ·			
STEP 3: LT From	n Minor Street	<u> </u>			$\supset V_7$				
Conflicting Flow	, V _c	1/2	× V ₃ +V ₂ +V	$+V_4 = 0$	+ 3 + 293 +	562= 85	\mathcal{E} vph (V _{c7})		
Critical Gap, T _c ,	and Potential Capa	city, c _p T _c =	= <u>8.0</u> _sec	(Table 10-2) c	$r_{p,7} = 190 \text{ pcp}$	h (Fig. 10-3)			
Actual Capacity,	с _т	C _{m7}	$= c_{p7} \times P_4$	= <u>858 × [</u>	_= <u>858</u> pcp	h			
STAKED-LAN	SHARED-LANE CAPACITY $V_2 + V_2$ if lens is shown if								
	SI	$H = \frac{1}{(v_7/c_{m7})}$	- (v ₉ /c _{m9})	I IANE IS SNAF	ea				
Movement No.	v(pcph)	c _m (pcph)	c.	_H (pcph)	C _R		LOS		
7	0	858			858		A		
<u>y</u>	667	1000			978		A		
	100	070	<u> </u>		885		<u> </u>		

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WORKSHEET FOR ANALYSIS OF T-INTERSECTIONS										
	us po lun		<u>۵</u>		TC.	· · · · · · · · · · · · · · · · · · ·				
	MES		<u></u>		IMES IN P	Срн				
HOUKLI VOLU	MES	. (
Major St	reet: (VSBS E		N N	- 1						
N = []		V,	29	6 V2		$V_{4} \xrightarrow{\tau c}$	·		
Grade -	$V_1 = V_2$									
· · · ·]) \	√, v. [V, V,				
Date of Counts:_		ं। <u>लि</u>	STOP	Į						
Time Period:	CKISTAG -		YIELD			556				
Average Kunning	Speed:422 N					6				
		reet:	PD			•				
VOLUME ADIU	ISTMENTS	<u> </u>		L	<u></u> .	. <u></u>		· · · · · · · · · · · · · · · · · · ·		
Movement No.		2		3	4	5	7	9		
Volume (vph)	······································	29	0	3	22	12	6	556		
Vol. (pcph), see T	able 10-1									
STEP 1: RT from	STEP 1: RT from Minor Street ~ V,									
Conflicting Flow,	v.			1/2	/,+V,=	<u>2_+290</u> =	= <u>14.7</u> vph	(V _~)		
Critical Gap, T.,	and Potential Capac	city, c		T, =	<u>6.0</u> sec (Ta	able 10-2) c_= =	= <u>950</u> pcr	oh (Fig. 10-3)		
Actual Capacity,	- C _m	• •		c=	د ا	350 pcph				
STEP 2: LT From	Major Street					¢ v.	<u></u>			
Conflicting Flow,	V,	•		V ₃ +	$V_2 = 3$	+ 290 = 29	3_vph(V)		
Critical Gap, T, ,	and Potential Capac	city, c		T_=	- 70. sec (Ta	able 10-2) c, =	= <u>585 pcr</u>	oh (Fig. 10-3)		
Percent of c, Util	ized and Impedance	e Factor (Fi	g. 10-5)	(v,/c	,) × 100 = .	<u>50%</u> P. = -	58			
Actual Capacity,	C _m	• •		C4 ==	$c_{14} = 585$	pcph				
STEP 3: LT From	Minor Street					$\sum V_7$				
Conflicting Flow,	V,	·	1/2 V,+	-V,+V,+	-V, = <u>3</u> +	290+12	+22 = 3	$26 \text{ vph}(V_{-})$		
Critical Gap, T.,	and Potential Capac	city, c _n	T. = <u>8</u> .	<u>)</u> sec (1	[able 10-2) c	$= \frac{460}{100}$ pc	oh (Fig. 10-1	3)		
Actual Capacity,	۲ د		c_, = c_	,×P.=	460 × .50	8 = 267 pm	oh			
SHARED-LANE	CAPACITY		1P				<u> </u>	· · · · · · · · · · · · · · · · · · ·		
$SH = \frac{v_7 + v_9}{1 + v_9}$ if lane is shared										
		(v ₇ /0	$(v_{9}) + (v_{9})$	/c _{m9}) .		· .	<u> </u>			
Movement No.	v(pcph)	c_m (p	cph)	C _{SH}	(pcph)	C _R		LOS		
7	6	58	7	 		579		4		
4	4 7- 747					74		-		
	<u> </u>			1		673	<u> </u>			

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ENCLOSURE 9

J

ONCOR

TRANSMISSION ENGINEERING STANDARDS CONSTRUCTION

720-003 Construction Specification for Transmission Line Right-of-Way Clearing

INITIAL RELEASE DATE: March 30, 1992 LAST REVISION DATE: August 7, 2007

This standard has been reviewed and approved prior to the formation of Transmission Engineering Standards in 2006.

1.0 SCOPE

This specification covers the clearing of timber and brush from **Oncor Electric Delivery** Company transmission lines rights-of-way.

- 2.0 DEFINITIONS
 - 2.1 "COMPANY" shall mean Oncor Electric Delivery Company, its successors and/or assigns.
 - 2.2 "Work" shall mean all labor, materials, equipment, transportation, facilities or services necessary to perform the scope of work described in this Agreement.
 - 2.3 "Agreement" shall mean the form issued by the COMPANY for procurement of the Work. The Agreement includes all documents referenced therein made a part thereof.
 - 2.4 **"CONTRACTOR"** shall mean the party entering into this Agreement to perform the Work as defined herein, its successor and/or assigns.
 - 2.5 "COMPANY's Authorized Representative" shall mean the agent(s), representative(s), or appointee(s) who is authorized by the COMPANY to perform the functions provided for in this Agreement. The COMPANY may appoint at any time, at its sole discretion, more than one such agent, representative or appointee.

3.0 GENERAL

- 3.1 Right-Of-Way
 - 3.1.1 Transmission lines shall be constructed along the following types of right-of-way: 3.1.1.1 Along and within public streets or highways.
 - 3.1.1.2 Along easements or contract right-of-way obtained by the COMPANY defined either by specific widths or centerline.
 - 3.1.1.3 Along right-of-way of specific width owned in fee. 3.1.2 The Contractor shall be notified in writing by the COMPANY's Authorized Representative of land rights (i.e. stay-off list) that have not been secured by the COMPANY. Once these land rights have been secured, the CONTRACTOR shall be notified in writing by the COMPANY's Authorized Representative to perform the work required on these properties so as to avoid any unnecessary delays in the overall project.
 - 3.1.2 The CONTRACTOR shall not enter the lands or install gates and rebuild fences in either property line or cross fences on land not secured by the COMPANY.
 - 3.1.3 All rights-of-way necessary for construction of the transmission line shall be provided by the COMPANY with monumentations locating the centerline or the edge of the right-of-way or property line.

720-003 Page 1 of 9

TRANSMIS	SION I	ENGINEERING STANDARDS
720-003	Cons Clear	truction Specification for Transmission Line Right-of-Way
INITIAL RELEASE DATE: March 30, 1992 LAST REVISION DATE: August 7, 2007		
	3.1.4	The right-of-way provided by the COMPANY shall normally extend an equal distance on both sides of the transmission line centerline. Additional areas may be required at line angles and at deadends as indicated on alignment maps.
3.2	Danger	Trees (Outside of Right-of-Way)
	3.2.1	Any dead, unhealthy or leaning tree outside the right-of-way which would possibly fall into a conductor shall be removed.
	3.2.2	These trees shall be removed only after the COMPANY has properly marked them and after the COMPANY's Authorized Representative has secured landowner permission.
3.3	Gates	
	3.3.1	Gates shall be normally installed in all fences crossing the right-of-way on private property or where public access is available. Unless otherwise specified by the COMPANY's Authorized Representative, a gate shall be built in every fence that restricts the COMPANY from Ingress and egress along the right-of-way.
	3.3.2	The gates shall be installed near the centerline of the survey except when either a structure, irregular terrain or other obstruction located near a fence could necessitate that the gate be installed away from the centerline. In this instance, the COMPANY's Authorized Representative shall determine the proper location of the gate.
	3.3.3	All gates shall be installed according to the COMPANY's drawings and specifications unless otherwise specified. The COMPANY shall furnish the gate and H-braces.
	3.3.4	The CONTRACTOR shall install a chain and lock system provided by the COMPANY promptly after the gate installation is complete.
	3.3.5	Unless otherwise specified by the COMPANY Authorized Representative, all gates shall be left in place.
34	3.3.6	Any gate installation that does not comply with these standards shall be removed and rebuilt and/or relocated at no additional expense to the COMPANY.
0.4	2 4 4	
	3.4.1	No force shall be attend in any way without the consent of the COMPANY.
	3.4.2	No fence shall be cut or removed until approval of the COMPANY's Authorized Representative has been secured.
~	3.4.3	Prior approval of the COMPANY Authorized Representative shall be required for the construction of new or rebuilt fences.
	3.4.4	All fence material and gates shall be furnished by the COMPANY. The
	3.4.5	CONTRACTOR shall furnish construction material and installation. All rebuilt barbed wire fences shall have a minimum of four (4) wires with a maximum line post spacing of ten (10) feet and bracing as specified by the COMPANY's Authorized Representative.
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3.4.6 Any fence installation that does not comply with these standards shall be removed and rebuilt and/or relocated at no additional expense to the COMPANY.

3.5 Construction Access

- 3.5.1 The construction of access roads shall be minimized and shall require the approval of the COMPANY's Authorized Representative prior to beginning construction.
- 3.5.2 Construction roads are primarily for use of the CONTRACTOR(s) during line construction. The COMPANY shall bear no direct cost for the construction, improvement, repair or maintenance of the roads.
- 3.5.3 The CONTRACTOR shall construct necessary access' roads in a manner which prevents damage or erosion to the right-of-way and/or adjacent property.
- 3.5.4 When culverts are required, they shall be furnished by the COMPANY and installed by the CONTRACTOR.
- 3.5.5 The COMPANY's Authorized Representative shall have prior approval of location, quantity and size of culverts to be installed, normally including the following:
 - 3.5.5.1 Areas where normal water flow from creeks, small rivers or tributaries will be impeded along the right-of-way.
 - 3.5.5.2 Areas where excessive grading or cutting would be required to provide necessary access along the right-of-way.
- 3.5.6 Upon completion of the project, the COMPANY's Authorized Representative shall determine which culverts shall be removed by the CONTRACTOR.
- 3.5.7 If fill material is required, the CONTRACTOR shall furnish the material with approval of the COMPANY's Authorized Representative.

4.0 CLEARING

- 4.1 Clearing Requirements
 - 4.1.1 No grading, dumping of excess dirt, clearing or tree trimming shall be allowed unless permission has been obtained from the property owner(s) by the COMPANY and/or the CONTRACTOR.
 - 4.1.2 When lines are constructed along and within the right-of-way of streets or highways, trees shall be removed or trimmed to the extent necessary to clear structures and conductors for proper line operation. Specific clearing criteria shall be outlined in the construction drawings and specifications provided by the COMPANY Authorized Representative.

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	4.1.3	The CONTRACTOR shall be responsible for conforming to all city, county, or state laws regulating or pertaining to all phases of work on public streets.
4.2	Herbici	de Treatment of Stumps
	4.2.1	With prior approval of the COMPANY's Authorized Representative, all herbicides and Material Safety Data Sheets (MSDS) shall be furnished by CONTRACTOR.
	4.2.2	The CONTRACTOR shall assure strict compliance of all federal, state and local regulation for acquisition, handling and storing, application and disposition of the herbicide.
	4.2.3	The CONTRACTOR shall treat all stumps to prevent re-sprouting and regrowth with the herbicide.
4.3	Full Cu	t Clearing
	4.3.1	All trees, brush and undergrowth within the right-of-way shall be cut level with the ground. No stump exceeding two (2) inches above the ground shall remain.
	4.3.2	Any tree located in a fence line having a diameter greater than four (4) inches shall be cut even with top of fence.
	4.3.3	In the event stumps are located on hillsides or uneven ground, stumps shall be cut where a mowing machine can pass over the right-of-way without striking any stumps, roots or snags.
	4.3.4	Every tree which overhangs any part of the right-of-way shall be trimmed such that the right-of-way width on the alignment map is clear of all vegetation from the ground up.
	4.3.5	The method of measuring the total right-of-way unit of clearing is shown in Figure 4.3.5.1.
4.4	Selectiv	ve Cut Clearing
	4.4.1	Primary Cleared Area
		The CONTRACTOR shall clear all trees, brush or undergrowth within the primary cleared area which exceeds ten (10) feet in height. In addition, any vegetation which would conflict with construction or maintenance of the transmission line shall be removed. The width of the primary cleared area shall be as designated below:

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- **Disposal by Burning**
 - 5.1.1.1 Where timber and brush is to be disposed of by burning, CONTRACTOR shall assure strict compliance of all federal, state, and local regulations governing burning.
 - 5.1.1.2 The CONTRACTOR shall be liable for all damage by fire, as well as other property damages referred to herein.
 - 5.1.1.3 Timber and brush shall be piled along but not on the center line of the rightof-way and burned.
- 5.1.2 Disposal by Burying
 - 5.1.2.1 Unless specifically required by the COMPANY, burying of timber and brush is expressly forbidden.

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5.1.2.2 Whenever burying of timber and brush is required, it will be buried in accordance with instruction of the COMPANY and shall be specified by the COMPANY's Authorized Representative.

- 5.1.2.3 After the timber and brush are buried, the right-of-way shall be restored as nearly as possible to its condition prior to burying.
- 5.2 When specified by the COMPANY's Authorized Representative, trees, limbs and brush shall be left along the sides of the cleared strip or at specified locations. These items are to be placed in neat piles or wind-rows parallel to the right-of-way so as not to interfere with the ensuing construction work. These wind-rows shall be left within six (6) feet of the edge of the cleared area. There shall be a minimum of 30-foot wide break in these wind-rows at least every 200 feet to minimize the barrier effects of the wind-rows.
- 5.3 If the COMPANY enters into special agreements with property owners, the CONTRACTOR shall hand cut and trim trees into logs. The logs shall be placed along the side of the right-ofway.

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- TIMBER LINE SHALL BE REMOVED.
- 2.) PRIMARY CLEARED AREA SHALL VARY AND SHALL BE CLEARED IN ACCORDANCE WITH CONSTRUCTION SPECIFICATIONS FOR STRUCTURE TYPE.
- 3.) HEIGHTS SHOWN ARE BASED ON LEVEL GROUND FROM CENTERLINE OF THE TRANSMISSION LINE AND ARE ADDED TO THE ABSOLUTE ELEVATION OF THE CENTERLINE. ADJUSTMENT FOR ACTUAL TREE HEIGHT SHALL BE MADE IN THE FIELD BY THE COMPANY'S AUTHORIZED REPRESENTATIVE.
- 4.) ACCESS TO ANY DANGER TREES SHALL BE CLEARED TO FACILITATE REMOVAL OF THESE TREES.



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REVISION HISTORY (most recent listed first)

Revision Date	Revision Request Number	Changes Made by	Summary of Changes	Background/Historical	
8-7-07		Meg Mueller [•]	The section of the document from 4.4 on was missing from the converted file. Added remaining standard, including figures, back in to the document.		
4-24-07		Libby Smith	Template format changes		

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