TRAFFIC STUDY

KARL SOLOMON PROPERTY

AT

CENTRAL AND EDGEMOOR

MAY 17, 1982

PREPARED BY:

POE & ASSOCIATES OF KANSAS, INC.
CONSULTING ENGINEERS

INTRODUCTION

This report accesses the impact of traffic on Central and Edgemoor after the development of 33.5 acres located at the northeast corner of the intersection of these two streets. It is proposed to develop this area into a shopping center and an office park facility. A sketch of the proposed development is included in this report and is the basis for the location of traffic access points to Central and Edgemoor. The property immediately adjacent to this intersection is presently occupied by a service station and small shopping area. Present plans are to reserve this area for future development after the construction of commercial and office buildings on the remaining area.

LAND USE AND SITE GENERATED TRAFFIC

The number of trips to be generated by this development was computed from rates obtained from a report by the Institute of Transportation Engineers, entitled "TRIP GENERATION." This information is included in this report on the pages entitled "SUMMARY OF TRIP GENERATION RATES." The future development area has been excluded from the projected floor space and traffic volumes which are as follows:

25,000 SF Floor Space Commercial (future, not included).

200,000 SF Floor Space Commercial.

125,000 SF Floor Space Office.

General Office - 12.3 Trip Ends per 1000 SF of Floor Area.

125 x 12.3 = 1540 Trip Ends for Office Space.

Shopping Center - 49.9 Trip Ends per 1000 SF of Floor Area.

200 x 49.9 = 10,000 Trip Ends Commercial

10,000 + 1540 = 11,540 Total Trip Ends

The City of Wichita Traffic Engineering Department agreed with the use of 10% of the trips into and out of this area for peak hour volumes. The time for this peak was 4:45 to 5:45 as shown on the traffic volume summary which was completed May 5th.

TIME PERIOD	PERCENT	IN	PERCENT	OUT
4:45 to 5:45 P.M.	10	5770	10	5770
Design Day 11,540				

Peak Hour is 10% of 5770.

Use 600 Trips In - Peak Hour

Use 600 Trips Out - Peak Hour

5770
5770
11540

SUMMARY OF TRIP GENERATION RATES

Land Use/Building Type: Shopping Center ~~200,000 to 299,999 Gross Square Feet~~ — ITE Land Use Code: 823

Independent Variable—Trips per: 1,000 Gross Square Feet

			Average Trip Rate	Maximum Rate	Minimum Rate	Correlation Coefficient	Number of Studies	Average Size Independent Variable/Stud
Average Weekday Vehicle Trip Ends			49.9	92.0	18.0		29	236
Peak Hour of Adjacent Street Traffic	A.M. Between 7 and 9	Enter						
		Exit						
		Total						
	P.M. Between 4 and 6	Enter	2.1				3	234
		Exit	2.3				3	234
		Total	4.8				8	240
Peak Hour of Generator	A.M.	Enter	2.6				1	200
		Exit	2.5				1	200
		Total	4.1				9	230
	P.M.	Enter	2.7				4	240
		Exit	2.5				4	240
		Total	5.3				13	235
Saturday Vehicle Trip Ends			82.7				4	223
Peak Hour of Generator		Enter	4.3				2	206
		Exit	4.1				2	206
		Total	8.3				3	204
Sunday Vehicle Trip Ends			49.9				2	203
Peak Hour of Generator		Enter						
		Exit						
		Total						

Source Numbers 3, 13, 14, 19, 48, 49, 54, 59, 72, 76, 77, 78

ITE Technical Committee 6A-6—Trip Generation Rates

Date: 1975, Rev. 1979

SUMMARY OF TRIP GENERATION RATES

Land Use/Building Type General Office Building ITE Land Use Code 710

Independent Variable—Trips per 1,000 Gross Square Feet

			Average Trip Rate	Maximum Rate	Minimum Rate	Correlation Coefficient	Number of Studies	Average Size of Independent Variable/Study
Average Weekday Vehicle Trip Ends			12.30	43.5	3.6		35	233
Peak Hour of Adjacent Street Traffic	A.M. Between 7 and 9	Enter	1.86	3.3	1.3		8	210
		Exit	0.35	1.0	0.1		8	210
		Total	2.32	5.9	1.2		25	150
	P.M. Between 4 and 6	Enter	0.27	0.7	0.1		4	125
		Exit	1.36	2.6	0.7		4	125
		Total	2.20	6.4	0.8		24	122
Peak Hour of Generator	A.M.	Enter	1.86	3.3	1.3		8	210
		Exit	0.35	1.0	0.1		8	210
		Total	2.32	5.9	1.2		25	150
	P.M.	Enter	0.27	0.7	0.1		4	125
		Exit	1.36	2.6	0.7		4	125
		Total	2.20	6.4	0.8		24	122
Saturday Vehicle Trip Ends			3.34	8.9	1.0		13	81
Peak Hour of Generator		Enter	0.19	0.2	0.1		2	88
		Exit	0.16	0.2	0.1		2	88
		Total	0.50	2.2	0.2		13	81
Sunday Vehicle Trip Ends								
Peak Hour of Generator		Enter						
		Exit						
		Total						

Source Numbers 2, 5, 19, 20, 21, 51, 53, 54, 72, 88, 89, 92, 95, 97

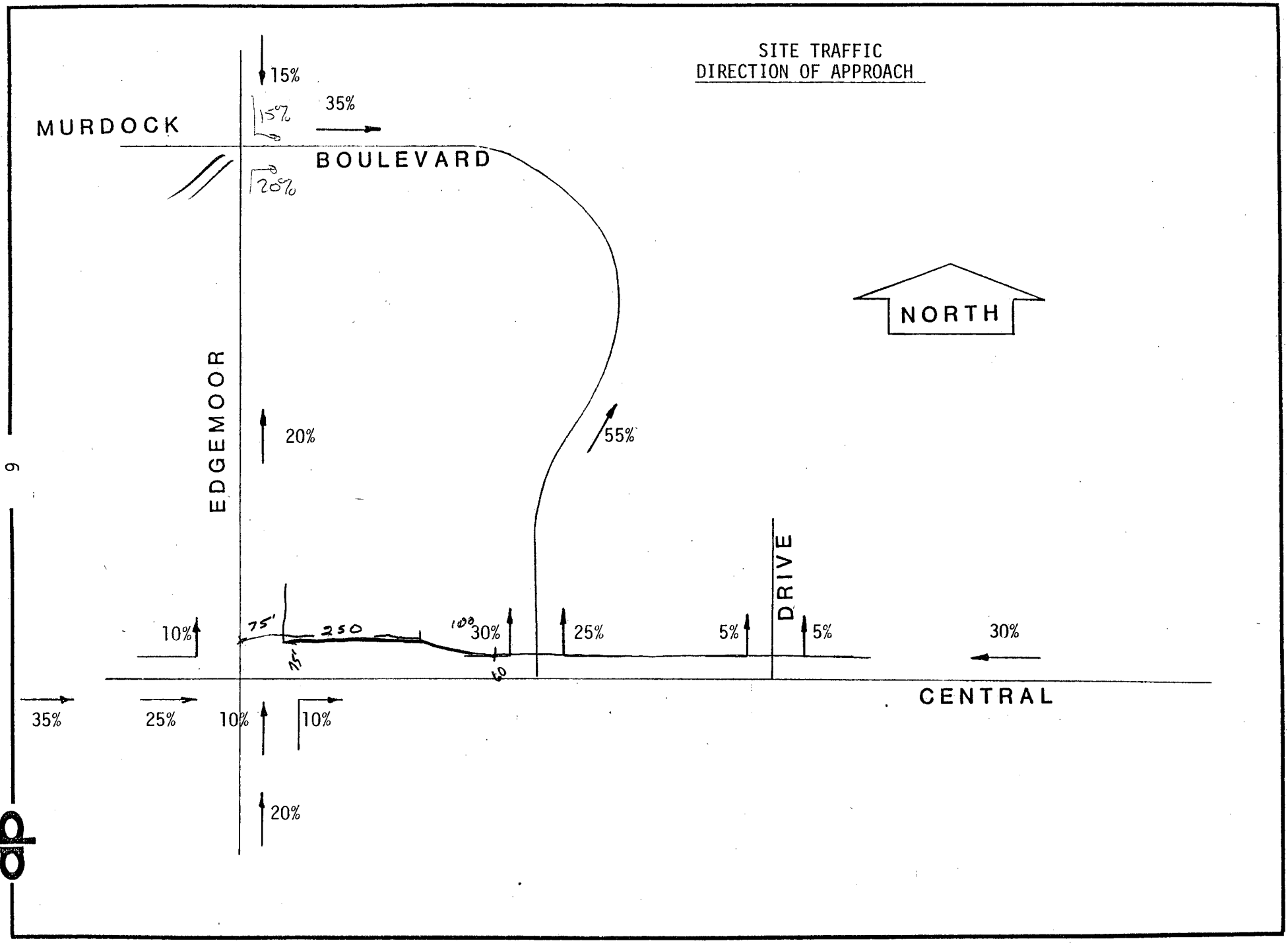
ITE Technical Committee 6A-6—Trip Generation Rates

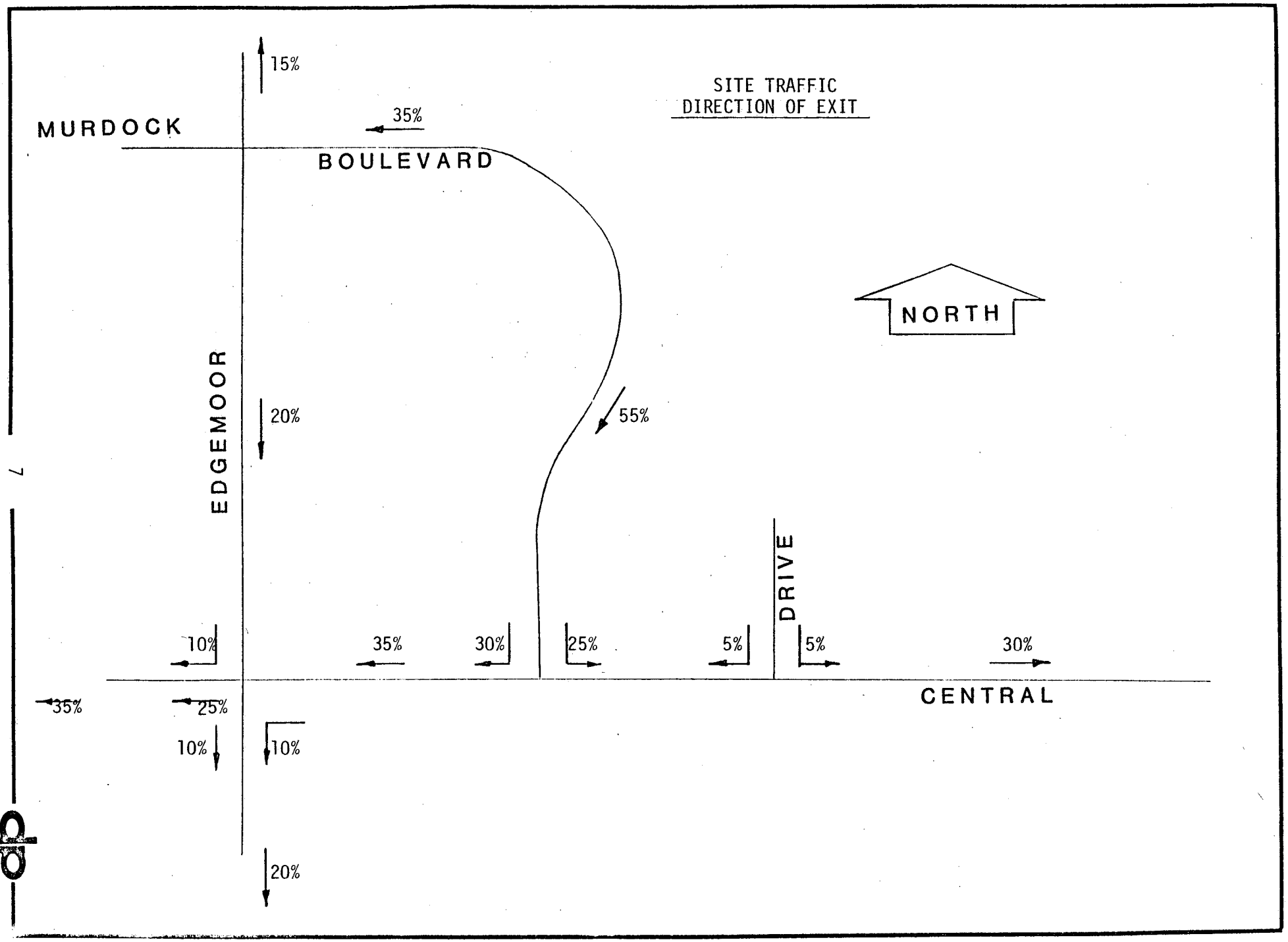
Date: 1975, Rev. 1979

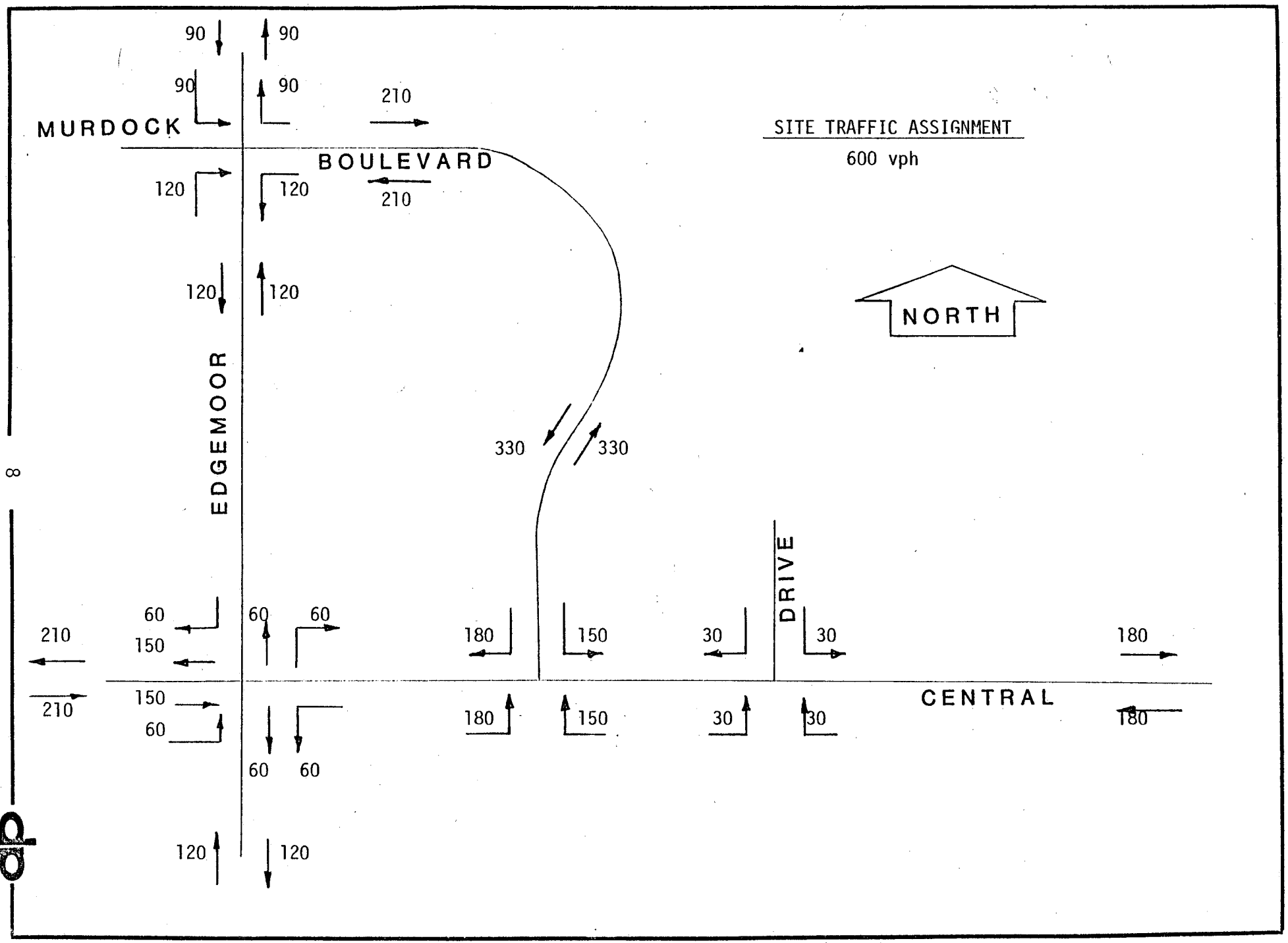
SITE TRAFFIC ASSIGNMENT

The percent of traffic approaching this area during peak traffic conditions was estimated and plotted on the map showing the direction of approach. A similar map was prepared for the direction of exit. The site traffic map was then prepared by combining both approaching and exit traffic. 600 peak hour traffic trips into and out of this area were then plotted on the traffic assignment map based on these estimated percentages.

These three maps are included on the following pages.


SITE TRAFFIC
DIRECTION OF APPROACH
MURDOCK
BOULEVARD
EDGEMOOR
DRIVE
CENTRAL
NORTH
15%
15%
35%
20%
20%
55%
10%
75'
250
100'
30%
25%
5%
5%
30%
75'
60
35%
25%
10%
10%
20%


SITE TRAFFIC
DIRECTION OF EXIT
MURDOCK
BOULEVARD
EDGEMOOR
DRIVE
CENTRAL
NORTH
15%
35%
20%
55%
10%
35%
30%
25%
5%
5%
30%
35%
25%
10%
10%
20%


SITE TRAFFIC ASSIGNMENT
600 vph
NORTH
MURDOCK
BOULEVARD
EDGEMOOR
DRIVE
CENTRAL
90
90
90
90
210
120
120
210
120
120
330
330
60
60
60
210
150
180
150
30
30
180
210
150
60
180
150
30
30
180
60
60
120
120

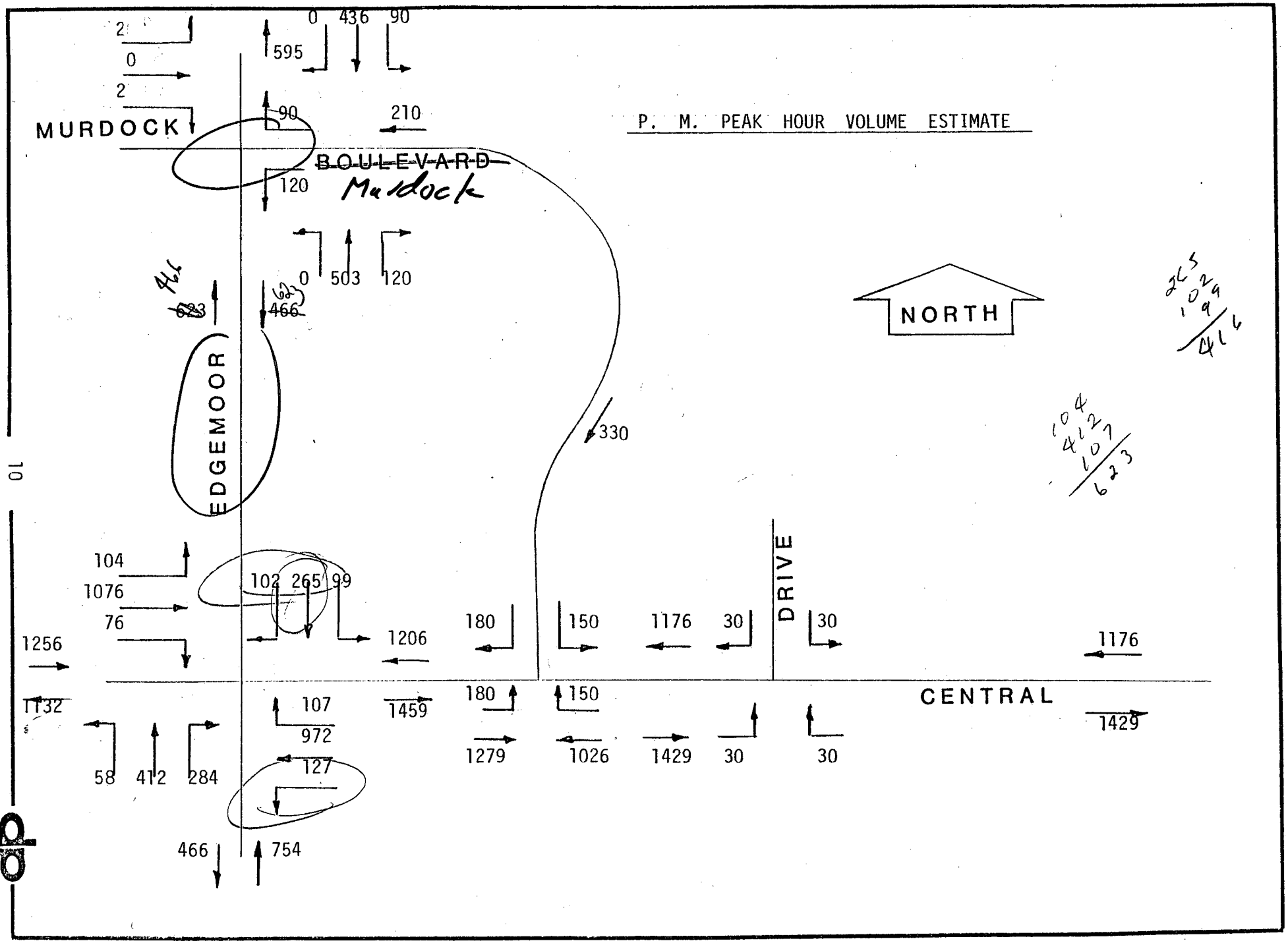
P.M. PEAK HOUR VOLUME ESTIMATES

A map of the peak hour traffic was prepared by first plotting the current traffic count with the additional estimated site traffic for the intersection of Central and Edgemoor. These counts were then extended to include the total study area by adding the traffic shown on the site traffic assignment map. P.M. peak hour volume estimates and the current traffic count are shown on the following pages.

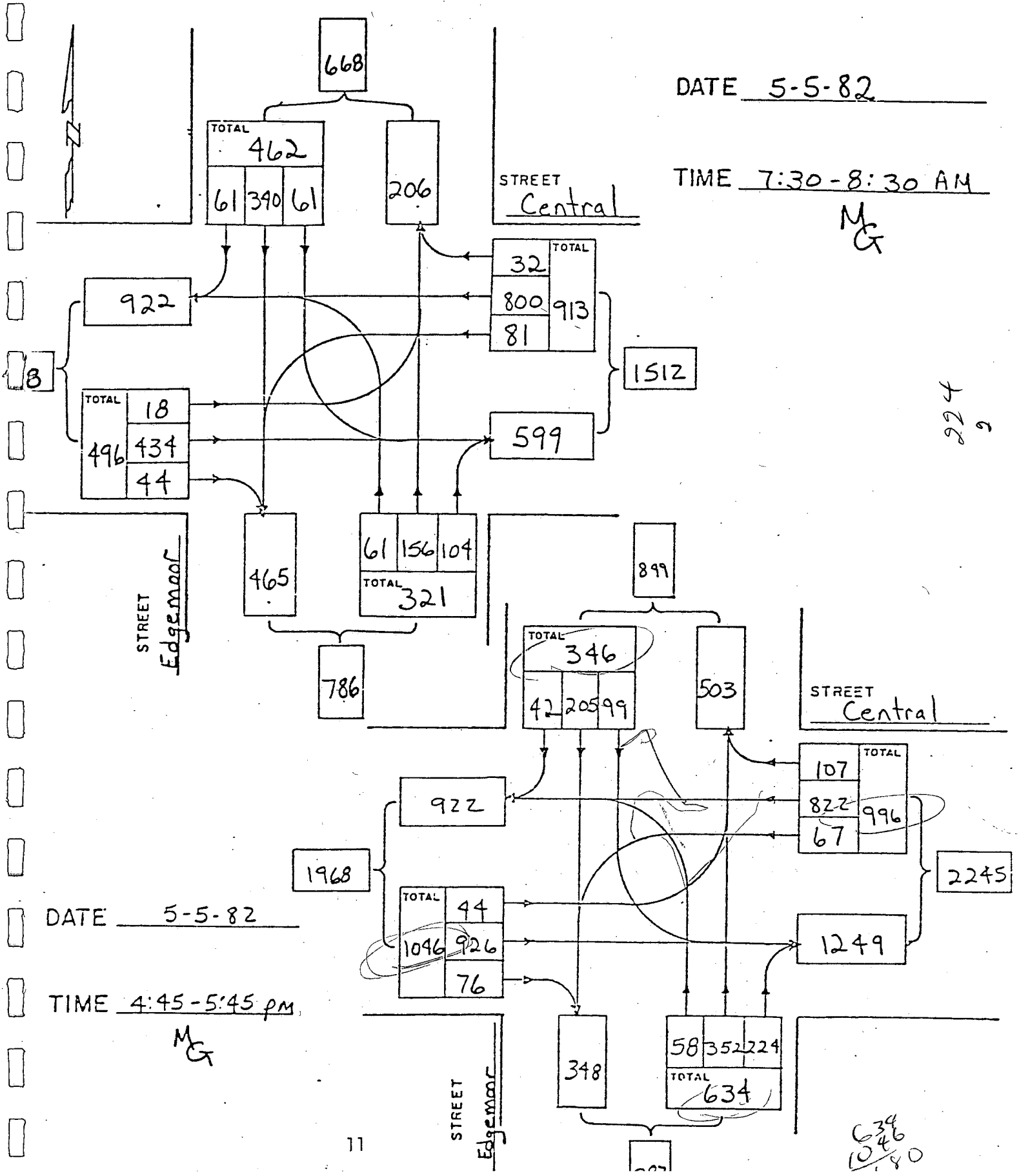
Alt. #1

Alt. #2

Alt. #3


P. M. PEAK HOUR VOLUME ESTIMATE
MURDOCK
BOULEVARD
Murdock
EDGEMOOR
DRIVE
CENTRAL
NORTH
2
0
2
595
0
436
90
90
210
120
0
503
120
623
466
330
104
1076
76
102
265
99
1206
180
150
1176
30
30
1176
1256
1132
107
972
127
1459
180
150
1279
1026
1429
30
30
1429
58
412
284
466
754

CITY OF WICHITA
TRAFFIC ENGINEERING DIVISION
K-024
TRAFFIC VOLUME SUMMARY



CITY OF WICHITA

TRAFFIC ENGINEERING DIVISION

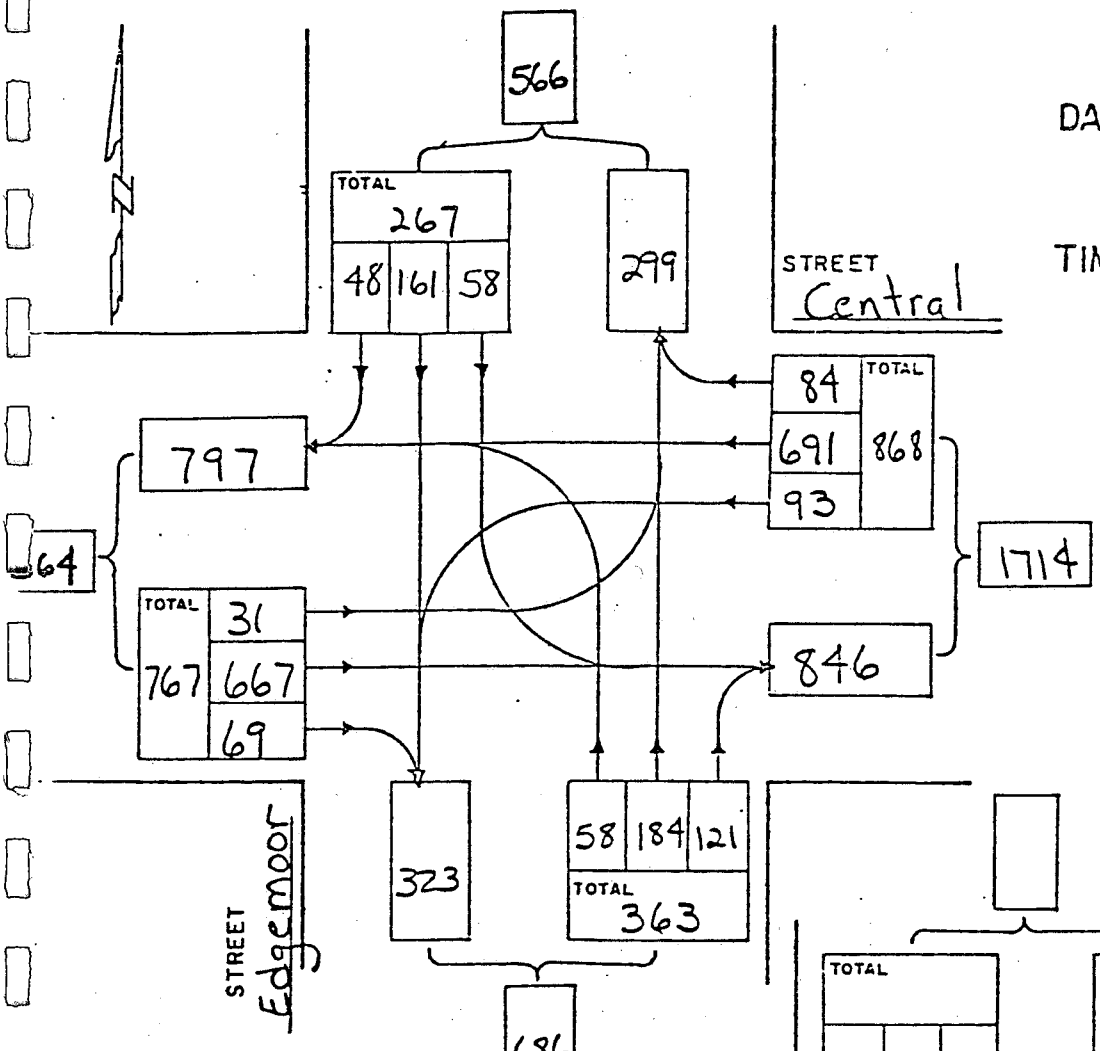
TRAFFIC VOLUME SUMMARY

K-024

DATE 5-5-82

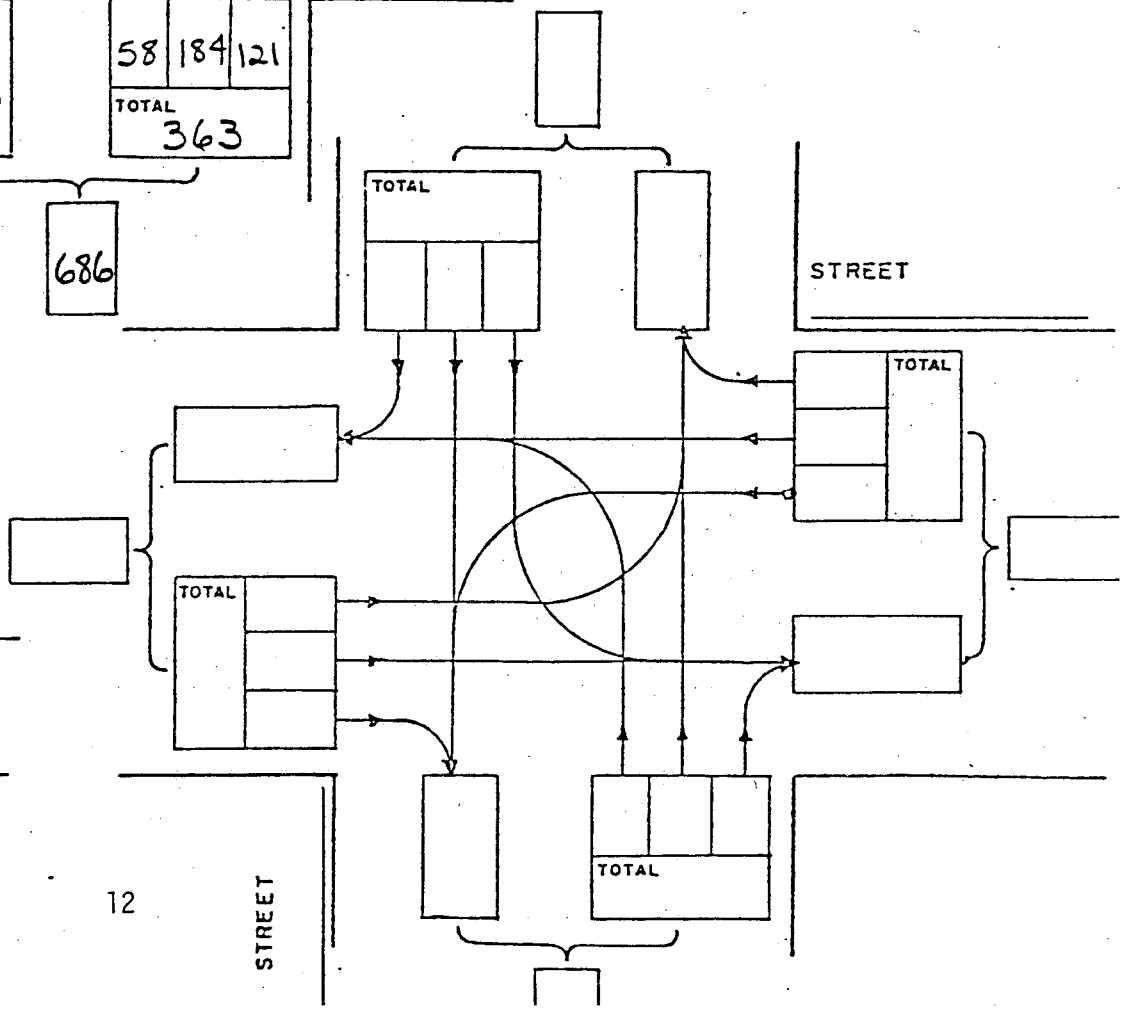
TIME 12:00-1:00 P.M.

MG



DATE _____

TIME _____



City of Wichita

TURNING MOVEMENT COUNT TABULATION

Traffic Engineering Divisi

LOCATION Central & Edgemoor DATE 5-5-82 DAY Wednesday

WEATHER Cool, Partly Cloudy, Light Rain OBSERVER M.L. German

TIME (15-minute interval)	FROM THE NORTH				FROM THE SOUTH				FROM THE EAST				FROM THE WEST				TOTAL ALL DIRECTIONS
	lt	st	rt	Total (l+s+r)	lt	st	rt	Total (l+s+r)	lt	st	rt	Total (l+s+r)	lt	st	rt	Total (l+s+r)	
7:15	2	35	3	40	3	14	4	21	8	65	4	77	2	30	5	37	175
7:30	10	46	7	63	13	28	11	52	12	146	5	163	2	52	13	67	345
7:45	19	114	17	150	11	37	26	74	24	210	7	241	6	111	14	131	596
8:00	18	119	12	149	13	50	44	107	31	249	10	290	4	129	17	150	696
One Hour Totals	49	314	39	402	40	129	85	254	75	670	26	771	14	322	49	385	1812
8:15	14	58	17	89	25	43	13	81	17	197	5	219	5	101	7	113	502
8:30	10	49	15	74	12	26	21	59	9	144	10	163	3	93	6	102	398
8:45	10	38	10	58	21	39	14	74	11	193	13	217	10	132	19	161	510
9:00	16	52	9	77	16	32	22	70	22	133	9	164	9	108	9	126	437
One Hour Totals	50	197	51	298	74	140	70	284	59	667	37	763	27	434	41	502	1847
4:15	15	35	7	57	20	44	29	93	10	175	16	201	4	180	19	203	554
4:30	18	46	11	75	19	82	32	133	13	167	20	200	10	198	18	226	634
4:45	19	60	11	90	18	83	40	141	24	223	18	265	12	182	19	213	709
5:00	25	39	8	72	19	78	48	145	14	193	20	227	7	191	21	219	663
One Hour Totals	77	180	37	294	76	287	199	512	61	758	74	893	33	751	77	861	2560
5:15	30	74	17	121	17	91	59	167	20	296	25	341	13	290	24	327	956
5:30	20	46	5	71	11	82	54	147	16	146	25	187	10	192	12	214	619
5:45	24	46	12	82	11	101	63	175	17	187	37	241	14	253	19	286	784
6:00	22	32	7	61	6	73	41	120	15	160	22	197	15	201	16	232	610
One Hour Totals	96	198	41	335	45	347	217	609	68	789	109	966	52	936	71	1059	2969

Remarks: Evening traffic entering Elm st. - From the South - 22
From the East - 21

City of Wichita

Traffic Engineering Division

TURNING MOVEMENT COUNT TABULATION

LOCATION Central & Edgemoor DATE 5-5-82 DAY Wednesday

WEATHER Mostly Cloudy, Cool, Light Rain OBSERVER M.L. German

TIME (15-minute interval)	FROM THE NORTH				FROM THE SOUTH				FROM THE EAST				FROM THE WEST				TOTAL ALL DIRECTIONS
	lt	st	rt	Total (l+s+r)	lt	st	rt	Total (l+s+r)	lt	st	rt.	Total (l+s+r)	lt	st	rt	Total (l+s+r)	
12:15	10	39	11	60	14	53	42	109	15	144	15	174	6	134	15	155	498
12:30	11	44	17	72	14	40	32	86	17	197	21	235	15	216	21	252	645
12:45	23	29	6	58	17	45	20	82	32	175	21	228	6	187	23	216	584
1:00	14	49	14	77	13	46	27	86	29	175	27	231	4	130	10	144	538
One Hour Totals	58	161	48	267	58	184	121	363	93	691	84	868	31	667	69	767	2265
One Hour Totals																	
One Hour Totals																	
One Hour Totals																	

2265

14

Remarks: Vehicles Turning on to Elm st. = From the East - 6, From the West - 1, From the South - 7

Vehicles Leaving Elm st = 13

192-218 (APR. 82)

SIGNALIZED INTERSECTION CAPACITY ANALYSIS

These intersections were analyzed by the critical movement summation method, which was obtained from the Transportation Research Circular No. 212. From studies of other intersections where heavy vehicular travel has been encountered, it has been determined that under the critical movement summation analysis, a level of service based on intersection total volumes is as follows:

Table 6. Level of Service Ranges

PLANNING Applications (in vph)

(deleted)

OPERATIONS AND DESIGN Applications (in pch)

Level of Service	Maximum Sum of Critical Volumes		
	Two Phase	Three Phase	Four or more Phases
A	1000	950	900
B	1200	1140	1080
C	1400	1340	1270
D	1600	1530	1460
(E)	1800	1720	1650
F	---------not applicable---------		

The City of Wichita attempts to provide a level of service C which will allow waiting vehicles to clear the intersection on one signal change. Obtaining this range of service after complete development of the area is what is proposed.

CENTRAL AND EDGEMOOR

	N	S	E	W
1. Approach Volume	342 466	634 754	996 1206	1046 1256
2. Volume per Lane	171 233	317 377	498 603	523 628
3. Opposing Left Turns	58 58	99 99	44 104	67 127
4. Factored Left Turns	58	158 198	416	496
5. Total [2 + 4]	229 291	415 475	1019	1124

Critical Movements 475 1124

Intersection Total 1599

Comments:
These calculations are for the existing intersection without any improvements.
This level of service is not acceptable.

CENTRAL AND EDGEMOOR

	N	S	E	W
1. Approach Volume	466	754	1079	1152
2. Volume per Lane	233	377	540	576
3. Opposing Left Turns	58	99	104	127
4. Factored Left Turns	58	198	109	133
5. Total [2 + 4]	291	575	649	709

Critical Movements 575 709

Intersection Total 1284

Comments:
Improvements are construction of left turn bays on each side of Central .
Level of service is slightly over C with these improvements.

CENTRAL AND EDGEMOOR

	N	S	E	W
1. Approach Volume	367	696	1079	1152
2. Volume per Lane	184	348	540	576
3. Opposing Left Turns	58	99	104	127
4. Factored Left Turns	61	104	109	133
5. Total [2 + 4]	245	452	649	709

Critical Movements 452 709

Intersection Total 1161

Comments:
Improvements are construction of left turn bays at all four corners. Level of service C is obtained by these improvements.

CENTRAL AND EDGEMOOR

INCLUDES FUTURE DEVELOPMENT

	N	S	E	W
1. Approach Volume	367	741	1169	1152
2. Volume per Lane	184	371	585	576
3. Opposing Left Turns	58	99	149	127
4. Factored Left Turns	61	104	156	133
5. Total [2 + 4]	245	475	741	709

Critical Movements 475 741

Intersection Total 1216

Comments:
Improvements are construction of left turn bays at all four corners. Level of service C is obtained by these improvements.

CENTRAL AND EDGEMOOR

5 YEAR TRAFFIC PROJECTION AFTER TOTAL DEVELOPMENT

(ASSUME 1% PER YEAR INCREASE)

	N	S	E	W
1. Approach Volume	385	778	1227	1210
2. Volume per Lane	192	389	614	605
3. Opposing Left Turns	61	104	156	133
4. Factored Left Turns	64	109	164	140
5. Total [2 + 4]	256	498	778	745

Critical Movements 498 778

Intersection Total 1276

Comments:

Improvements are construction of four left turn bays. Level of service C is 1270.

SUMMARY OF CENTRAL AND EDGEMOOR ANALYSIS

With the addition of 4 left turn bays this intersection will operate at service level C during peak hour volume estimates after adding the traffic from this total development. The reconstruction of this intersection is in the Wichita Capitol Improvement Program and is scheduled for improvement in 1983-84.

UNSIGNALIZED INTERSECTION ANALYSIS

This method of analysis was also obtained from the Transportation Research Circular No. 212. Table 3 taken from this circular indicates the level of service.

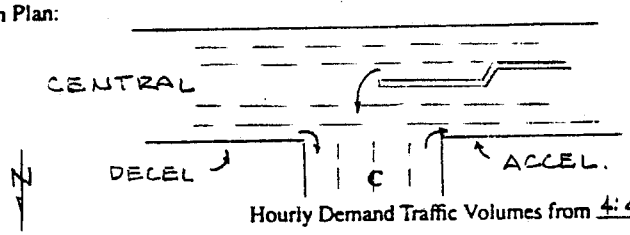
Table 3. Level of Service and Expected Delay for Reserve Capacity Ranges

Reserve Capacity	Level of Service	Expected Traffic Delay
400 or more	A	Little or no delay
300 to 399	B	Short traffic delays
200 to 299	C	Average traffic delays
100 to 199	D	Long traffic delays
0 to 99	E	Very Long traffic delays
Less than 0	E	Failure - extreme congestion
(Any value)	F	Intersection blocked by external causes

Unsignalized "T" Intersection Capacity Calculation Form

Intersection CENTRAL AND BOULEVARD

Location Plan:



Counts:
Date
Day
Time
Control STOP
Prevailing Speed 30 MPH

Hourly Demand Traffic Volumes from 4:45 to 5:45 P. m

PEAK P.M. HOURLY VOLUME ESTIMATES

Approach	A		B		C	
Movement	A_T	A_R	B_L	B_T	C_L	C_R
Volume	1026	150	180	1279	0	330
pch (see Table 1)					180	180

1.14

Step 1 — Right Turn from C (C_R)

Conflicting Flows = M_H = (from Fig. 1): $\frac{1}{2}A_R + A_T = \frac{0}{2} + \frac{1026}{2} = 513$ pch

Critical Gap from Table 2 T_g = 6.0 sec

Capacity from Fig. 2 = $M_{No} = M_1 = 530$ pch

____ Shared Lane – See Step 3

C No Shared Lane Demand = 330 (150) pch

Available Reserve = $M_1 - C_R = 530 - 330 = 200$ pch

Delay & Level of Service (Table 3): Short Traffic Delays AVERAGE DELAY [B]

No Shared Lane

Step 2 — Left Turn from B (B_L)

Conflicting Flows = M_H = (from Fig. 1): $A_R + A_T = \frac{0}{2} + \frac{1026}{2} = 513$ pch

Critical Gap from Table 2 T_g = 5.5 sec

Capacity from Fig. 2 = $M_{No} = M_2 = 600$ pch

Demand = $B_L = 180$ pch

Capacity Used = $100\,(B_L/M_2) = 30\%$

Impedance Factor from Fig. 3 = $P_2 = .77$

Available Reserve = $M_2 - B_L = 420$ pch

Delay & Level of Service (Table 3): NO DELAY [A]

Step 3 — Left Turn from C (C_L)

~~NO LEFT TURN FROM BOULEVARD~~

Conflicting Flows = M_H = (from Fig. 1): $\frac{1}{2}A_R + A_T + B_L + B_T = 0 + 513 + 180 + 640 = 1333$ pch

Critical Gap from Table 2 T_g = 8.0 sec

Capacity from Fig. 2 = $M_{No} = 33$ pch

Adjust for Impedance: $M_{No} \times P_2 = M_3 = 25$ pch

____ No Shared Lane Demand = $C_L = 180$ pch

Available Reserve = $M_3 - C_L = -147$ pch

Delay & Level of Service (Table 3): Failure [F]

Intersection would fail with left turns from Boulevard needing signalization PM peak during

Shared Lane Demand = $C_R + C_L = C_{RL} =$ ____ pch

____ Shared Lane with Right Turn

Capacity of Shared Lane = $M_{13} = \frac{(C_R + C_L)}{(C_R/M_1) + (C_L/M_3)}$

$M_{13} =$ ____ pch

Available Reserve = $M_{13} - C_{RL} =$ ____ pch

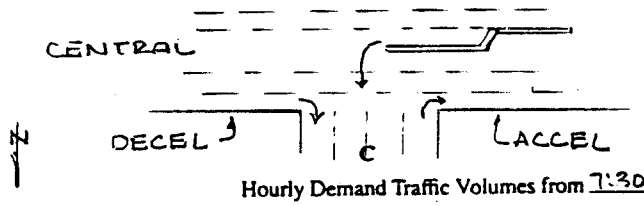
Delay & Level of Service (Table 3): ____ [ ]

Overall Evaluation IMPROVEMENTS INCLUDE ACCEL-DECEL LANE AND LEFT TURN BAY. AVERAGE DELAYS CAN BE EXPECTED TURNING RIGHT FROM THE BOULEVARD.

Unsignalized "T" Intersection Capacity Calculation Form

Intersection CENTRAL AND BOULEVARD

Location Plan:



Counts:
Date
Day
Time
Control STOP
Prevailing Speed 30 MPH

Hourly Demand Traffic Volumes from 7:30 to 8:30 P. m

Approach	A		B		C	
Movement	A_T	A_R	B_L	B_T	C_L	C_R
Volume	750	110	130	935	0	240
pch (see Table 1)						

73% PEAK P.M. HOURLY VOLUME ESTIMATES

Step 1	**Right Turn from C**	C_R
	Conflicting Flows = M_H = (from Fig. 1)	½ A_R + A_T = 0 + 750/2 = 375 pch
	Critical Gap from Table 2 T_g =	6.0 sec
	Capacity from Fig. 2 =	$M_{No} = M_1$ = 630 pch
	Shared Lane – See Step 3	
C	No Shared Lane Demand =	C_R = 240 pch
	Available Reserve =	$M_1 - C_R$ = 390 pch
	Delay & Level of Service (Table 3)	NO DELAY A
Step 2	**Left Turn from B**	B_L
	Conflicting Flows = M_H = (from Fig. 1)	A_R + A_T = 0 + 750/2 = 375 pch
	Critical Gap from Table 2 T_g =	5.5 sec
	Capacity from Fig. 2 =	$M_{No} = M_2$ = 720 pch
	Demand =	B_L = 130 pch
	Capacity Used =	100 (B_L/M_2) = 18 %
	Impedance Factor from Fig. 3 =	P_2 = 0.87
	Available Reserve =	$M_2 - B_L$ = 590 pch
	Delay & Level of Service (Table 3)	NO DELAY A
Step 3	**Left Turn from C**	C_L
	Conflicting Flows = M_H = (from Fig. 1)	½A_R + A_T + B_L + B_T = ___ + ___ + ___ + ___ = ___ pch
	Critical Gap from Table 2 T_g =	___ sec
	Capacity from Fig. 2 =	M_{No} = ___ pch
	Adjust for Impedance	$M_{No} \times P_2 = M_3$ = ___ pch
	No Shared Lane Demand =	C_L = ___ pch
	Available Reserve =	$M_3 - C_L$ = ___ pch
	Delay & Level of Service (Table 3)	___
	Shared Lane Demand =	$C_R + C_L = C_{RL}$ = ___ pch
	Shared Lane with Right Turn Capacity of Shared Lane =	$M_{13} = \frac{(C_R + C_L)}{(C_R/M_1) + (C_L/M_3)}$
		M_{13} = ___ pch
	Available Reserve =	$M_{13} - C_{RL}$ = ___ pch
	Delay & Level of Service (Table 3)	___

NO LEFT TURN FROM BOULEVARD

Overall Evaluation THIS INTERSECTION WILL FUNCTION AT A LEVEL OF SERVICE A EXCEPT DURING PEAK P.M. VOLUMES WHERE RIGHT TURNS FROM THE BOULEVARD WILL HAVE AVERAGE DELAYS.

CENTRAL AND EDGEMOOR

	N	S	E	W
1. Approach Volume	367	741	1319	1152
2. Volume per Lane	184	371	660	576
3. Opposing Left Turns	58	99	149	127
4. Factored Left Turns	61	104	156	133
5. Total [2 + 4]	245	475	816	709

Critical Movements 475 816

Intersection Total 1291

Comments:
After adding traffic created by no left turn at the Boulevard, this intersection will operate at level C. If a right turn lane was added to the east leg of Central the intersection total is reduced to 1237.

CENTRAL AND BOULEVARD

(WITH TRAFFIC SIGNAL, LEFT TURN BAY AND ACCEL-DECEL LANES)

	N	S	E	W
1. Approach Volume	530		1026	1279
2. Volume per Lane	165		513	640
3. Opposing Left Turns	0		180	0
4. Factored Left Turns			360	
5. Total [2 + 4]	165		873	640

Critical Movements 165 873

Intersection Total 1038

Comments:

With the above noted improvements this intersection will operate at level of service B.

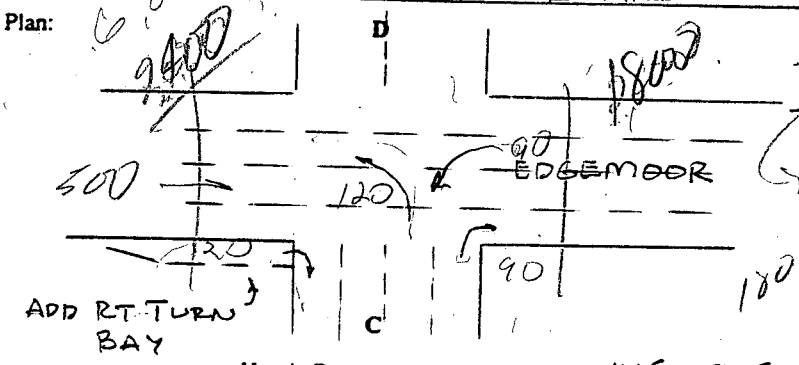
SUMMARY OF CENTRAL AND BOULEVARD ANALYSIS

Severe problems with left turn traffic onto Central without a signalized intersection were indicated. We, therefore, eliminated left turns for our analysis of this intersection without signalization. These calculations indicated that the right turn traffic from the Boulevard during peak traffic volumes will experience average delays. The traffic count for Central and Edgemoor indicates a 27% reduction in volumes from 7:30 to 8:30. By reducing the traffic volume through this intersection we found that it will operate at level A. Additional traffic was directed through Central and Edgemoor when the left turns from the Boulevard were turned to the right. New calculations for this condition indicated that this intersection will still operate at level C. If a traffic signal, left turn bays and accel-decel lanes are added at the Boulevard the resulting level of service is B.

Unsignalized Intersection Capacity Calculation Form

Intersection 6 EDGEMOOR AND BOULEVARD

Location Plan:



Counts:
Date
Day
Time
Control
Prevailing Speed 30 MPH

210
210
420

Hourly Demand Traffic Volumes from 4:45 to 5:45 P m

Approach	A			B			C			D		
Movement	A_L	A_T	A_R	B_L	B_T	B_R	C_L	C_T	C_R	D_L	D_T	D_R
Volume	20	503	120	90	436	20	120	28	90	20	28	2
pch (see Table 1)												

11%

Step 1 — Right Turn from C/D

	C_R	D_R
Conflicting Flows = M_H = (from Fig. 1)	½ A_R + A_T = 0 + 503/2 = 252 vph	½ B_R + B_T = 0 + 436/2 = 218 vph
Critical Gap from Table 2 T_g =	6.0 sec	6.0 sec
Capacity from Fig. 2 =	$M_{No} = M_1$ = 750 pch	$M'_{No} = M'_1$ = 780 pch
Demand =	C_R = 90 pch	D_R = 2 pch
Capacity Used =	100 (C_R/M_1) = 12 %	100 (D_R/M'_1) = 0.3 %
Impedance Factor from Fig. 3 =	P_1 = 0.92	P'_1 = 1.0
____ Shared Lane — See Step 3		
____ No Shared Lane — Available Reserve	$M_1 - C_R$ = 660 pch	$M'_1 - D_R$ = 778 pch
Delay & Level of Service (Table 3)	NO DELAY A	NO DELAY A

Step 2 — Left Turn from B/A

	B_L	A_L 20 NONE
Conflicting Flows = M_H = (from Fig. 1)	A_R + A_T = 0 + 503/2 = 252 vph	B_R + B_T = 20 + 436/2 = 238 vph
Critical Gap from Table 2 T_g =	5.5 sec	5.5 sec
Capacity from Fig. 2 =	$M_{No} = M_2$ = 830 pch	$M'_{No} = M'_2$ = 830 pch
Demand =	B_L = 90 pch	A_L = 20 pch
Capacity Used =	100 (B_L/M_2) = 10.8 %	100 (A_L/M'_2) = 2 %
Impedance Factor from Fig. 3 =	P_2 = 0.92	P'_2 = .98
Available Reserve =	$M_2 - B_L$ = 740 pch	$M'_2 - A_L$ = 810 pch
Delay & Level of Service (Table 3)	NO DELAY A	No Delay A

Step 3 — Thru Movement from C/D

	C_T 20 NONE	D_T 20 NONE
Conflicting Flows = M_H = (from Fig. 1) (M_T & M'_T are used in Step 4)	½A_R + A_T + A_L + B_L + ½B_T + B_R = 0 + 503/2 + 20 + 90 + 436/2 + 20 = 600 vph	½B_R + B_T + B_L + A_L + ½A_T + A_R = 10 + 436/2 + 90 + 20 + 503/2 + 0 = 510 vph
Critical Gap from Table 2 T_g =	7.5 sec	7.5 sec
Capacity from Fig. 2 =	M_{No} = 320 pch	M'_{No} = 325 pch
Adjust for Impedance	$M_{No} \times P_2 \times P'_2 = M_3$ = 288 pch	$M'_{No} \times P'_2 \times P_2 = M'_3$ = 293 pch
Demand =	C_T = 20 pch	D_T = 20 pch
Capacity Used =	100 (C_T/M_3) = 7 %	100 (D_T/M'_3) = 7 %
Impedance Factor from Fig. 3	P_3 = .95	P'_3 = .95

Unsignalized Intersection Capacity Calculation Form (continued)

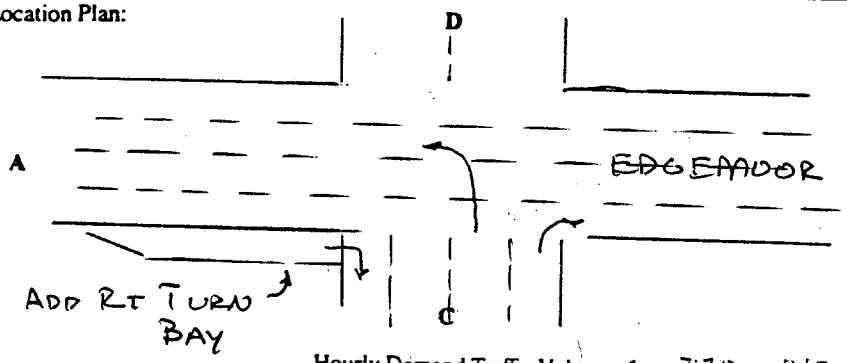
Step 3 (Continued)	C_T ↑ NONE	D_T ↑ NONE
____ No Shared Lane Available Reserve = Delay & Level of Service (Table 3)	$M_3 - C_T =$ ____ pch ____ ☐	$M'_3 - D_T =$ ____ pch ____ ☐
D Shared Lane with Left Turn See Step 4		
C Shared Lane Demand = Shared Lane with Right Turn Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_R + C_T = C_{RT} =$ 110 pch $M_{13} = \frac{(C_R + C_T)}{(C_R/M_1) + (C_T/M_3)}$ 110 / .12 + .07 $M_{13} =$ 579 pch $M_{13} - C_{RT} =$ 469 pch Little or No Delay ☐ A	$D_R + D_T = D_{RT} =$ 40 pch $M'_{13} = \frac{(D_R + D_T)}{(D_R/M'_1) + (D_T/M'_3)}$ 40 / .01 + .07 $M'_{13} =$ 500 pch $M'_{13} - D_{RT} =$ 460 pch Little or No Delay ☐ A
Step 4 **Left Turn from C/D**	C_L ↘	D_L ↘
Conflicting Flows = M_H = (M_T & M'_T were calculated in Step 3) Critical Gap from Table 2 T_g = Capacity from Fig. 2 = Adjust for Impedance	$M_3 + D_3 + 2D_R =$ 640 560 + 0 + 2 = 562 cph 3.0 sec $M_{No} =$ 275 / 310 pch $M_{No} \times P_2 \times P'_2 \times P'_1 \times P'_3 = M_4$ 235 $M_4=$ 285 pch	$M'_T + C_T + C_R =$ 700 560 + 28 + 20 = 650 cph 8.0 sec $M'_{No} =$ 250 / 270 pch $M'_{No} \times P'_2 \times P_2 \times P_1 \times P_3 = M'_4$ 197 $M'_4 =$ 248 pch
C No Shared Lane Demand = Available Reserve = Delay & Level of Service (Table 3)	$C_L =$ 120 pch $M_4 - C_L =$ 115 / 165 pch LONG DELAY ☐ D	$D_L =$ 70 pch $M'_4 - D_L =$ 177 / 248 pch Long AVERAGE DELAY ☐ D
____ Shared Lane Demand = Shared Lane with Thru Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_T + C_L = C_{TL} =$ ____ pch $M_{34} = \frac{(C_T + C_L)}{(C_T/M_3) + (C_L/M_4)}$ $M_{34} =$ ____ pch $M_{34} - C_{TL} =$ ____ pch ____ ☐	$D_T + D_L = D_{TL} =$ ____ pch $M'_{34} = \frac{D_T + D_L}{(D_T/M'_3) + (D_L/M'_4)}$ $M'_{34} =$ ____ pch $M'_{34} - D_{TL} =$ ____ pch ____ ☐
D Shared Lane Demand = Shared Lane with Thru & Right Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_R + C_T + C_L = C_{RTL} =$ ____ pch $M_{134} = \frac{C_R + C_T + C_L}{(C_R/M_1) + (C_T/M_3) + (C_L/M_4)}$ $M_{134} =$ ____ pch $M_{134} - C_{RTL} =$ ____ pch ____ ☐	$D_R + D_T + D_L = D_{RTL} =$ 60 pch $M'_{134} = \frac{D_R + D_T + D_L}{(D_R/M'_1) + (D_T/M'_3) + (D_L/M'_4)}$ 60 / .01 + .07 + .07 $M'_{134} =$ 215 / 315 pch $M'_{134} - D_{RTL} =$ ____ pch Short Traffic Delay ☐ B

Overall Evaluation LEFT TURNS ONTO EDGEMOOR WILL CAUSE PROBLEMS DURING PEAK HOUR VOLUMES.

Unsignalized Intersection Capacity Calculation Form

Intersection EDGEMOOR AND BOULEVARD

Location Plan:



Counts:
Date
Day
Time
Control
Prevailing Speed 30 MPH

73% OF PEAK HOUR VOLUMES

Hourly Demand Traffic Volumes from 7:30 to 8:30. a m

Approach	A ←			B →			C ↓			D ↑		
Movement	A_L ↙	A_T →	A_R ↗	B_L ↖	B_T ←	B_R ↙	C_L ↗	C_T ↑	C_R ↖	D_L ↘	D_T ↑	D_R ↙
Volume	0	367	88	66	318	0	88	0	66	2	0	2
pch (see Table 1)												

Step 1 — Right Turn from C/D

	C_R ↖	D_R ↙
Conflicting Flows = M_H = (from Fig. 1)	½ A_R + A_T = 0 + 367/2 = 184 vph	½ B_R + B_T = 0 + 318/2 = 159 vph
Critical Gap from Table 2 T_g =	6.0 sec	6.0 sec
Capacity from Fig. 2 =	$M_{No} = M_1$ = 800 pch	$M'_{No} = M'_1$ = 850 pch
Demand =	C_R = 66 pch	D_R = 2 pch
Capacity Used =	100 (C_R/M_1) = 8.3 %	100 (D_R/M'_1) = 0.2 %
Impedance Factor from Fig. 3 =	P_1 = 0.95	P'_1 = 1.0
____ Shared Lane – See Step 3		
C No Shared Lane – Available Reserve	$M_1 - C_R$ = 734 pch	$M'_1 - D_R$ = 848 pch
Delay & Level of Service (Table 3)	NO DELAY [A]	NO DELAY [A]

Step 2 — Left Turn from B/A

	B_L ↖	A_L ↙ NONE
Conflicting Flows = M_H = (from Fig. 1)	A_R + A_T = 0 + 367/2 = 184 vph	B_R + B_T = ____ + ____ = ____ vph
Critical Gap from Table 2 T_g =	5.5 sec	____ sec
Capacity from Fig. 2 =	$M_{No} = M_2$ = 900 pch	$M'_{No} = M'_2$ = ____ pch
Demand =	B_L = 66 pch	A_L = ____ pch
Capacity Used =	100 (B_L/M_2) = 7.3 %	100 (A_L/M'_2) = ____ %
Impedance Factor from Fig. 3 =	P_2 = 0.97	P'_2 = ____
Available Reserve =	$M_2 - B_L$ = 834 pch	$M'_2 - A_L$ = ____ pch
Delay & Level of Service (Table 3)	NO DELAY [A]	[ ]

Step 3 — Thru Movement from C/D

	C_T ↑ NONE	D_T ↑ NONE
Conflicting Flows = M_H = (from Fig. 1) (M_T & M'_T are used in Step 4)	½A_R + A_T + A_L + B_L + B_T + B_R = 0 + 367/2 + 0 + 66 + 318/2 + 0	½B_R + B_T + B_L + A_L + A_T + A_R = 0 + 318/2 + 66 + 0 + 367/2 + 0
	$M_H = M_T$ = 409 vph	$M_H = M'_T$ = 409 vph
Critical Gap from Table 2 T_g =	____ sec	____ sec
Capacity from Fig. 2 =	M_{No} = ____ pch	M'_{No} = ____ pch
Adjust for Impedance	$M_{No} \times P_2 \times P'_2 = M_3$ = ____ pch	$M'_{No} \times P'_2 \times P_2 = M'_3$ = ____ pch
Demand =	C_T = ____ pch	D_T = ____ pch
Capacity Used =	100 (C_T/M_3) = ____ %	100 (D_T/M'_3) = ____ %
Impedance Factor from Fig. 3	P_3 = ____	P'_3 = ____

Unsignalized Intersection Capacity Calculation Form (continued)

Step 3 (Continued)	C_T ↑ NONE	D_T ↑ NONE
____ No Shared Lane Available Reserve = Delay & Level of Service (Table 3)	$M_3 - C_T =$ ____ pch ____ ☐	$M'_3 - D_T =$ ____ pch ____ ☐
____ Shared Lane with Left Turn See Step 4		
Shared Lane Demand = ____ Shared Lane with Right Turn Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_R + C_T = C_{RT} =$ ____ pch $M_{13} = \frac{(C_R + C_T)}{(C_R/M_1) + (C_T/M_3)}$ $M_{13} =$ ____ pch $M_{13} - C_{RT} =$ ____ pch ____ ☐	$D_R + D_T = D_{RT} =$ ____ pch $M'_{13} = \frac{(D_R + D_T)}{(D_R/M'_1) + (D_T/M'_3)}$ $M'_{13} =$ ____ pch $M'_{13} - D_{RT} =$ ____ pch ____ ☐
Step 4 **Left Turn from C/D**	C_L ↰	D_L ↳
Conflicting Flows = M_H = (M_T & M'_T were calculated in Step 3) Critical Gap from Table 2 T_g = Capacity from Fig. 2 = Adjust for Impedance	$M_T + D_T + D_R =$ 409 + 0 + 2 = 411 vph 8 sec $M_{No} =$ 400 pch $M_{No} \times P_2 \times P'_2 \times P'_1 \times P'_3 = M_4$ $M_4 =$ 388 pch	$M'_T + C_T + C_R =$ 409 + 0 + 66 = 475 vph 8 sec $M'_{No} =$ 350 pch $M'_{No} \times P'_2 \times P_2 \times P_1 \times P_3 = M'_4$ $M'_4 =$ 333 pch
____ No Shared Lane Demand = Available Reserve = Delay & Level of Service (Table 3)	$C_L =$ 88 pch $M_4 - C_L =$ 300 pch SHORT DELAY ☐ B	$D_L =$ 2 pch $M'_4 - D_L =$ 331 pch SHORT DELAY ☐ B
Shared Lane Demand = ____ Shared Lane with Thru Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_T + C_L = C_{TL} =$ ____ pch $M_{34} = \frac{(C_T + C_L)}{(C_T/M_3) + (C_L/M_4)}$ $M_{34} =$ ____ pch $M_{34} - C_{TL} =$ ____ pch ____ ☐	$D_T + D_L = D_{TL} =$ ____ pch $M'_{34} = \frac{D_T + D_L}{(D_T/M'_3) + (D_L/M'_4)}$ $M'_{34} =$ ____ pch $M'_{34} - D_{TL} =$ ____ pch ____ ☐
Shared Lane Demand = ____ Shared Lane with Thru & Right Capacity of Shared Lane = Available Reserve = Delay & Level of Service (Table 3)	$C_R + C_T + C_L = C_{RTL} =$ ____ pch $M_{134} = \frac{C_R + C_T + C_L}{(C_R/M_1) + (C_T/M_3) + (C_L/M_4)}$ $M_{134} =$ ____ pch $M_{134} - C_{RTL} =$ ____ pch ____ ☐	$D_R + D_T + D_L = D_{RTL} =$ ____ pch $M'_{134} = \frac{D_R + D_T + D_L}{(D_R/M'_1) + (D_T/M'_3) + (D_L/M'_4)}$ $M'_{134} =$ ____ pch $M'_{134} - D_{RTL} =$ ____ pch ____ ☐

Overall Evaluation THIS INTERSECTION UNSIGNALIZED WILL OPERATE ABOVE LEVEL C EXCEPT AT PEAK HOUR VOLUMES

EDGEMOOR AND BOULEVARD

	N	S	E	W
1. Approach Volume	526	623	210	50
2. Volume per Lane	263	312	105	25
3. Opposing Left Turns	0	90	25	120
4. Factored Left Turns	0	180	25	120
5. Total [2 + 4]	263	492	130	145

Critical Movements 492 145

Intersection Total 637

Comments:
Improvements will require installation of a traffic signal. Level of service A is obtained at this intersection.

SUMMARY OF EDGEMOOR AND BOULEVARD ANALYSIS

The addition of a right turn bay on Edgemoor is indicated for this intersection to operate without a signal. During peak hour traffic volumes, the unsignalized intersection will have delays of traffic turning left onto Edgemoor. At all other times the level of service will be above the average. With the addition of a traffic signal, Edgemoor and Boulevard traffic will not experience any delays.

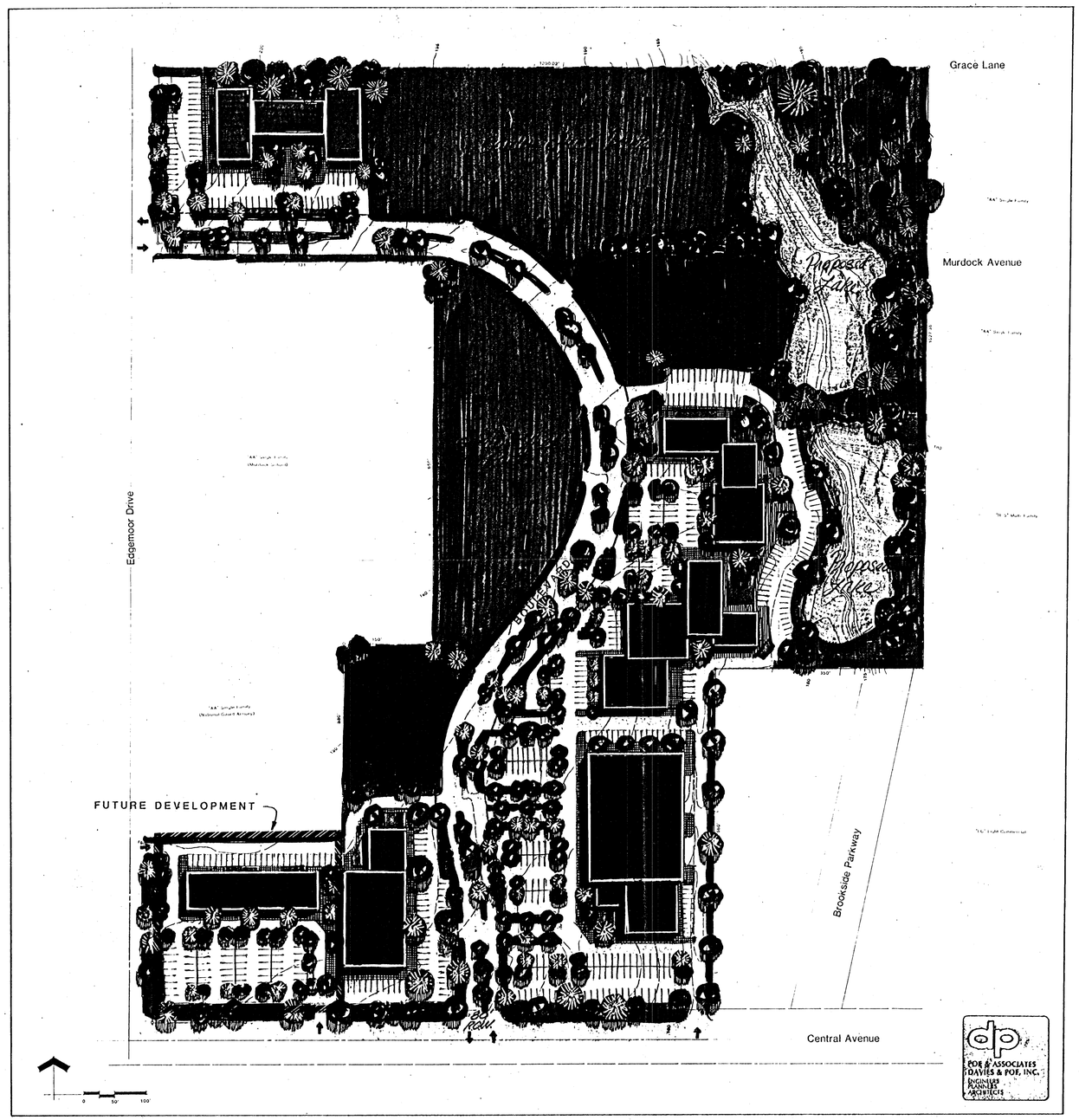
ok

CONCLUSIONS

Additional traffic generated by the construction of the proposed shopping center and office park can be provided for with the construction of the following improvements. Left turn bays at all four corners of Central and Edgemoor, a left turn bay and accel-decel lanes at Central and the Boulevard, and a right turn bay at Edgemoor and the Boulevard. Traffic signals will not be required at any of the access points to Central and Edgemoor from the proposed shopping center.

Maybe at Central & The Boulevard

This report is a traffic planning study and is intended to show the maximum probable improvements that will be necessary to provide adequate service at the intersections that were analyzed. A detailed design study may indicate improvements that are more cost effective than those suggested in this report. The projected traffic flow from this area should be used in the redesign of Central and Edgemoor, which is scheduled to begin in 1983.


Grace Lane
Murdock Avenue
Proposed Lake
Proposed Lake
Edgemoor Drive
FUTURE DEVELOPMENT
Brookside Parkway
Central Avenue
POE & ASSOCIATES
DAVIES & POE, INC.
ENGINEERS
PLANNERS
ARCHITECTS