BRADLEY FAIR SHOPPING CENTER
TRAFFIC IMPACT STUDY
WICHITA, KANSAS

Submitted to
CITY OF WICHITA, KANSAS

Submitted by
HWS CONSULTING GROUP INC.

February 8, 1999

DRAFT

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Chapter 1
INTRODUCTION

The Bradley Fair Shopping center is being proposed on parcel 8 at the Southeast corner of the intersection of Rock Road and Bradley Fair Parkway. The Shopping center has direct access only to Bradley Fair Parkway. The site is approximately 9.87 acres in size and will be developed with a 100,000 square foot retail store and approximately 5,000 square foot restaurant. HWS Consulting Group, Inc. (HWS) was retained to conduct a traffic study to determine the impact of the traffic generated by the development on the street system in the vincinity. The site location is shown in figures 1-1 and 1-2.

1.1 Study Area

The study area will focus on the following three intersections: Bradley Fair Parkway and Rock Road, Bradley Fair Parkway and 21st Street, and Rock Road and 21st Street.

1.2 Study Approach

In August of 1997, HWS was retained to study the Rock Road Corridor from Pawnee Avenue to 45th Street. In this study, HWS recommended improvements to meet the demands of the year 2020 projected traffic demands. The City of Wichita also perfomed traffic counts at the critical intersections of this site. The approach of this study is to use the information already developed and accepted by the various agencies to include the Bradley Fair Shopping Center. The approach can be summarized as follows:

Task 1.2.1: Data Collection

1.2.1.1 Document the current geometrics and traffic control at the following intersections:

- Rock Road and Bradley Fair Parkway
- Rock Road and 21st Street North
- Bradley Fair Parkway and 21st Street

1.2.1.2 Obtain weekday A.M. and P.M. peak period intersection turning movements for the above intersections from the City of Wichita. Maps, construction plans, and other geometric information will also be provided by the City of Wichita.

1.2.1.3 Obtain a listing of programmed improvements within the study area from the City of Wichita.

1.2.1.4 Obtain from the developer data regarding the site plan to be studied, including land use, store hours of operation, size, site orientation and other data as required to properly estimate traffic characteristics for the site.

Task 1.2.2: Traffic Forecast

1.2.2.1 Prepare a trip generation table (trip rates, daily and A.M. and P.M. peak hour volumes) for the proposed development using data obtained from the developer and trip rates documented in the *ITE Trip Generation Manual*. This subtask will also include determining the anticipated trip generation using the existing zoning regulations.

1.2.2.2 Develop an expected directional orientation of site generated trips by analyzing demographic data, if available, and existing traffic volumes and relative locations of major roadways and population centers.

1.2.2.3 Distribute and assign site generated trips to the road system in accordance with estimated directional distribution and minimum travel paths.

1.2.2.4 Prepare post development traffic forecasts for a weekday A.M. and P.M. peak hour at the key intersections. These forecasts will consist of existing traffic volumes plus the expected site generated traffic volume forecasts for the proposed development under existing conditions.

1.2.2.5 Prepare base condition Year 2020 forecast for A.M. and P.M. peak hour at the critical intersections. This will be accomplished by subtracting out anticipated development using existing zoning from the projected traffic volumes in the *Rock Road Corridor Study* (HWS Consulting Group Inc., August 1997).

1.2.2.6 Prepare post development Year 2020 traffic forecast for weekday A.M. and P.M. peak hour at each key intersection. These forecasts consist of the future Year 2020 base traffic volumes plus the expected site generated volume forecasts for the proposed development.

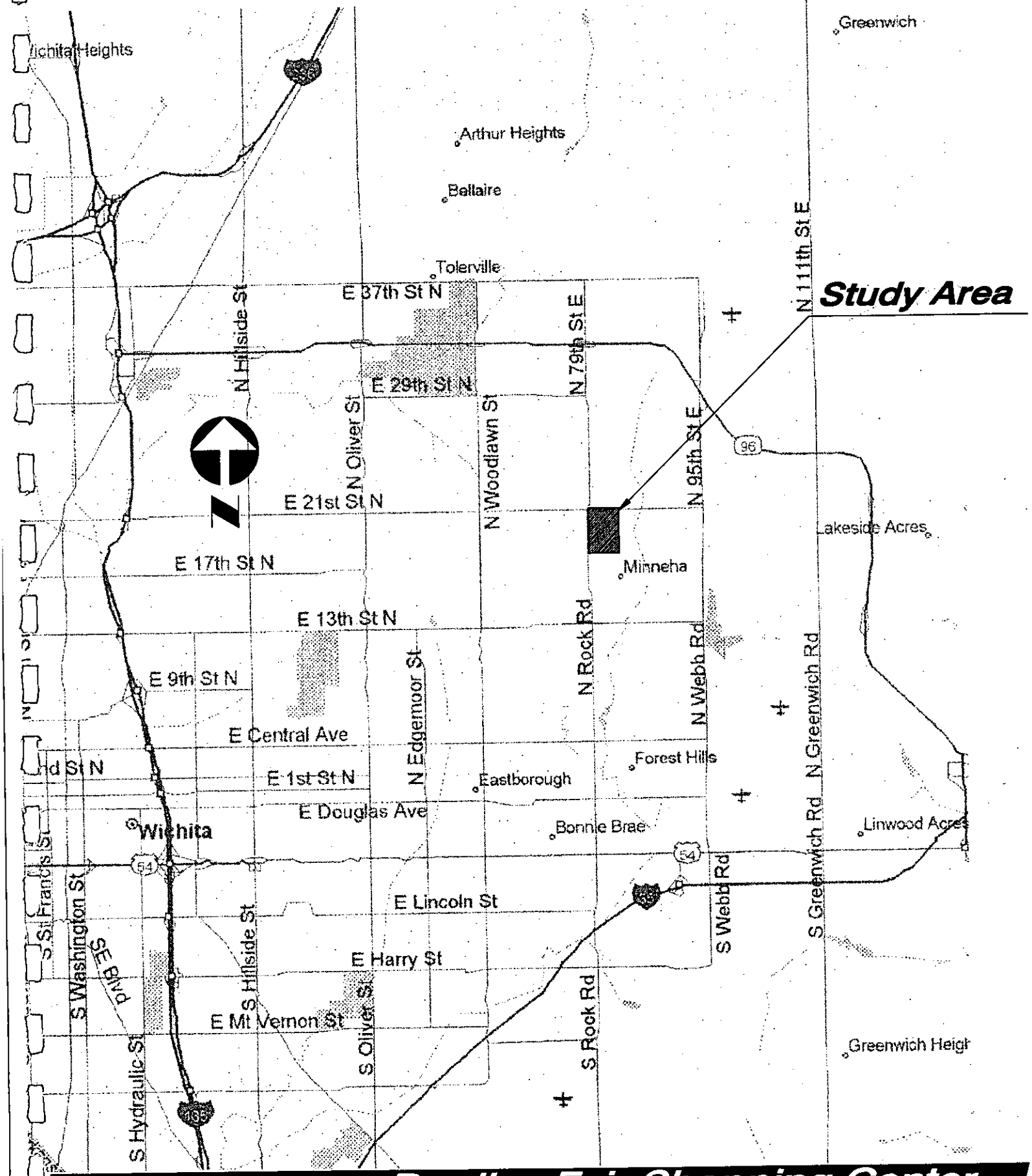
Task 1.2.3: Traffic Analysis

1.2.3.1 Conduct intersection capacity analysis for the key intersections during the Year 2020 post development conditions for a weekday A.M. and P.M. peak hour. The peak hours of Rock Road will be used for analysis purposes. Deficiencies discovered in the post development condition will be noted and considered in the report. The 1994 Highway Capacity Manual methodology will be used to conduct these analyses and to identify and evaluate potential mitigative roadway improvements.

1.2.3.2 Evaluate need and appropriateness of planned improvements at the key intersections, including number of through lanes, auxiliary lanes, and traffic signalization.

1.2.3.3 Conduct queuing analysis to determine required storage distances for left and right turning vehicles at the key intersections.

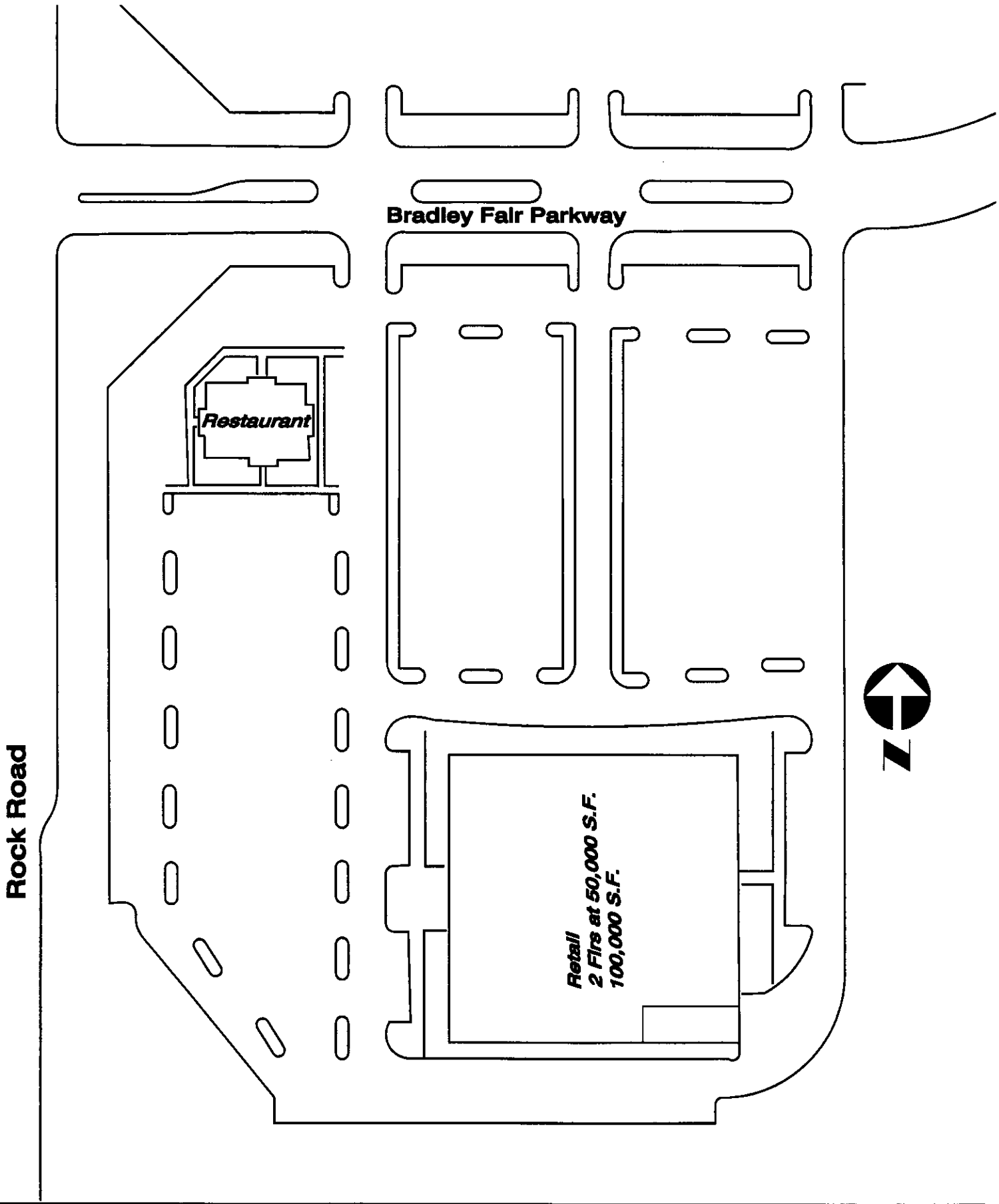
Vicinity Map



Bradley Fair Shopping Center

Rock Road and 21st Street **Figure 1-1**

Site Plan



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Bradley Fair Shopping Center

Rock Road and 21st Street Figure 1-2

Chapter 2
EXISTING CONDITIONS

The parcel where the Bradley Fair Shopping Center is currently undeveloped. The surrounding parcels in the same vicinity are approximately 50% developed. This area is a mixed-use area with offices, retail, restaurants, and residential. Bradley Fair Parkway connects to two major arterials, Rock Road and 21st Street.

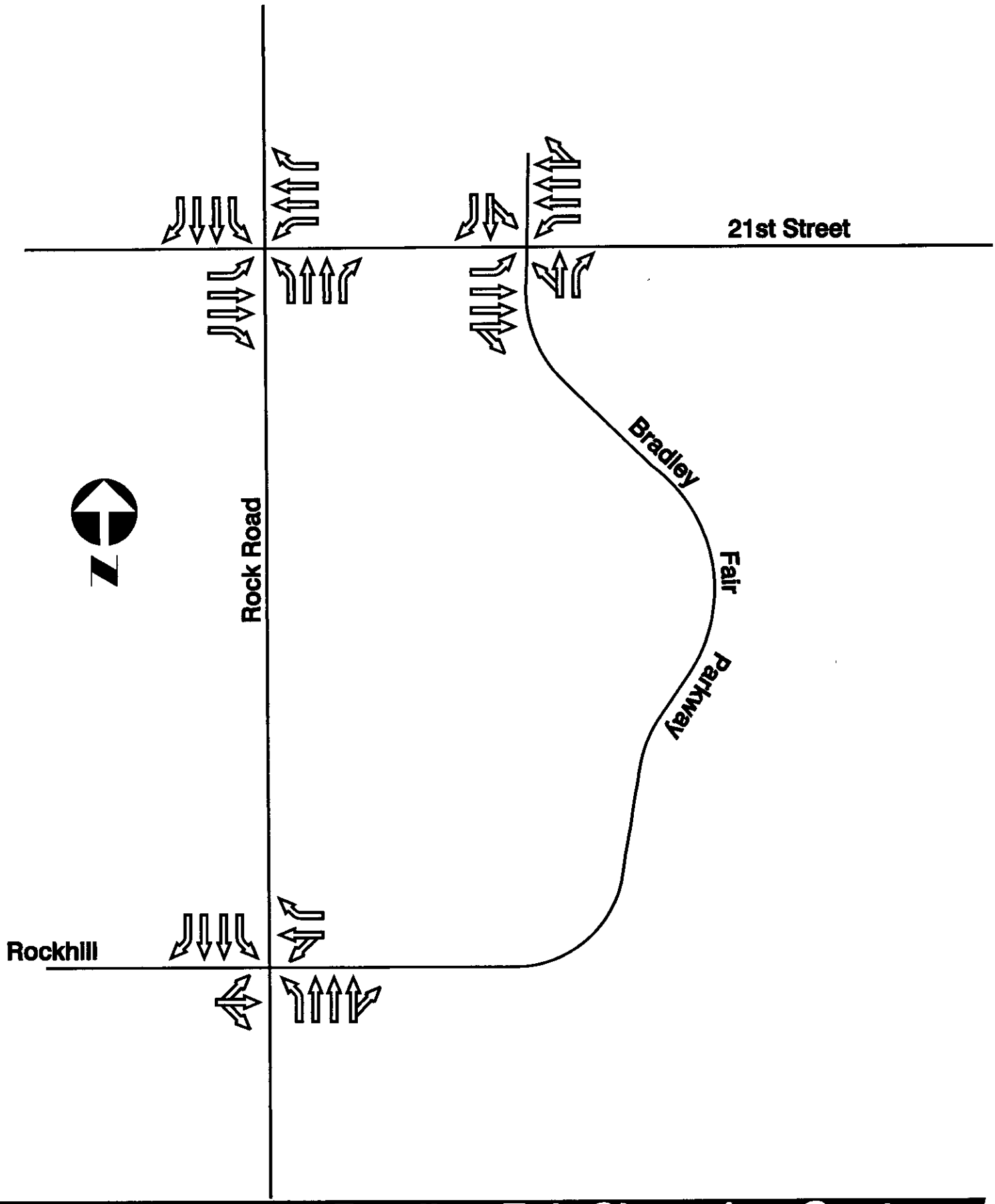
2.1 Existing Lane Configurations

The current lane configurations are shown in Figure 2-1. Bradley Fair Parkway operates as a single lane in each direction with a right turn lane at the intersection of Rock Road and 21st Street.

2.2 Traffic Volumes

The existing peak hour traffic counts are shown in figure 2-2. The existing traffic along Bradley Fair is relatively low compared to the traffic along Rock Road and 21st Street. The traffic counts were taken in January, 1999 by the City of Wichita.

Existing Lane Configurations

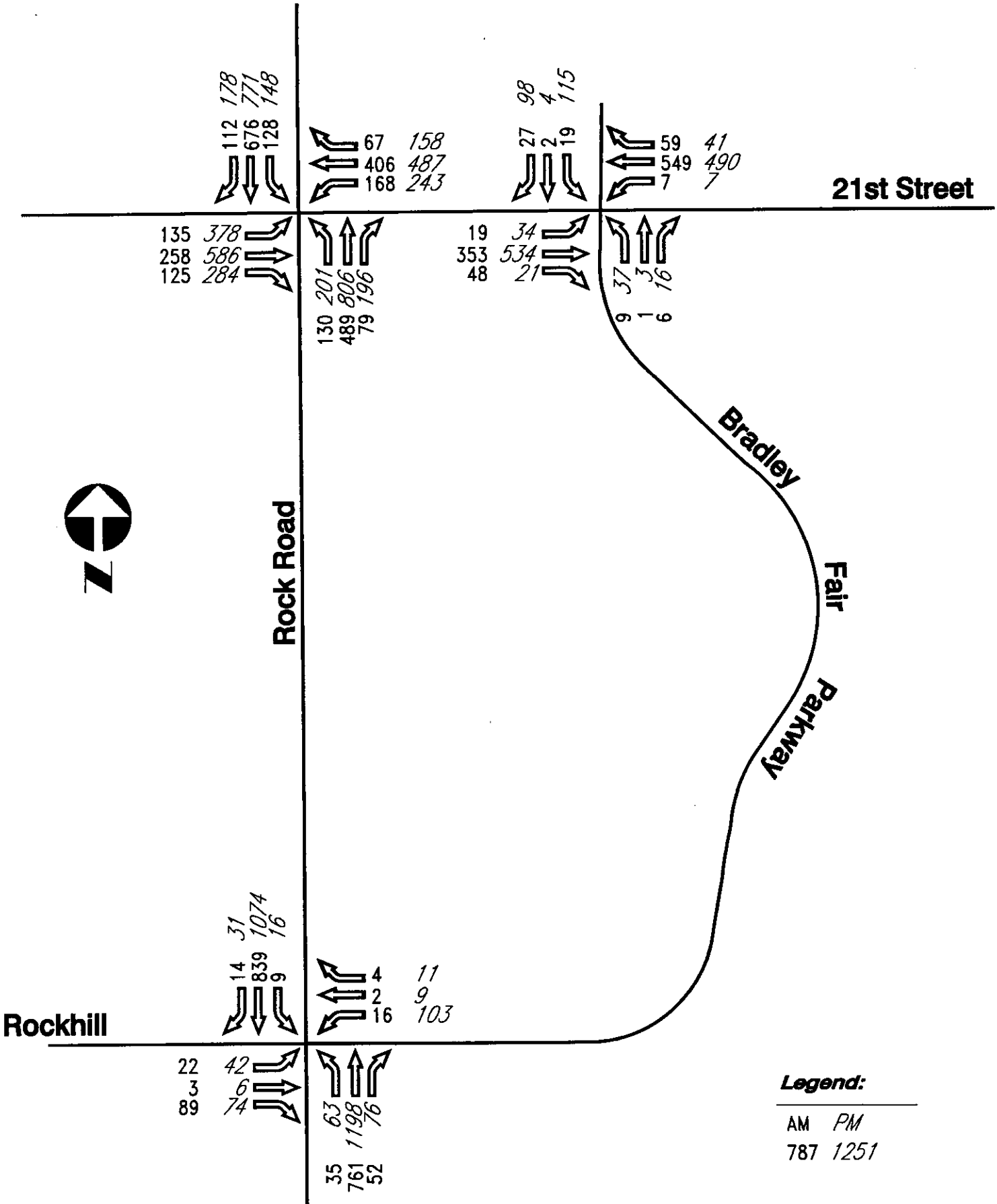


HWS

Bradley Fair Shopping Center

Rock Road and 21st Street Figure 2-1

1999 Peak Hour Turning Movements



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Bradley Fair Shopping Center

Rock Road and 21st Street **Figure 2-2**

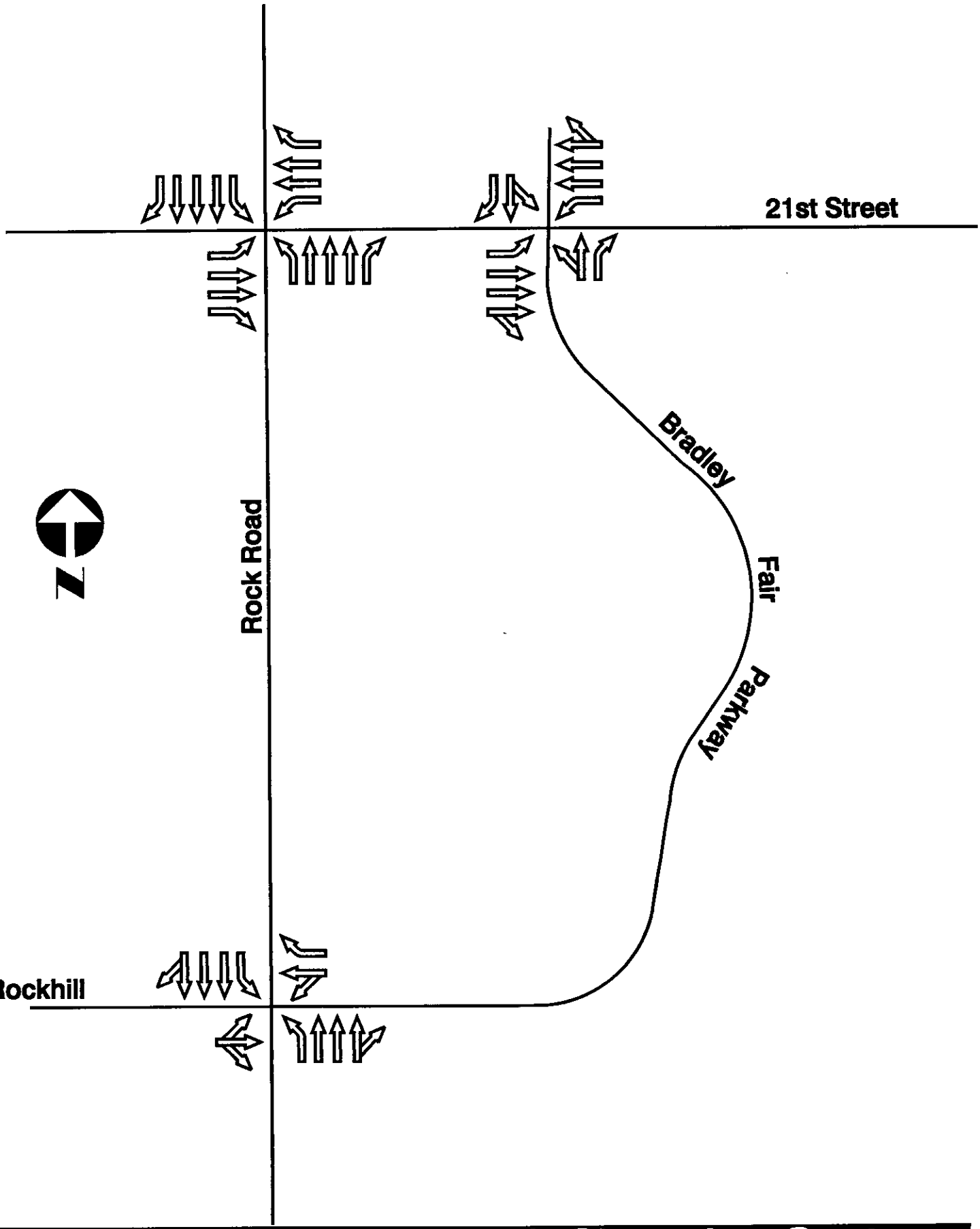
Chapter 3
PROPOSED IMPROVEMENTS

In August of 1997, HWS was retained to study the Rock Road Corridor from Pawnee Avenue to 45th Street. In this study, HWS recommended improvements to meet the demands of the year 2020 projected traffic demands.

3.1 Proposed Lane Configurations

The proposed lane configurations for Rock Road include adding a third through lane North of 21st Street in both the northbound and southbound directions and adding a third lane south of the Bradley Fair and Rock Road intersection in both directions. The City of Wichita also provided the proposed improvements at the other intersections. Proposed lane configurations shown in figure 3-1.

Proposed Lane Configurations



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Bradley Fair Shopping Center

Rock Road and 21st Street Figure 3-1

Chapter 4
TRAFFIC PROJECTIONS

4.1 Trip Generation

The number of vehicle trips that will be generated by the proposed uses on the site was estimated based on land use by using the trip generation rates and equations published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (sixth edition, 1997). The ITE Trip Generation Manual is the industry standard for estimating traffic generation characteristics for various development types. Both A.M. and P.M. peak period trips were determined and analyzed for this study. The number of trips generated for the proposed development and the previously zoned development are summarized in table 4-1 and 4-2, respectively.

4.1 Trip Distribution and Assignment

The distribution of the approach and departure trips were calculated using the (ITE) Trip Generation Manual (sixth edition, 1997).

Once the approach and departure directions were estimated, the trips were assigned to the street network following the shortest travel time paths and engineering judgement. Figures 4-1 and 4-2 illustrate the expected trip assignment for the A.M. and P.M. peak periods. The total post development trips were calculated by adding the new trips generated to the existing traffic in the A.M. and P.M. peak hours. These totals are shown in Figure 4-3 and 4-4.

4.2 2020 Post Development Traffic

These forecast consist of base 2020 traffic projections from the Rock Road Corridor Study and future development information from the City of Wichita. The existing zoning of the office park and restaurant were subtracted from the traffic projections and the proposed development of a shopping center and a restaurant was then added. These results are summarized figures 4-5 and 4-6.

TABLE 4-1
BRADLEY FAIR SHOPPING CENTER
WICHITA, KANSAS

PROPOSED DEVELOPMENT TRIP GENERATION

Prepared by HWS Consulting Group, Inc.
January 1, 1999

LAND USE	SIZE	ITE CODE	24-HOUR 2-WAY VOLUME	A.M. PEAK HOUR		P.M. PEAK HOUR	
				ENTER	EXIT	ENTER	EXIT
Shopping Center	100	820	6817	97	62	301	327
	(1000 g.l.a.)						
High Turnover (Sit-Down)	5	832	652	24	22	33	22
Restaurant	(1000 sq. ft.)						
TOTAL			7469	121	84	334	349

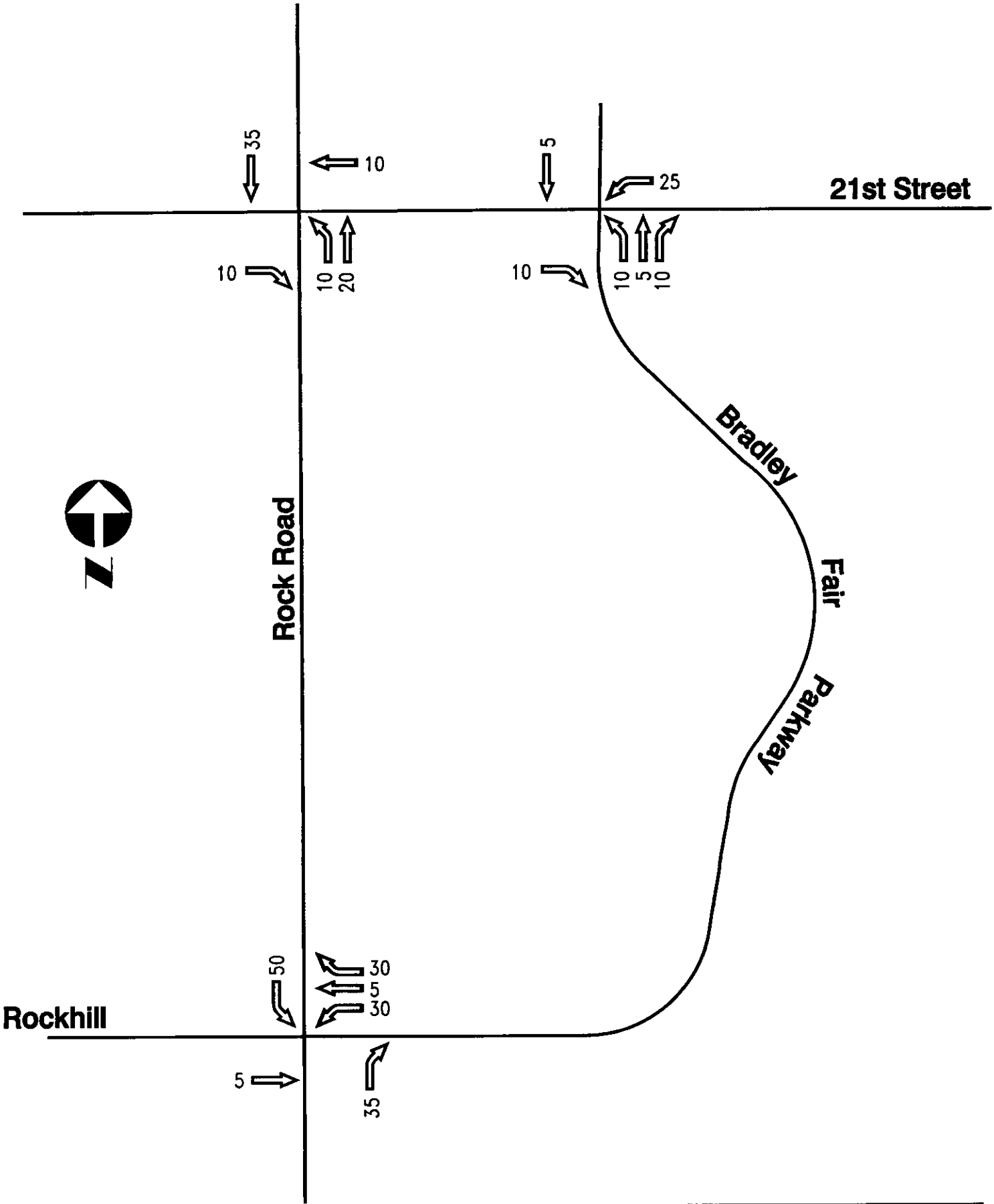
TABLE 4-2
BRADLEY FAIR SHOPPING CENTER
WICHITA, KANSAS

CURRENT ZONING TRIP GENERATION

Prepared by HWS Consulting Group, Inc.
January 1, 1999

LAND USE	SIZE	ITE CODE	24-HOUR 2-WAY VOLUME	A.M. PEAK HOUR		P.M. PEAK HOUR	
				ENTER	EXIT	ENTER	EXIT
Office Park	45	750	878	100	12	23	138
	(1000 sq. ft.)						
High Turnover (Sit-Down)	12	832	1564	58	53	78	52
Restaurant	(1000 sq. ft.)						
TOTAL			2442	158	65	101	190

AM Peak Hour Trip Assignment



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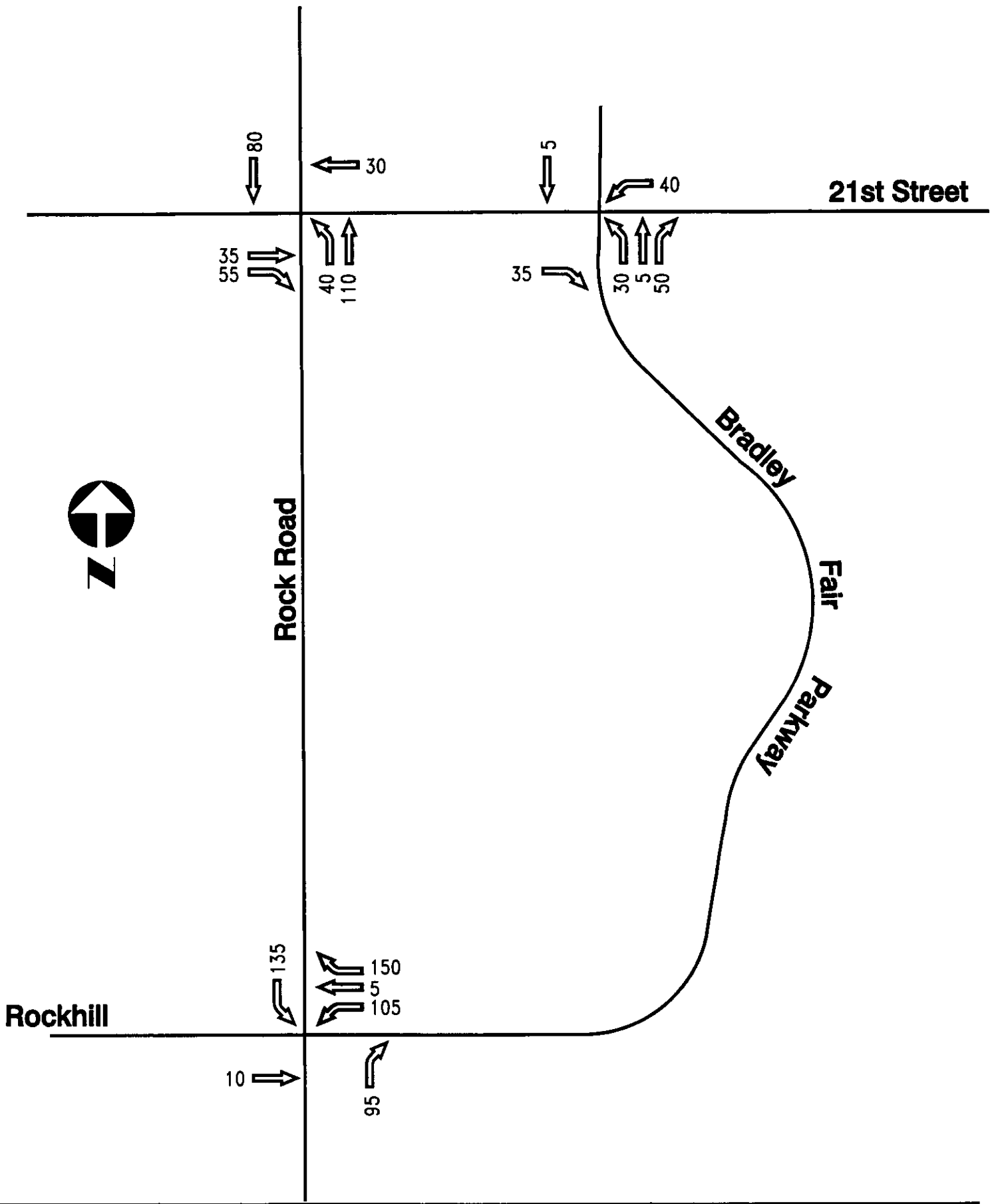
Bradley Fair Shopping Center

Rock Road and 21st Street **Figure 4-1**

PM Peak Hour Trip Assignment



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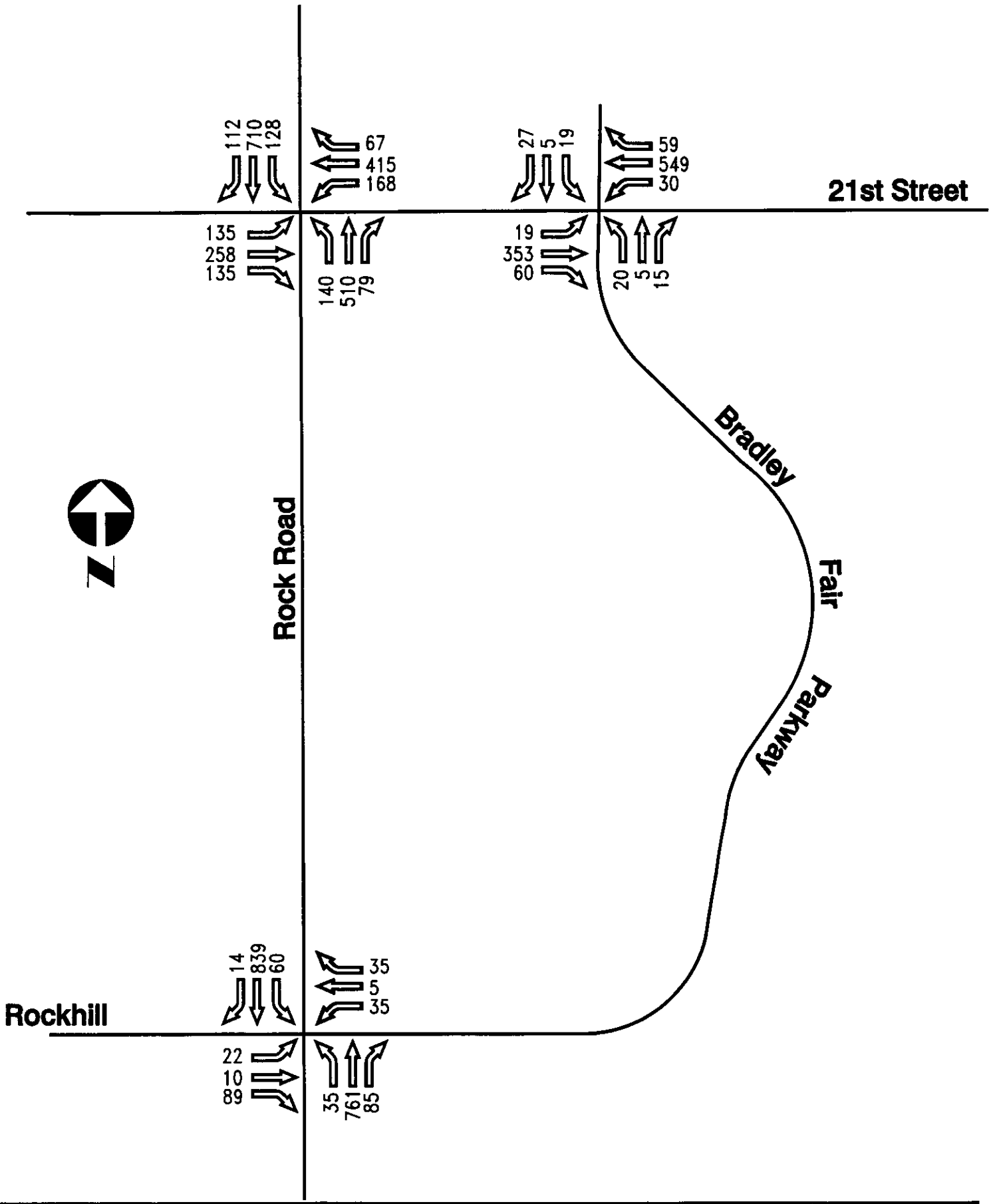
Bradley Fair Shopping Center

Rock Road and 21st Street Figure 4-2

1999 AM Peak Hour Post Development

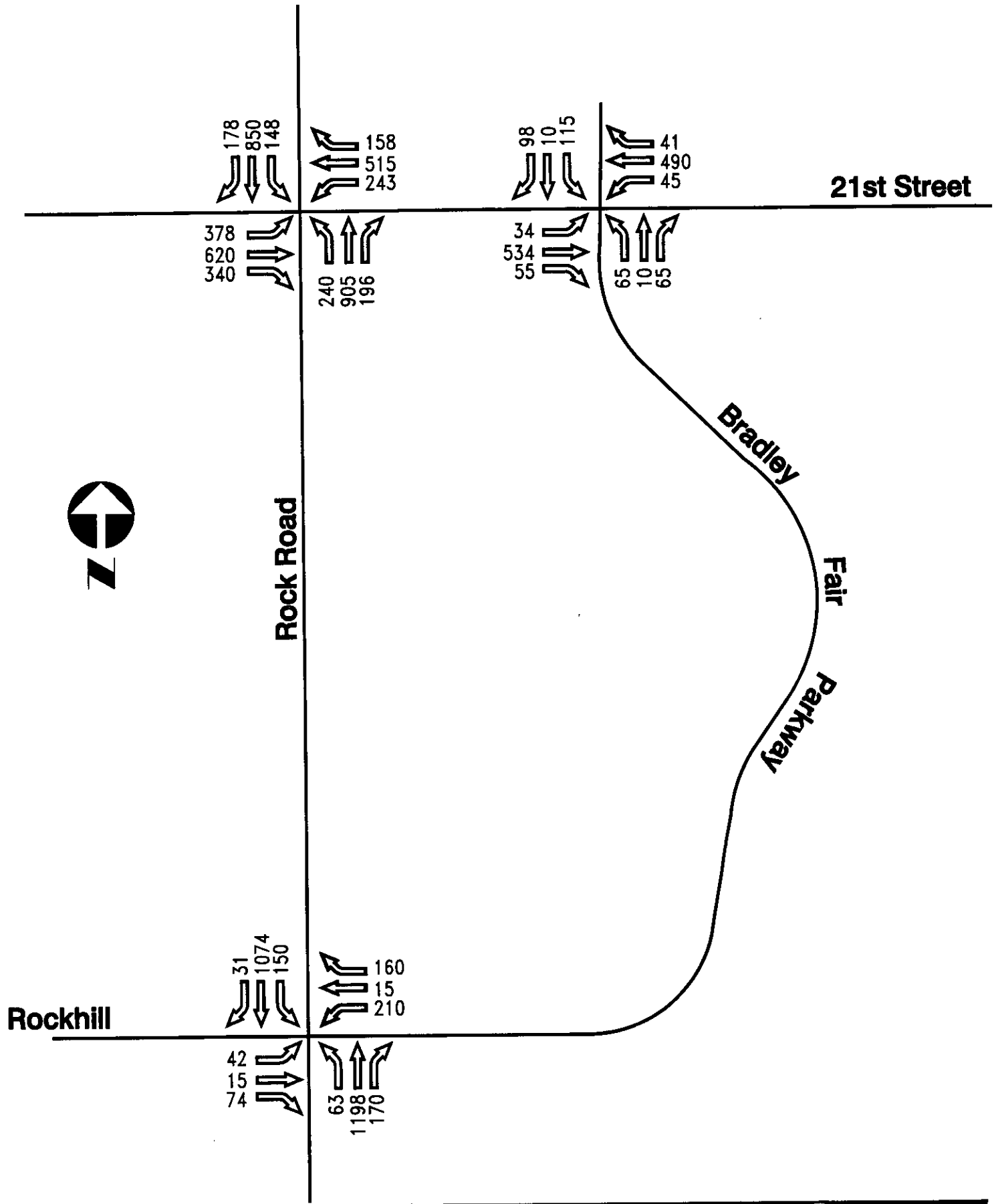


HWS

Bradley Fair Shopping Center

Rock Road and 21st Street Figure 4-3

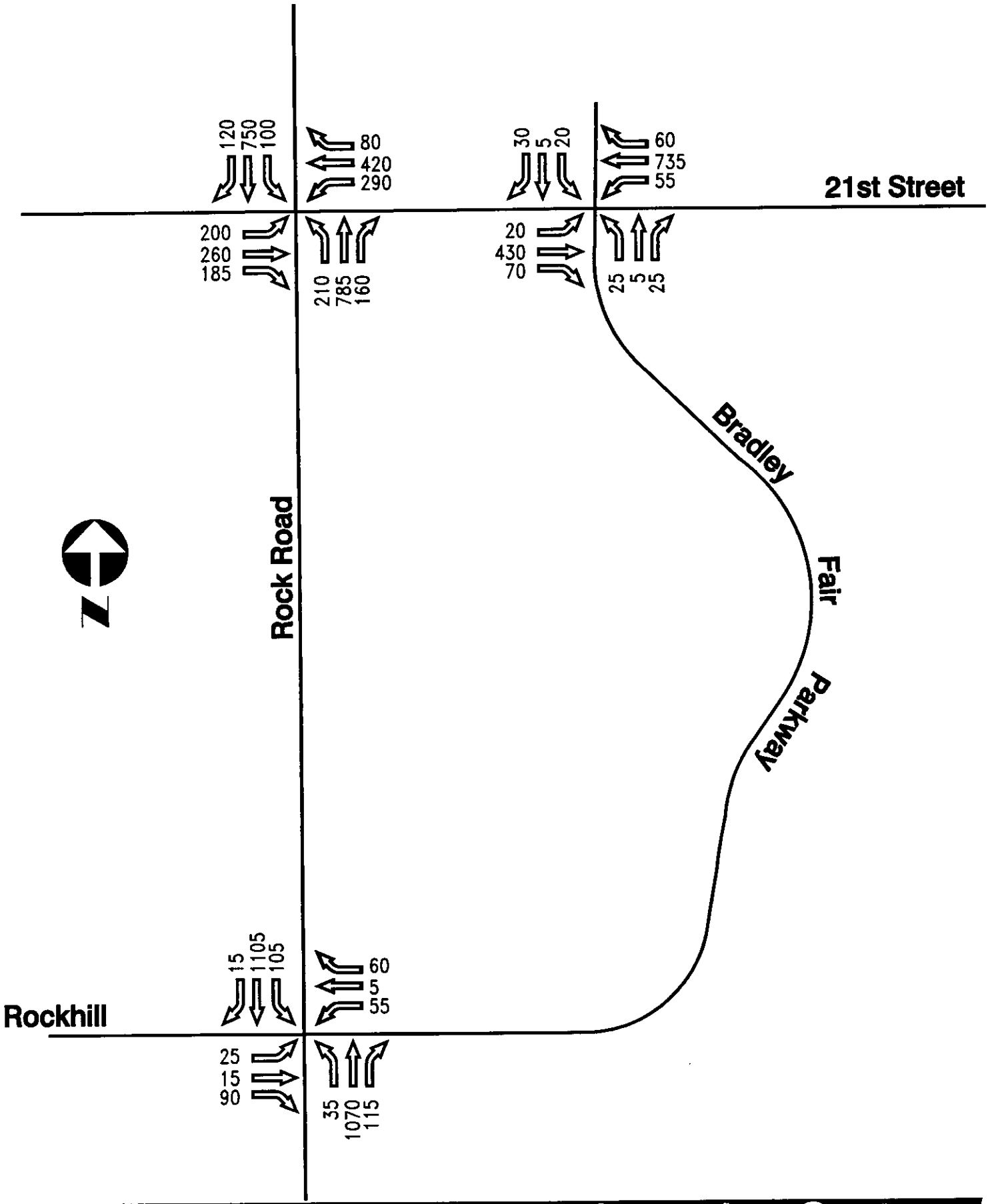
1999 PM Peak Hour Post Development



Bradley Fair Shopping Center

Rock Road and 21st Street Figure 4-4

2020 AM Peak Hour Post Development



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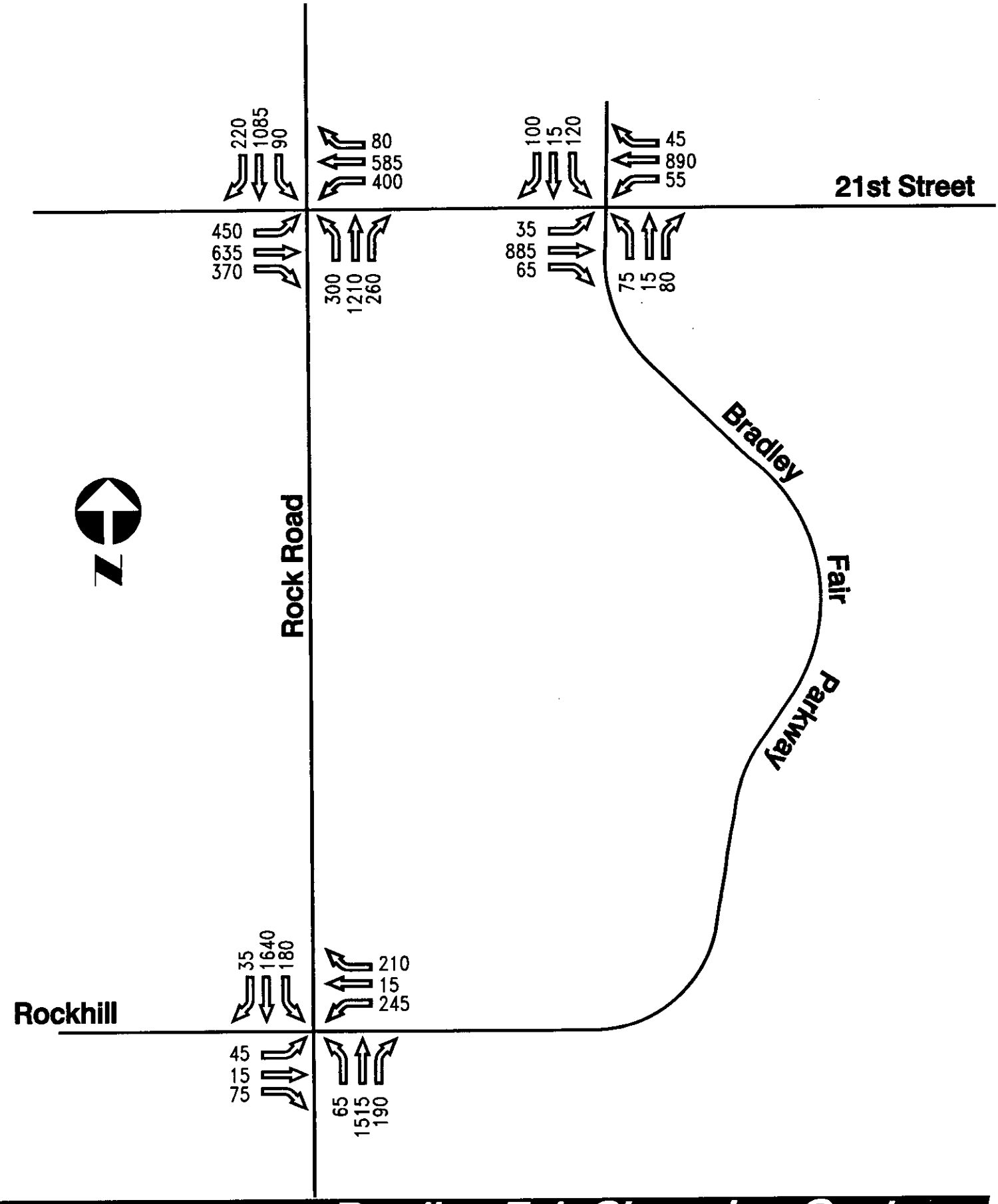
Bradley Fair Shopping Center

Rock Road and 21st Street Figure 4-5

2020 PM Peak Hour Post Development



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Bradley Fair Shopping Center

Rock Road and 21st Street Figure 4-6

Chapter 5
INTERSECTION CAPACITY ANALYSIS

5.1 Level of Service

Levels of Service (LOS) were determined as described in the 1994 Highway Capacity Manual. Level of Service is a qualitative system of ranking intersection performance using average stop delay per vehicle as the evaluation criteria.

5.1.1 Level of Service

Standard techniques outlined in the 1994 Highway Capacity Manual were utilized through the March 1995 version of the Highway Capacity Software (HCS). HCS was developed by the University of Florida for the Federal Highway Administration (FHWA). The results obtained from the capacity analysis indicate the predicted intersection operation during the A.M. and P.M. peak hour.

For signalized intersections, level of service is defined in terms of the average stop delay per vehicle. A brief description of the LOS criteria for signalized intersections follows:

LOS A describes primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.

LOS B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.

LOS C represents stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification. Motorists will experience appreciable tension while driving.

LOS D borders on a range in which small increases in flow may cause substantial increases in delay and hence decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these factors. Average travel speeds are about 40 percent of free-flow speed.

LOS E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F characterizes arterial flow at extremely low speeds below one-third to one-fourth of the free-flow speed. Intersection congestion is likely at critical signalized locations, with high delays and extensive queuing. Adverse progression is frequently a contributor to this condition.

5.1.2 Input Parameters

A minimum cycle length of 120 seconds was used on all intersections for planning purposes. Table 5-1 summarizes input parameters used in this analysis.

5.1.3 Capacity Analysis

Table 5-2 summarizes the results of the analysis using 1999 post development turning movement data and table 5-3 summarizes the results using 2020 post development turning movement data, with the proposed improvements. A minimum level of service of C was desired, but in some locations where right-of-way is limited, level of service D is considered acceptable. Level of service for each turning movement is shown in Figures 5-1, 5-2, and 5-3.

Table 5-1
Input Parameters

Cycle Length	120 seconds
Peak Hour Factor	0.90
Lost Time	3.0 seconds
Yellow + All Red	4.0 seconds
Lane Width	11 feet
Percent Trucks	2%
Grade	0%
Detection	Actuated (all approaches)
Arrival Type	4 (favorable)
Controller	8 Phase

Table 5-2
1999 Post Development Intersection Capacity Analyses

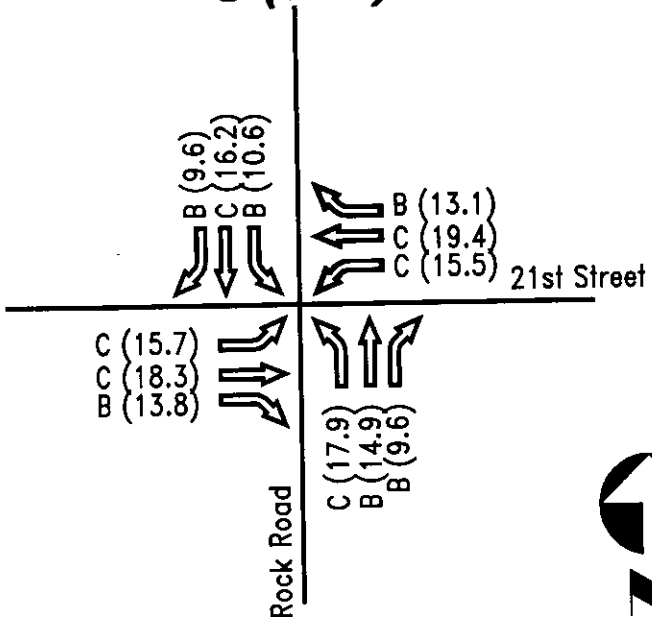
Intersection	AM	PM
21st Street and Rock Road	C(15.8)	D(31.0)
Bradley Fair Parkway and Rock Road	C(21.4)	C(19.4)
Bradley Fair Parkway and 21st Street	A(1.1)	C(18.9)

Table 5-3
2020 Post Development Intersection Capacity Analyses w/ Proposed Improvements

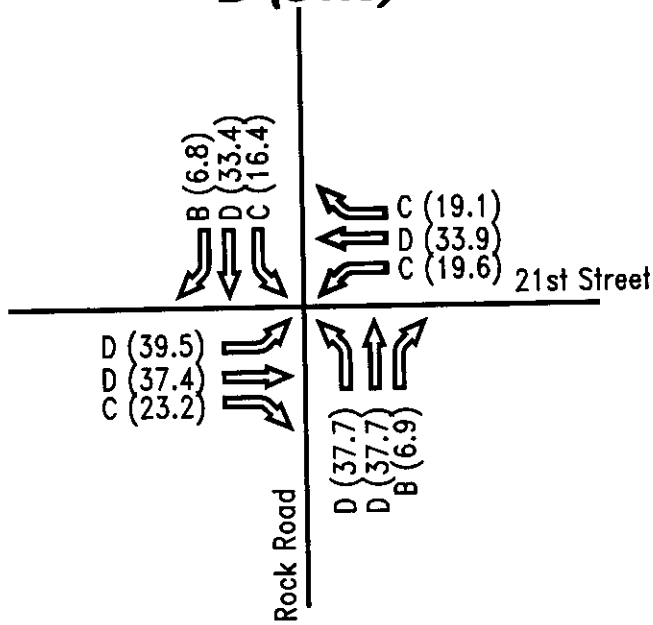
Intersection	AM	PM
21st Street and Rock Road	C(20.0)	D(36.0)
Bradley Fair Parkway and Rock Road	C(18.3)	C(20.2)
Bradley Fair Parkway and 21st Street	A(1.8)	F(535.4)

Intersection Level of Service

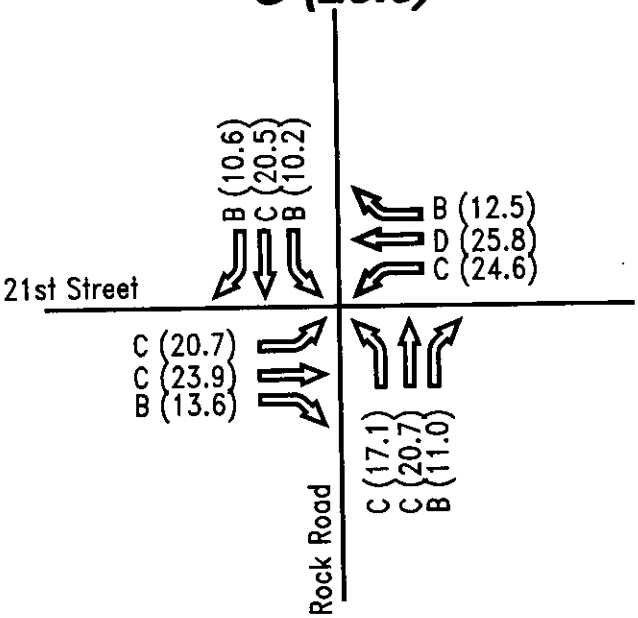
1999 AM Post Development
C (15.8)



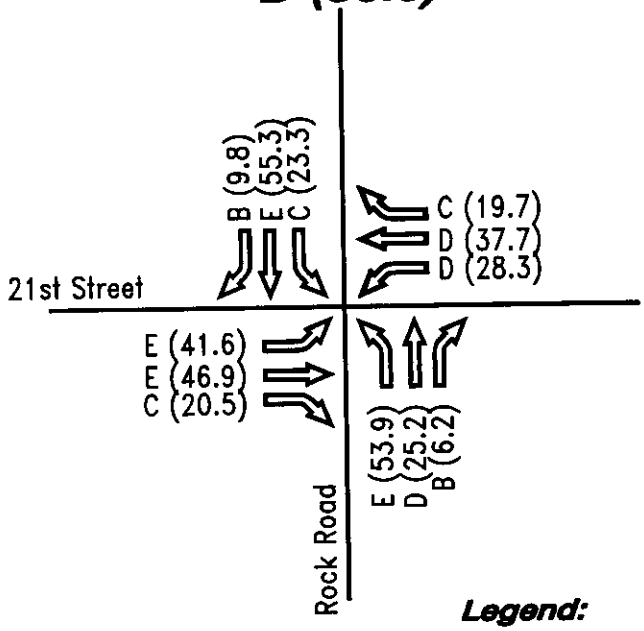
1999 PM Post Development
D (31.0)



2020 AM Post Development w/ Propsosed Improvements
C (20.0)



2020 PM Post Development w/ Proposed Improvements
D (36.0)



Legend:

C	Level of Service
(12.4)	Delay in Seconds
⇦	Lane Group

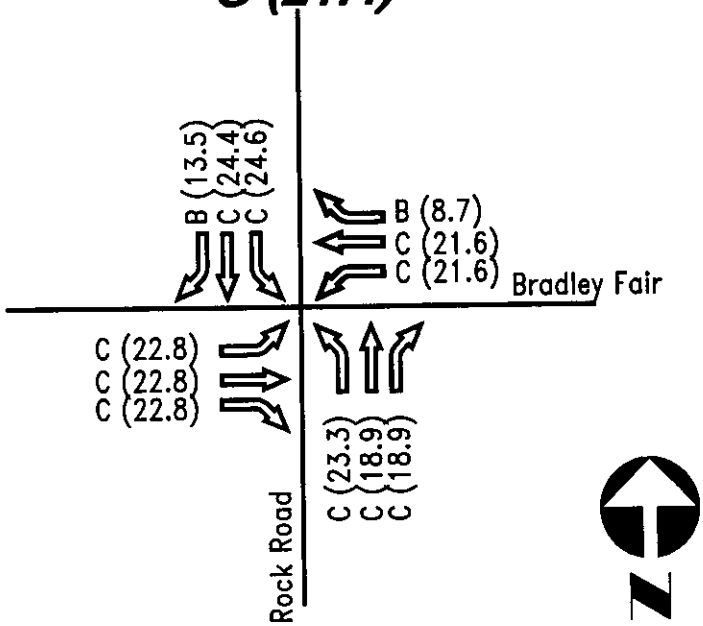
HWS

Bradley Fair Shopping Center

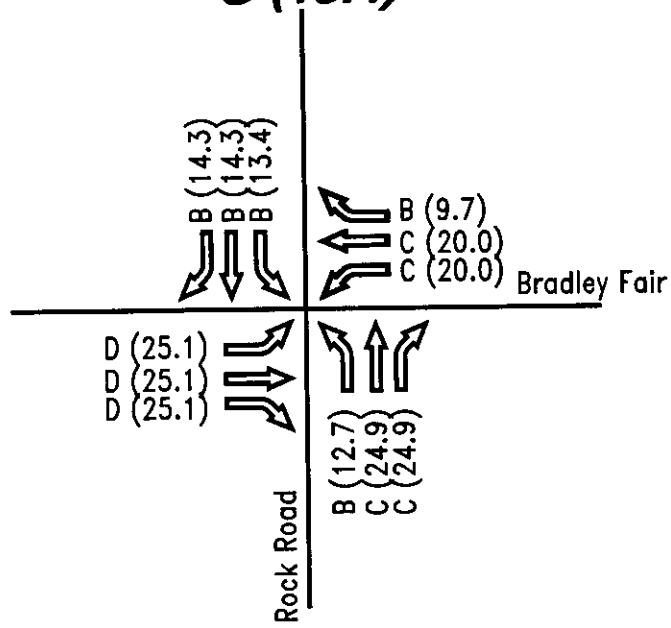
Rock Road and 21st Street Figure 5-1

Intersection Level of Service

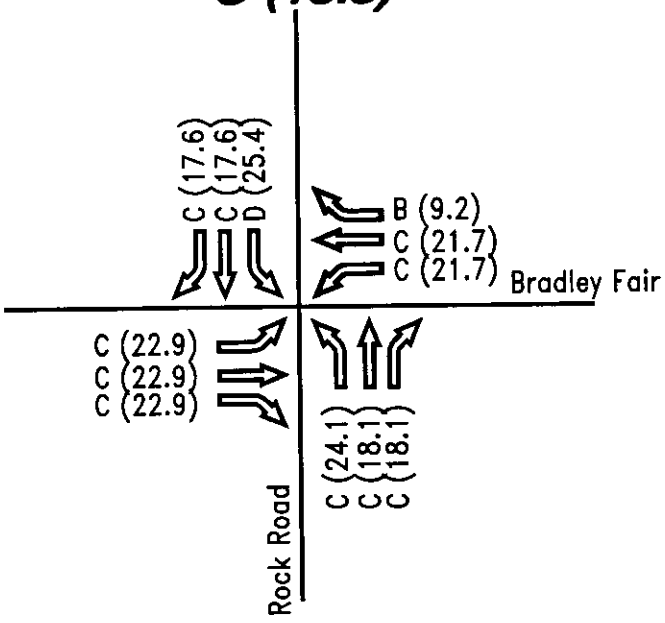
1999 AM Post Development
C (21.4)



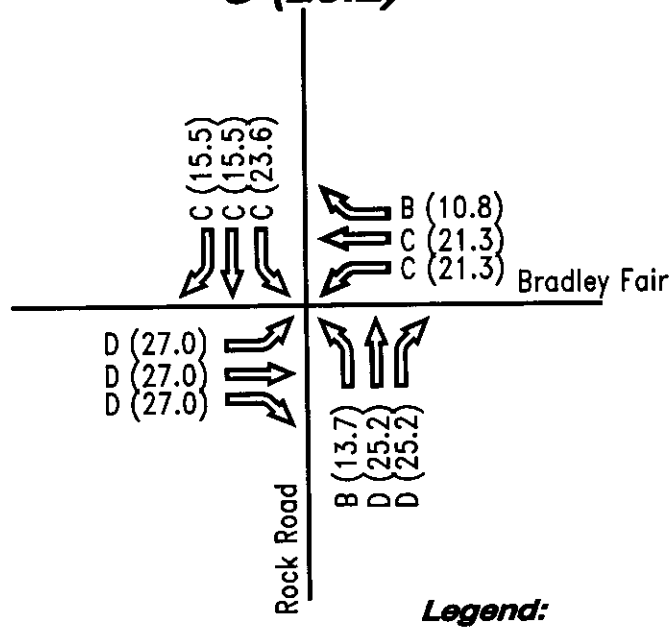
1999 PM Post Development
C (19.4)



2020 AM Post Development w/ Proposed Improvements
C (18.3)



2020 PM Post Development w/ Proposed Improvements
C (20.2)

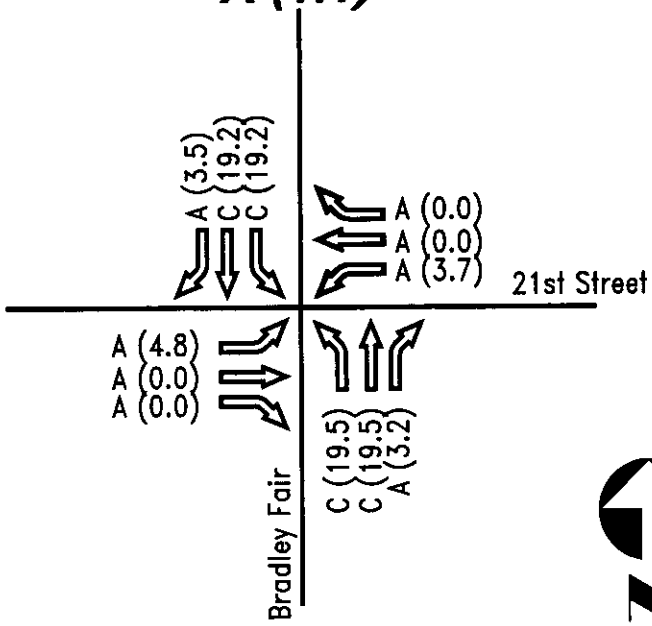


Legend:

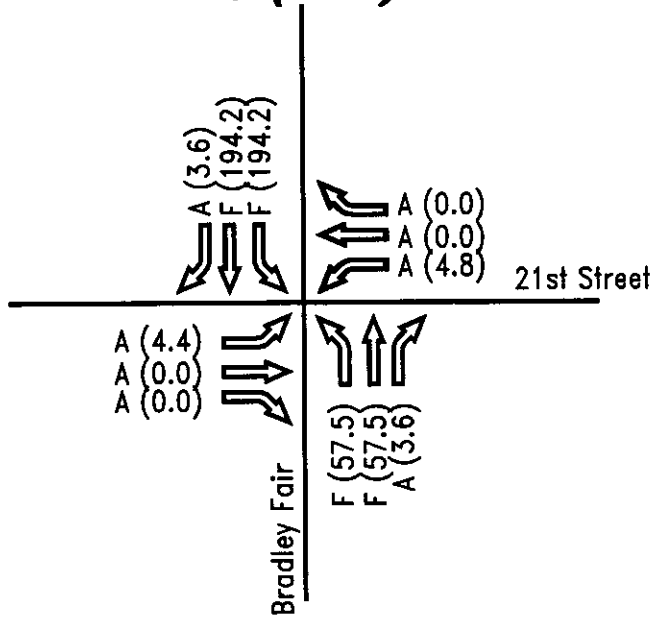
C	Level of Service
(12.4)	Delay in Seconds
⇦	Lane Group

Intersection Level of Service

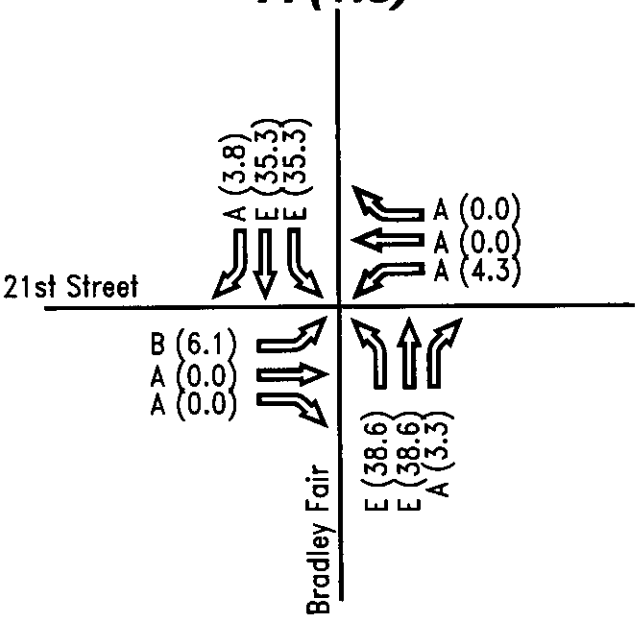
1999 AM Post Development
A (1.1)



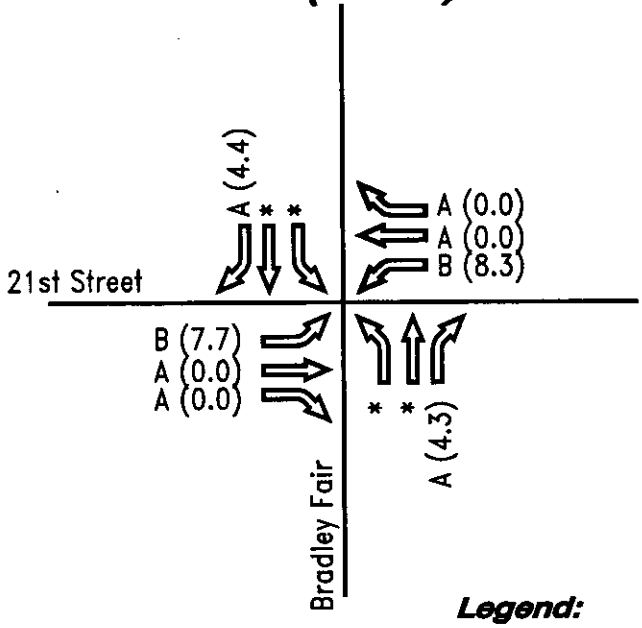
1999 PM Post Development
C (18.9)



2020 AM Post Development
A (1.8)



2020 PM Post Development
F (534.4)



Legend:

C	Level of Service
(12.4)	Delay in Seconds
⇦	Lane Group

* The calculated value was greater than 999.9

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Bradley Fair Shopping Center

Rock Road and 21st Street **Figure 5-3**

Chapter 6
QUEUE LENGTH ANALYSIS

6.1 Auxiliary Lane Queue Lengths

After the lane configurations at each major arterial intersection were identified a queue length analysis was determined for the projected 2020 A.M. and P.M. peak hours with the recommended improvements. For signalized intersections the following formula was used to determine queue lengths that will occur during peak periods.

$$QL = \frac{VC}{3{,}600} \times L \times PF \times (1-g/c)$$

where V = peak hour movement volume
C = cycle length
L = vehicle length (25 feet, front bumper to front bumper)
PF = peaking factor for 90% confidence level (2.0)
g = anticipated effective green time for movement

Projected queue and bay lengths are shown in Tables 6-1 and 6-2.

TABLE 6-1

Bradley Fair Shopping Center

WICHITA, KANSAS

SUMMARY OF 1999 POST DEVELOPMENT PEAK HOUR QUEUE LENGTH ANALYSIS

Prepared by HWS Consulting Group, Inc.

8-Feb-99

Intersection	Approach	Traffic Movement	Existing Storage Length (ft)	Design Storage Length (ft)	Governing Peak Hour (AM or PM)
Rock Road & 21st Street Signalized	EB	LT	400'+	500'	PM
		RT	400'+	350'	PM
	WB	LT	200'	325'	PM
		RT	300'	175'	PM
	NB	LT	325'	350'	PM
		RT	400'+	175'	PM
	SB	LT	200'	225'	PM
		RT	200'	150'	PM
Rock Road & Bradley Fair Signalized	EB	LT	-	-	-
		RT	-	-	-
	WB	LT	-	-	-
		RT	-	-	-
	NB	LT	150'	100'	PM
		RT	-	-	-
	SB	LT	180'	225'	PM
		RT	-	-	-
21st Street & Bradley Fair Signalized	EB	LT	100'	25'	PM
		RT	-	-	-
	WB	LT	100'	25'	PM
		RT	-	-	-
	NB	LT	-	-	-
		RT	-	-	-
	SB	LT	-	-	-
		RT	-	-	-

Abbreviations:

NB - Northbound *LT - Left Turn*

SB - Southbound *RT - Right Turn*

WB - Westbound *TH - Through*

EB - Eastbound *N/A - Not Applicable*

TABLE 6-2

Bradley Fair Shopping Center

WICHITA, KANSAS

SUMMARY OF 2020 PEAK HOUR QUEUE LENGTH ANALYSIS w/ RECOMMENDED IMPROVEMENTS

Prepared by HWS Consulting Group, Inc.

8-Feb-99

Intersection	Approach	Traffic Movement	Existing Storage Length (ft)	Design Storage Length (ft)	Governing Peak Hour (AM or PM)
Rock Road & 21st Street Signalized	EB	LT	400'+	350'	PM
		RT	400'+	425'	PM
	WB	LT	200'	275'	PM
		RT	300'	150'	PM
	NB	LT	325'	425'	PM
		RT	400'+	175'	PM
	SB	LT	200'	150'	PM
		RT	200'	200'	PM
Rock Road & Bradley Fair Signalized	EB	LT	-	-	-
		RT	-	-	-
	WB	LT	-	-	-
		RT	-	-	-
	NB	LT	150'	150'	PM
		RT	-	-	-
	SB	LT	180'	275'	PM
		RT	-	-	-
21st Street & Bradley Fair Signalized	EB	LT	100'	75'	PM
		RT	-	-	-
	WB	LT	100'	100'	PM
		RT	-	-	-
	NB	LT	-	-	-
		RT	-	-	-
	SB	LT	-	-	-
		RT	-	-	-

Abbreviations:

NB - Northbound *LT - Left Turn*

SB - Southbound *RT - Right Turn*

WB - Westbound *TH - Through*

EB - Eastbound *N/A - Not Applicable*

Chapter 7
RECOMMENDATIONS

SUMMARY OF IMPROVEMENTS

The following provides a summary of the recommended improvements to the proposed road modifications for each of the intersections. Table 7-1 summarizes the 2020 post development capacity analysis with the recommended improvements. Level of service for each turning movement is shown in Figure 7-1.

21st Street and Rock Road

Analysis indicates the LOS for the intersection is adequate for the 1999 post development traffic volumes. However, the following improvements are recommended to accommodate adequate storage length for the 1999 post development traffic and address the 2020 post development traffic volumes.

- Add an additional left turn lane on eastbound and westbound 21st Street to create dual lefts.
- Extend westbound 21st Street left turn bay (see queueing analysis). In order to accommodate this extension, the 21st Street Court drive will have to be changed to a right-in, right-out intersection.
- Extend northbound Rock Road left turn bay (see queueing analysis). In order to accommodate the extension, the southbound left turn bay into the shopping center will need to be closed to allow for the storage in the northbound left turn bay.

With the proposed improvements, the 2020 post development traffic volumes still operates at a LOS 'D', but it reduces the average delay by approximately 10 seconds per car (36.0 to 26.8). If dual left turn lanes are not provided on 21st Street, the left turn storage lengths on all approaches would be considerably longer.

Bradley Fair Parkway and Rock Road

Analysis indicates the LOS for the intersection is adequate for the 1999 post development traffic volumes. However, the following improvements are recommended to accommodate adequate storage length for the 1999 post development traffic and address the 2020 post development traffic volumes.

- Extend southbound Rock Road left turn bay (see queueing analysis). In order to accommodate this extension, the Sundance Apartment driveway will need to be changed to a right-in, right-out intersection.

This intersection operates at a LOS 'C' in the P.M. peak period and a LOS 'B' in the A.M. peak period.

Bradley Fair Parkway and 21st Street
The following improvement is recommended to address the 1999 post development traffic volumes.

- Add traffic signals.

With the addition of traffic signals at this intersection, the intersection operates at a LOS 'B' in the AM peak hour and a LOS 'C' in the PM peak hour for the 2020 post development traffic. It is recommended to add the traffic signal before the opening of the shopping center.

Table 7-1
2020 Post Development Intersection Capacity Analyses with Recommended Improvements

Intersection	AM	PM
21st Street and Rock Road	C(22.6)	D(26.8)
Bradley Fair Parkway and 21st Street	B(12.0)	C(21.2)

Appendix

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STAM.HC9
Area Type: Other 2-8-99 AM Peak
Comment: 1999 turning movements post development

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Volumes	135	258	135	168	415	67	140	510	79	128	710	112
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	*	*			NB Left	*	*	
	Thru		*			Thru		*	
	Right		*			Right		*	
	Peds					Peds			
WB	Left	*	*			SB Left	*	*	
	Thru		*			Thru		*	
	Right		*			Right		*	
	Peds					Peds			
NB	Right	*				EB Right	*		
SB	Right	*				WB Right	*		
Green		6.0A	40.0A			Green	7.0A	51.0A	
Yellow/AR		4.0	4.0			Yellow/AR	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	278	1752	0.540	0.425	15.7	C	16.5	C
	T	1260	3689	0.239	0.342	18.3	C		
	R	679	1568	0.221	0.433	13.8	B		
WB	L	386	1752	0.484	0.425	15.5	C	17.8	C
	T	1260	3689	0.384	0.342	19.4	C		
	R	679	1568	0.109	0.433	13.1	B		
NB	L	211	1752	0.739	0.525	17.9	C	14.9	B
	T	1599	3689	0.372	0.433	14.9	B		
	R	810	1568	0.109	0.517	9.6	B		
SB	L	307	1752	0.463	0.525	10.6	B	14.8	B
	T	1599	3689	0.518	0.433	16.2	C		
	R	810	1568	0.153	0.517	9.8	B		

Intersection Delay = 15.8 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.534

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STPM.HC9
Area Type: Other 2-8-99 PM Peak
Comment: 1999 turning movements post development

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Volumes	378	620	340	243	515	158	240	905	196	148	850	178
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left		*			NB	Left	*	*		
	Thru		*				Thru		*		
	Right		*				Right		*		
	Peds						Peds				
WB	Left	*	*			SB	Left	*	*		
	Thru		*				Thru		*		
	Right		*				Right		*		
	Peds						Peds				
NB	Right		*			EB	Right	*			
SB	Right		*			WB	Right	*			
Green		26.0A	27.0A			Green		15.0A	36.0P		
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	456	1752	0.921	0.483	39.5	D	34.4	D
	T	861	3689	0.840	0.233	37.4	D		
	R	614	1568	0.616	0.392	23.2	C		
WB	L	456	1752	0.592	0.483	19.6	C	27.4	D
	T	861	3689	0.698	0.233	33.3	D		
	R	614	1568	0.287	0.392	19.1	C		
NB	L	295	1752	0.905	0.467	37.7	D	33.2	D
	T	1137	3689	0.928	0.308	37.5	D		
	R	875	1568	0.249	0.558	6.9	B		
SB	L	295	1752	0.556	0.467	16.4	C	27.4	D
	T	1137	3689	0.871	0.308	33.4	D		
	R	875	1568	0.226	0.558	6.8	B		

Intersection Delay = 31.0 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.934

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STAM.HC9
Area Type: Other 1-29-99 AM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	3	1	1	3	1
Volumes	200	260	185	290	420	80	210	785	160	100	750	120
Lane W (ft)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*	*		
	Thru		*				Thru		*		
	Right		*				Right		*		
	Peds						Peds				
WB	Left	*	*			SB	Left	*	*		
	Thru		*				Thru		*		
	Right		*				Right		*		
	Peds						Peds				
NB	Right	*				EB	Right	*			
SB	Right	*				WB	Right	*			
Green		15.0A	29.0A			Green		20.0A	40.0A		
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	321	1694	0.692	0.408	20.7	C	20.1	C
	T	892	3566	0.340	0.250	23.9	C		
	R	682	1516	0.302	0.450	13.6	B		
WB	L	404	1694	0.797	0.408	24.6	C	24.1	C
	T	892	3566	0.550	0.250	25.8	D		
	R	682	1516	0.130	0.450	12.5	B		
NB	L	367	1694	0.635	0.542	17.1	C	18.8	C
	T	1828	5350	0.525	0.342	20.7	C		
	R	758	1516	0.235	0.500	11.0	B		
SB	L	360	1694	0.308	0.542	10.2	B	18.3	C
	T	1828	5350	0.501	0.342	20.5	C		
	R	758	1516	0.175	0.500	10.6	B		

Intersection Delay = 20.0 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.647

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STPM.HC9
Area Type: Other 1-29-99 PM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	3	1	1	3	1
Volumes	450	635	370	400	585	80	300	1210	260	90	1085	220
Lane W (ft)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*	*	*	
	Thru		*				Thru		*	*	
	Right		*				Right		*	*	
	Peds						Peds				
WB	Left	*	*			SB	Left	*		*	
	Thru		*				Thru			*	
	Right		*				Right			*	
	Peds						Peds				
NB	Right	*				EB	Right	*	*		
SB	Right	*				WB	Right	*			
Green		32.0A	25.0A			Green		7.0A	8.0A	28.0A	
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	526	1694	0.951	0.517	41.6	E	38.7	D
	T	773	3566	0.959	0.217	46.9	E		
	R	619	1516	0.664	0.408	20.5	C		
WB	L	526	1694	0.844	0.517	28.3	D	33.0	D
	T	773	3566	0.883	0.217	37.7	D		
	R	467	1516	0.190	0.308	19.7	C		
NB	L	342	1694	0.974	0.433	53.9	E	27.1	D
	T	1828	5350	0.809	0.342	25.2	D		
	R	973	1516	0.297	0.642	6.2	B		
SB	L	179	1694	0.559	0.333	23.3	C	46.7	E
	T	1293	5350	1.026	0.242	55.3	E		
	R	821	1516	0.297	0.542	9.8	B		

Intersection Delay = 36.0 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.997

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STAMDL.HC9
Area Type: Other 1-29-99 AM Peak
Comment: 2020 turning movements post development with improvements w/d lt

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	1	2	2	1	1	3	1	1	3	1
Volumes	200	260	185	290	420	80	210	785	160	100	750	120
Lane W (ft)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*	*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds					Peds				
WB Left	*				SB Left	*	*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds					Peds				
NB Right	*				EB Right	*			
SB Right	*				WB Right	*			
Green	23.0A	31.0A			Green	16.0A	34.0A		
Yellow/AR	4.0	4.0			Yellow/AR	4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	678	3388	0.338	0.200	26.7	D	21.7	C
	T	951	3566	0.319	0.267	22.8	C		
	R	657	1516	0.314	0.433	14.5	B		
WB	L	678	3388	0.490	0.200	28.0	D	24.7	C
	T	951	3566	0.515	0.267	24.6	C		
	R	657	1516	0.135	0.433	13.2	B		
NB	L	300	1694	0.777	0.458	26.6	D	22.8	C
	T	1560	5350	0.615	0.292	24.2	C		
	R	783	1516	0.227	0.517	10.3	B		
SB	L	300	1694	0.370	0.458	13.8	B	21.3	C
	T	1560	5350	0.587	0.292	23.9	C		
	R	783	1516	0.170	0.517	9.9	B		

Intersection Delay = 22.6 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.614

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21ST N (N-S) Rock Road
Analyst: Brian Ray File Name: 21STPMDL.HC9
Area Type: Other 1-29-99 PM Peak
Comment: 2020 turning movements post development with improvements w/d lt

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	1	2	2	1	1	3	1	1	3	1
Volumes	450	635	370	400	585	80	300	1210	260	90	1085	220
Lane W (ft)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left		*			NB	Left	*	*	*	
	Thru			*			Thru		*	*	
	Right			*			Right		*	*	
	Peds						Peds				
WB	Left		*			SB	Left	*		*	
	Thru			*			Thru			*	
	Right			*			Right			*	
	Peds						Peds				
NB	Right		*			EB	Right	*	*		
SB	Right		*			WB	Right	*			
Green		21.0A	26.5A			Green		8.0A	9.5A	35.0A	
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	621	3388	0.829	0.183	36.9	D	33.1	D
	T	817	3566	0.907	0.229	38.9	D		
	R	670	1516	0.614	0.442	17.8	C		
WB	L	621	3388	0.736	0.183	33.0	D	32.4	D
	T	817	3566	0.835	0.229	33.7	D		
	R	499	1516	0.178	0.329	18.5	C		
NB	L	378	1694	0.881	0.512	36.5	D	20.1	C
	T	2207	5350	0.670	0.412	19.0	C		
	R	941	1516	0.307	0.621	6.9	B		
SB	L	191	1694	0.524	0.400	18.6	C	24.9	C
	T	1605	5350	0.827	0.300	27.9	D		
	R	771	1516	0.317	0.508	11.3	B		

Intersection Delay = 26.8 sec/veh Intersection LOS = D

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.884

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) Bradley Fair (N-S) Rock Road
Analyst: Brian Ray File Name: RCKBRDAM.HC9
Area Type: Other 2-8-99 AM Peak
Comment: 1999 turning movements post development

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	1	1	3	< 0	1	2	1
Volumes	25	15	90	55	5	60	35	1070	115	105	1105	15
Lane W (ft)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru		*		
Right	*				Right		*		
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru		*		
Right	*				Right		*		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	*			
Green	32.5A				Green	27.0A	48.5A		
Yellow/AR	4.0				Yellow/AR	4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	381	1365	0.381	0.279	22.8	C	22.8	C
WB	LT	285	1020	0.235	0.279	21.6	C	15.1	C
	R	815	1516	0.082	0.538	8.7	B		
NB	L	395	1694	0.099	0.233	23.3	C	19.0	C
	TR	2175	5272	0.666	0.412	18.9	C		
SB	L	395	1694	0.296	0.233	24.6	C	24.3	C
	T	1471	3566	0.876	0.412	24.4	C		
	R	625	1516	0.027	0.412	13.5	B		

Intersection Delay = 21.4 sec/veh Intersection LOS = C
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.580

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) Bradley Fair (N-S) Rock Road
Analyst: Brian Ray File Name: RCKBRDPM.HC9
Area Type: Other 2-8-99 PM Peak
Comment: 1999 turning movements post development

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	1	1	3	< 0	1	3	< 0
Volumes	42	15	74	210	15	160	63	1198	170	150	1074	31
Lane W (ft)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left		*			NB	Left	*		*	
	Thru		*				Thru			*	
	Right		*				Right			*	
	Peds						Peds				
WB	Left	*	*			SB	Left	*	*	*	
	Thru	*	*				Thru		*	*	
	Right	*	*				Right		*	*	
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right	*	*		
Green		6.0A	37.0A			Green		6.0A	6.0A	45.0P	
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

	Lane Group: Mvmts	Adj Sat Flow Cap	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	335 1059	0.435	0.317	25.1	D	25.1	D
WB	LT	595 1487	0.420	0.400	20.0	C	15.7	C
	R	859 1516	0.207	0.567	9.7	B		
NB	L	180 1694	0.389	0.467	12.7	B	24.4	C
	TR	2012 5250	0.831	0.383	24.9	C		
SB	L	300 1694	0.557	0.550	13.4	B	14.2	B
	TR	2486 5327	0.543	0.467	14.3	B		

Intersection Delay = 19.4 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.633

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) Bradley Fair (N-S) Rock Road
Analyst: Brian Ray File Name: RCKBRDAM.HC9
Area Type: Other 2-2-99 AM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	1	1	3	< 0	1	3	< 0
Volumes	25	15	90	55	5	60	35	1070	115	105	1105	15
Lane W (ft)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru		*		
Right	*				Right		*		
Peds					Peds				
WB Left	*				SB Left	*			
Thru	*				Thru		*		
Right	*				Right		*		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	*			
Green	32.5A				Green	25.5A	50.0A		
Yellow/AR	4.0				Yellow/AR	4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #5 #6

Intersection Performance Summary

	Lane Group: Mvmts	Adj Sat Flow Cap	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	381	1365	0.381	0.279	22.9	C	22.9	C
WB	LT	272	974	0.246	0.279	21.7	C	15.4	C
	R	796	1516	0.084	0.525	9.2	B		
NB	L	374	1694	0.104	0.221	24.1	C	18.3	C
	TR	2241	5272	0.647	0.425	18.1	C		
SB	L	374	1694	0.313	0.221	25.4	D	18.2	C
	TR	2269	5339	0.604	0.425	17.6	C		

Intersection Delay = 18.3 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.487

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) Bradley Fair (N-S) Rock Road
Analyst: Brian Ray File Name: RCKBRDPM.HC9
Area Type: Other 2-2-99 PM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	1	1	3	< 0	1	3	< 0
Volumes	45	15	75	245	15	210	65	1515	190	180	1640	35
Lane W (ft)		11.0			11.0	11.0	11.0	11.0		11.0	11.0	
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left		*			NB	Left	*		*	
	Thru		*				Thru			*	
	Right		*				Right			*	
	Peds						Peds				
WB	Left	*	*			SB	Left	*	*	*	
	Thru	*	*				Thru		*	*	
	Right	*	*				Right		*	*	
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right	*	*		
Green		6.0A	31.0A			Green		6.0A	6.0A	51.0P	
Yellow/AR		4.0	4.0			Yellow/AR		4.0	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6 #7

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	LTR	259	972	0.579	0.267	27.0	D	27.0	D
WB	LT	519	1484	0.556	0.350	21.3	C	16.6	C
	R	783	1516	0.297	0.517	10.8	B		
NB	L	162	1694	0.444	0.517	13.7	B	24.8	C
	TR	2279	5260	0.914	0.433	25.2	D		
SB	L	300	1694	0.667	0.600	23.6	C	16.2	C
	TR	2755	5333	0.743	0.517	15.5	C		

Intersection Delay = 20.2 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.766

Center For Microcomputers In Transportation
University of Florida
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Ph: (904) 392-0378

Streets: (N-S) Bradley Fair Parkway (E-W) 21st Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Brian Ray
Date of Analysis..... 2/8/99
Other Information..... 1999 AM turning movements post development

Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3 < 0		1	3 < 0		0 > 1		1	0 > 1		1
Stop/Yield			N			N						
Volumes	19	353	60	30	549	59	20	5	15	19	5	27
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	156	224
Potential Capacity: (pcph)	1154	1066
Movement Capacity: (pcph)	1154	1066
Prob. of Queue-Free State:	0.98	0.97
Step 2: LT from Major Street	**WB**	**EB**
Conflicting Flows: (vph)	435	640
Potential Capacity: (pcph)	1001	777
Movement Capacity: (pcph)	1001	777
Prob. of Queue-Free State:	0.97	0.97
Step 3: TH from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1096	1096
Potential Capacity: (pcph)	249	249
Capacity Adjustment Factor due to Impeding Movements	0.94	0.94
Movement Capacity: (pcph)	233	233
Prob. of Queue-Free State:	0.97	0.97
Step 4: LT from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1036	1036
Potential Capacity: (pcph)	230	230
Major LT, Minor TH Impedance Factor:	0.91	0.91
Adjusted Impedance Factor:	0.93	0.93
Capacity Adjustment Factor due to Impeding Movements	0.91	0.92
Movement Capacity: (pcph)	209	211

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB	L	23	209	>	214	19.5	0.5	C	
NB	T	6	233	>					13.3
NB	R	18	1154			3.2	0.0	A	
SB	L	22	211	>	215	19.2	0.4	C	
SB	T	6	233	>					10.9
SB	R	31	1066			3.5	0.0	A	
EB	L	22	777			4.8	0.0	A	0.2
WB	L	35	1001			3.7	0.0	A	0.2

Intersection Delay = 1.1 sec/veh

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Streets: (N-S) Bradley Fair Parkway (E-W) 21st Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Brian Ray
Date of Analysis..... 2/8/99
Other Information..... 1999 PM turning movements post development
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	< 0	1	3	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	34	534	55	45	490	41	65	10	65	115	10	98
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	216	194
Potential Capacity: (pcph)	1076	1104
Movement Capacity: (pcph)	1076	1104
Prob. of Queue-Free State:	0.93	0.90
Step 2: LT from Major Street	**WB**	**EB**
Conflicting Flows: (vph)	620	559
Potential Capacity: (pcph)	797	859
Movement Capacity: (pcph)	797	859
Prob. of Queue-Free State:	0.93	0.95
Step 3: TH from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1233	1240
Potential Capacity: (pcph)	207	205
Capacity Adjustment Factor due to Impeding Movements	0.89	0.89
Movement Capacity: (pcph)	184	183
Prob. of Queue-Free State:	0.93	0.93
Step 4: LT from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1194	1188
Potential Capacity: (pcph)	183	184
Major LT, Minor TH Impedance Factor:	0.83	0.83
Adjusted Impedance Factor:	0.87	0.87
Capacity Adjustment Factor due to Impeding Movements	0.78	0.81
Movement Capacity: (pcph)	143	149

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	75	143 >	148	57.5	3.8	F	
NB T	12	184 >					32.5
NB R	75	1076		3.6	0.1	A	
SB L	133	149 >	151	194.2	12.3	F	
SB T	12	183 >					110.5
SB R	113	1104		3.6	0.3	A	
EB L	40	859		4.4	0.0	A	0.2
WB L	52	797		4.8	0.1	A	0.4

Intersection Delay = 18.9 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21st Street (N-S) Bradley Fair
Analyst: Brian Ray File Name: 21BRDAM.HC9
Area Type: Other 2-8-99 AM Peak
Comment: 1999 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3 < 0		1	3 < 0		0 > 1		1	0 > 1		1
Volumes	19	353	60	30	549	59	20	5	15	19	5	27
Lane W (ft)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	*	*			NB Left *			
Thru		*			Thru *			
Right		*			Right *			
Peds					Peds			
WB Left	*	*			SB Left *			
Thru		*			Thru *			
Right		*			Right *			
Peds					Peds			
NB Right	*				EB Right			
SB Right	*				WB Right			
Green	6.0A	56.0P			Green 46.0A			
Yellow/AR	4.0	4.0			Yellow/AR 4.0			

Cycle Length: 120 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	283	1694	0.074	0.558	6.1	B	11.0	B
	TR	2485	5232	0.203	0.475	11.2	B		
WB	L	385	1694	0.086	0.558	6.1	B	11.5	B
	TR	2504	5271	0.297	0.475	11.8	B		
NB	LT	642	1639	0.044	0.392	17.2	C	15.5	C
	R	720	1516	0.024	0.475	12.7	B		
SB	LT	642	1640	0.042	0.392	17.2	C	14.9	B
	R	720	1516	0.042	0.475	12.8	B		

Intersection Delay = 11.6 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.192

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-08-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21st Street (N-S) Bradley Fair
Analyst: Brian Ray File Name: 21BRDPM.HC9
Area Type: Other 2-8-99 PM Peak
Comment: 1999 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	< 0	1	3	< 0	0	> 1	1	0	> 1	1
Volumes	34	534	55	45	490	41	65	10	65	115	10	98
Lane W (ft)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	*	*			NB Left	*		
	Thru		*			Thru	*		
	Right		*			Right	*		
	Peds					Peds			
WB	Left	*	*			SB Left		*	
	Thru		*			Thru		*	
	Right		*			Right		*	
	Peds					Peds			
NB	Right	*				EB Right			
SB	Right	*				WB Right			
Green		6.0A	40.0A			Green	29.0A	29.0A	
Yellow/AR		4.0	4.0			Yellow/AR	4.0	4.0	

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	241	1694	0.158	0.425	13.4	B	19.2	C
	TR	1802	5275	0.399	0.342	19.5	C		
WB	L	221	1694	0.226	0.425	13.6	B	18.8	C
	TR	1806	5287	0.359	0.342	19.2	C		
NB	LT	427	1709	0.194	0.250	22.9	C	21.3	C
	R	467	1516	0.154	0.308	19.5	C		
SB	LT	426	1705	0.326	0.250	23.9	C	21.5	C
	R	505	1516	0.216	0.333	18.6	C		

Intersection Delay = 19.5 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.329

Center For Microcomputers In Transportation
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512 Weil Hall
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Ph: (904) 392-0378

Streets: (N-S) Bradley Fair Parkway (E-W) 21st Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Brian Ray
Date of Analysis..... 2/8/99
Other Information..... 2020 AM turning movements post development
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3 < 0		1	3 < 0		0 > 1		1	0 > 1		1
Stop/Yield			N			N						
Volumes	20	430	70	55	735	60	25	5	25	20	5	30
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	188	290
Potential Capacity: (pcph)	1112	987
Movement Capacity: (pcph)	1112	987
Prob. of Queue-Free State:	0.97	0.96
Step 2: LT from Major Street	**WB**	**EB**
Conflicting Flows: (vph)	527	837
Potential Capacity: (pcph)	894	609
Movement Capacity: (pcph)	894	609
Prob. of Queue-Free State:	0.93	0.96
Step 3: TH from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1406	1412
Potential Capacity: (pcph)	164	163
Capacity Adjustment Factor due to Impeding Movements	0.89	0.89
Movement Capacity: (pcph)	147	146
Prob. of Queue-Free State:	0.96	0.96
Step 4: LT from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	1346	1340
Potential Capacity: (pcph)	146	147
Major LT, Minor TH Impedance Factor:	0.86	0.86
Adjusted Impedance Factor:	0.89	0.89
Capacity Adjustment Factor due to Impeding Movements	0.86	0.87
Movement Capacity: (pcph)	125	127

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	29	125 >	128	38.6	1.2	E	
NB T	6	147 >					22.6
NB R	29	1112		3.3	0.0	A	
SB L	23	127 >	131	35.3	0.9	E	
SB T	6	146 >					18.1
SB R	35	987		3.8	0.0	A	
EB L	23	609		6.1	0.0	B	0.2
WB L	64	894		4.3	0.1	A	0.3

Intersection Delay = 1.8 sec/veh

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Streets: (N-S) Bradley Fair Parkway (E-W) 21st Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Brian Ray
Date of Analysis..... 2/8/99
Other Information..... 2020 PM turning movements post development
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	< 0	1	3	< 0	0	> 1	1	0	> 1	1
Stop/Yield			N			N						
Volumes	35	885	65	55	890	45	75	15	80	120	15	100
PHF	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	345	336
Potential Capacity: (pcph)	926	936
Movement Capacity: (pcph)	926	936
Prob. of Queue-Free State:	0.90	0.88
Step 2: LT from Major Street	**WB**	**EB**
Conflicting Flows: (vph)	1000	984
Potential Capacity: (pcph)	498	508
Movement Capacity: (pcph)	498	508
Prob. of Queue-Free State:	0.87	0.92
Step 3: TH from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	2045	2056
Potential Capacity: (pcph)	69	68
Capacity Adjustment Factor due to Impeding Movements	0.80	0.80
Movement Capacity: (pcph)	55	54
Prob. of Queue-Free State:	0.67	0.67
Step 4: LT from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	2006	1996
Potential Capacity: (pcph)	55	56
Major LT, Minor TH Impedance Factor:	0.53	0.54
Adjusted Impedance Factor:	0.63	0.64
Capacity Adjustment Factor due to Impeding Movements	0.56	0.58
Movement Capacity: (pcph)	31	32

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB	L	87	31	>	34	*	36.8	F	
NB	T	18	55	>					*
NB	R	92	926			4.3	0.3	A	
SB	L	139	32	>	34	*	62.3	F	
SB	T	18	54	>					*
SB	R	116	936			4.4	0.4	A	
EB	L	41	508			7.7	0.2	B	0.3
WB	L	64	498			8.3	0.5	B	0.5

Intersection Delay = 535.4 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21st Street (N-S) Bradley Fair
Analyst: Brian Ray File Name: 21BRDAM.HC9
Area Type: Other 2-2-99 AM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3 < 0		1	3 < 0		0 > 1		1	0 > 1		1
Volumes	20	430	70	55	735	60	25	5	25	20	5	30
Lane W (ft)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*	*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds					Peds				
WB Left	*	*			SB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds					Peds				
NB Right	*				EB Right				
SB Right	*				WB Right				
Green	25.5A	58.0P			Green	24.5A			
Yellow/AR	4.0	4.0			Yellow/AR	4.0			

Cycle Length: 120 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	485	1694	0.045	0.737	3.2	A	11.1	B
	TR	2575	5237	0.238	0.492	11.4	B		
WB	L	612	1694	0.100	0.737	3.0	A	11.8	B
	TR	2600	5289	0.374	0.492	12.3	B		
NB	LT	340	1598	0.100	0.213	24.6	C	18.7	C
	R	695	1516	0.040	0.458	11.6	B		
SB	LT	340	1598	0.082	0.213	24.5	C	17.5	C
	R	695	1516	0.047	0.458	11.6	B		

Intersection Delay = 12.0 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.261

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4f 02-05-1999
Center For Microcomputers In Transportation

Streets: (E-W) 21st Street (N-S) Bradley Fair
Analyst: Brian Ray File Name: 21BRDPM.HC9
Area Type: Other 2-2-99 PM Peak
Comment: 2020 turning movements post development with improvements

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3 <	0	1	3 <	0	0 >	1	1	0 >	1	1
Volumes	35	885	65	55	890	45	75	15	80	120	15	100
Lane W (ft)	11.0	11.0		11.0	11.0			11.0	11.0		11.0	11.0
RTOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*	*			NB Left	*			
Thru		*			Thru	*			
Right		*			Right	*			
Peds					Peds				
WB Left	*	*			SB Left		*		
Thru		*			Thru		*		
Right		*			Right		*		
Peds					Peds				
NB Right	*				EB Right				
SB Right	*				WB Right				
Green	7.0A	41.0A			Green	28.0A	28.0A		
Yellow/AR	4.0	4.0			Yellow/AR	4.0	4.0		

Cycle Length: 120 secs Phase combination order: #1 #2 #5 #6

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	173	1694	0.225	0.442	13.8	B	21.2	C
	TR	1853	5295	0.626	0.350	21.5	C		
WB	L	173	1694	0.353	0.442	14.6	B	21.0	C
	TR	1859	5311	0.615	0.350	21.3	C		
NB	LT	414	1712	0.242	0.242	23.7	C	21.8	C
	R	467	1516	0.190	0.308	19.7	C		
SB	LT	413	1707	0.364	0.242	24.7	C	22.1	C
	R	505	1516	0.220	0.333	18.6	C		

Intersection Delay = 21.2 sec/veh Intersection LOS = C

Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.446