

1889 York Street
Denver, CO 80206
(303) 333-1105
FAX (303) 333-1107
E-mail: lsc@lscden.com
Web Site: <http://www.lscden.com>

March 12, 2001

Seminole Land Holdings
c/o Mr. Tom Garvin
8240 Creek Hollow Road
Boulder, CO 80301

Re: Silver Mountain Village
Silverthorne, Colorado
(LSC #010210)

Dear Mr. Garvin:

We have completed a review of the traffic impacts of the proposed Silver Mountain Village development located west of State Highway (SH) 9 at Ruby Ranch Road in Silverthorne, Colorado. The proposed site is presently vacant. The Silver Mountain Village development is proposed to contain a 85,000 square foot shopping center, a 6,000 square foot daycare center, 47 single-family dwelling units, 100 condominium/townhouse units, 36 apartment units, and a 400-student elementary school. Access is proposed from SH 9 via Ruby Ranch Road, Blue River Circle and Willowbrook Road. The remainder of this report presents our findings concerning the traffic impacts of the proposed development.

Existing Roadways

Figure 1, enclosed, illustrates the location of the site within the surrounding roadway network. As indicated, the site is located west of SH 9 at Ruby Ranch Road. Major roadways in the vicinity of the site are described below with a brief discussion of anticipated future roadway improvements.

- SH 9 is a two-lane rural highway with north-south continuity from Silverthorne on the south to SH 40 in the Town of Kremmling on the north. Within the Town of Silverthorne, SH 9 generally has a five-lane cross-section with a center median. The *Silverthorne Town-Wide Transportation Plan* prepared by Felsburg Holt & Ullevig in 1995 shows this roadway as a principal arterial with a five-lane cross-section (two through lanes in each direction and a center left-turn lane) in the vicinity of the proposed site.
- Bald Eagle Road, Ruby Ranch Road, Willow Brook Road and Blue River Circle are two-lane local roadways that currently provide access to single family and townhome residential dwelling units in the vicinity of the proposed site.

Existing Traffic Conditions

Figure 2 depicts existing lane geometry, traffic controls, and Year 2001 background peak-hour turning movement traffic activity at the intersections of Willowbrook Road/SH 9, Ruby Ranch Road/SH 9 and Blue Rive Circle/SH 9. These volumes are based on traffic counts conducted by Counter Measures, Inc. in January 2001 and projected land uses in the area. A summary of the raw count data is provided in Appendix A.

Projected Year 2021 Background Traffic

In order to have a basis for determining future traffic impacts, projections of future Years 2011 and 2021 peak-hour traffic were made at the critical intersections. Year 2011 represents the expected buildout year for the development and Year 2021 represents the long range projection for the area. Figures 3 and 4 illustrate Years 2011 and 2021 traffic projections, respectively. These traffic projections were derived by applying a 7.5 percent annual growth rate (2.06 growth factor for 10 years and 4.25 growth factor for 20 years) to the existing through traffic on SH 9 and adding in the traffic expected to be generated from the proposed Buffalo Mountain development located on the east side of SH 9 at Bald Eagle Road. The growth rate was estimated based on future projections from the *Silverthorne Town-Wide Transportation Plan* prepared by Felsburg Holt & Ullevig in 1995. The volumes illustrated in Figures 3 and 4 constitute "background traffic", or traffic anticipated on the roadway system without consideration of the traffic generated by the proposed development.

Estimated Traffic Generation

Based on applicable rates cited in the 1997 edition of *Trip Generation*, published by the Institute of Transportation Engineers, enclosed Table 1 presents estimates of average daily and peak-hour traffic to be generated by buildout of the proposed Silver Mountain Village residential development. As indicated, the Silver Mountain Village development is projected to generate 5,801 external average weekday vehicle-trips (2,900 entering and 2,900 exiting). This total includes 181 entering and 197 exiting trips during the morning peak-hour and 319 entering and 306 exiting trips during the evening peak-hour.

Estimated Traffic Distribution and Assignment

A key element in the determination of the proposed project's traffic impacts is the directional distribution of its traffic onto the surrounding roadway system. The relative location of the site, the type of land use, and specific characteristics of the roadway and access system will dictate what this distribution will be. Figure 5 illustrates the distribution expected to be applicable to the proposed development. As Figure 5 shows, the majority of the site-generated traffic is expected to be oriented towards the south with 65 percent originating and destined to the south, 20 percent oriented towards the north, five percent originating towards the residential development on the east side of SH 9, and ten percent of the traffic originating and destined within the proposed site. Application of the percentage distribution projections shown in Figure 5 to the generation estimates of Table 1 yields the assignment of site-generated traffic shown on Figure 6. Figures 7 and 8 illustrate the combination of weekday

peak-hour background traffic (from Figures 3 and 4) and project-generated traffic from the proposed development (from Figure 6).

Estimated Traffic Impacts

In order to assess the impact of the proposed project, peak-hour capacity analyses have been prepared for three key study intersections assuming background plus site-generated traffic conditions. The methodology used is that presented in the *2000 Highway Capacity Manual*, published by the Transportation Research Board of the National Academy of Sciences. The concept of Level of Service (LOS) is used as a basis for computing combinations of roadway operating conditions which accommodate various levels of traffic activity. By definition, six different Levels of Service are used (A, B, C, D, E, and F) with "A" being a free-flow condition and "E" representing the capacity of a given intersection or roadway. Table 2, enclosed, summarizes the results of the morning and evening peak-hour LOS analyses for the proposed development (actual computer analysis printouts are enclosed) and the following discusses the results of the capacity analysis for each intersection.

Willowbrook Road/SH 9: All approaches of this unsignalized intersection will operate at an acceptable Level of Service (LOS "D" or better) through Year 2011 with both the background and background plus site-generated traffic and the proposed geometry. By Year 2021, however, the westbound approach is expected to operate at a poor Level of Service (LOS "F") during the PM peak-hour with both the background and background plus site-generated traffic. Our traffic projections do not show that this intersection will meet warrants for a traffic signal by Year 2021.

Blue River Circle/SH 9: All movements of this unsignalized intersections will operate at an acceptable Level of Service (LOS "D" or better) through Year 2011 with both the background and background plus site-generated traffic with the proposed lane configuration. By Year 2021, however, the eastbound and westbound approaches are expected to operate at a poor Level of Service (LOS "F") with both the background and background plus site generated traffic. Our traffic projections do not show that this intersection will meet warrants for a traffic signal by Year 2021.

Ruby Ranch Road/SH 9: The eastbound and westbound approaches of this unsignalized intersection are expected to operate at a poor Level of Service (LOS "F" or better) with both the background and background plus site-generated traffic. Our traffic projections do not show that this intersection will meet peak-hour warrants for a traffic signal by Year 2021. However, due to its close proximity to the proposed elementary school, it is likely that Warrant #4 (School Crossing) from the *Manual on Uniform Traffic Control Devices* will be met.

The recommended lane geometry and traffic control for the site accesses are illustrated on Figure 9 and the Year 2021 link capacity analysis is illustrated on Figure 10. Figure 10 illustrates the average weekday traffic expected to be generated by the proposed development and background plus site-generated average daily traffic along with roadway capacity. The figure indicates that all surrounding roads will operate within their roadway capacities.

Conclusions and Recommendations

Based on the analyses presented herein, the following conclusions and recommendations are made with respect to buildout of the proposed Silver Mountain Village development:

1. The Silver Mountain Village development is proposed to contain a 85,000 square foot shopping center, a 6,000 square foot daycare center, 47 single-family dwelling units, 100 condominium/townhouse units, 36 apartment units, and a 400-student elementary school.
2. Access to the development is proposed from SH 9 via Ruby Ranch Road, Blue River Circle and Willowbrook Road.
3. The development is projected to generate 5,801 external average weekday vehicle-trips (2,900 entering and 2,900 exiting). This total includes 181 entering and 197 exiting trips during the morning peak-hour and 319 entering and 306 exiting trips during the evening peak-hour.
4. The majority of the site-generated traffic is expected to be oriented towards the south with 65 percent originating and destined to the south, 20 percent oriented towards the north, five percent originating towards the residential development on the east side of SH 9, and ten percent of the traffic originating and destined within the proposed site.
5. Because of its close proximity to a proposed elementary school, the Ruby Ranch Road/SH 9 intersection may meet warrants for a traffic signal. This intersection should be monitored and a traffic signal should be constructed if Warrant # 4 (School Crossing) from the *Manual on Uniform Traffic Control Devices* is met.
6. Although our analysis shows that the side street traffic at the Willowbrook Drive/SH 9 and Blue River Circle/SH 9 intersections will experience significant delay, it is not expected that these intersections will meet warrants for a traffic signal. In addition, it should be noted that the reported delay is expected to be less than projected due to gaps provided by the potential upstream signal at Bald Eagle Road and if a signal is installed at the Ruby Ranch Road/SH 9 intersection, vehicles will have an alternative access that will experience little delay.
7. The traffic impacts of the proposed development are moderate and can be accommodated by the adjacent roadway network.

* * *

We trust that this report will assist with planning for the Silver Mountain Village development. Please call if we can provide additional assistance.

Sincerely,

LSC Transportation Consultants, Inc

By: Alex J. Ariniello
Alex J. Ariniello, P.E.



AJA/BW/wc

Enclosures: Tables 1 and 2
Figures 1 through 10
Traffic Counts
Capacity Analyses

\\Server\d\LSC\Projects\2001\010210\F-SMVI.wpd

Table 1
Estimated Traffic Generation
Silver Mountain Village
Silverthorne, Colorado
LSC # 010210

Landuse	Quantity	Traffic Generation Rates				Vehicle-Trips Generated								
		Average		Peak - Hours		Average		Peak - Hours						
		Weekday	AM In	AM Out	PM In	PM Out	Weekday	AM In	AM Out	PM In	PM Out			
Silver Mountain Village														
Shopping Center	(4) 85 KSF	42.92	0.63	0.40	1.80	1.95	3,648	54	34	153	166			
Child Care Center	(5) 6 KSF	79.26	6.74	5.97	6.20	7.00	476	40	36	37	42			
Single Family	(6) 47 DU	9.57	0.19	0.56	0.65	0.36	450	9	26	30	17			
Townhomes	(7) 100 DU	5.86	0.07	0.37	0.36	0.18	586	7	37	36	18			
Appartments	(8) 36 DU	6.49	0.08	0.43	0.41	0.20	234	3	15	15	7			
Elementary School	(9) 400 Students	1.02	0.17	0.12	0.12	0.14	408	68	48	48	56			
							5,801	181	197	319	306			

Notes:

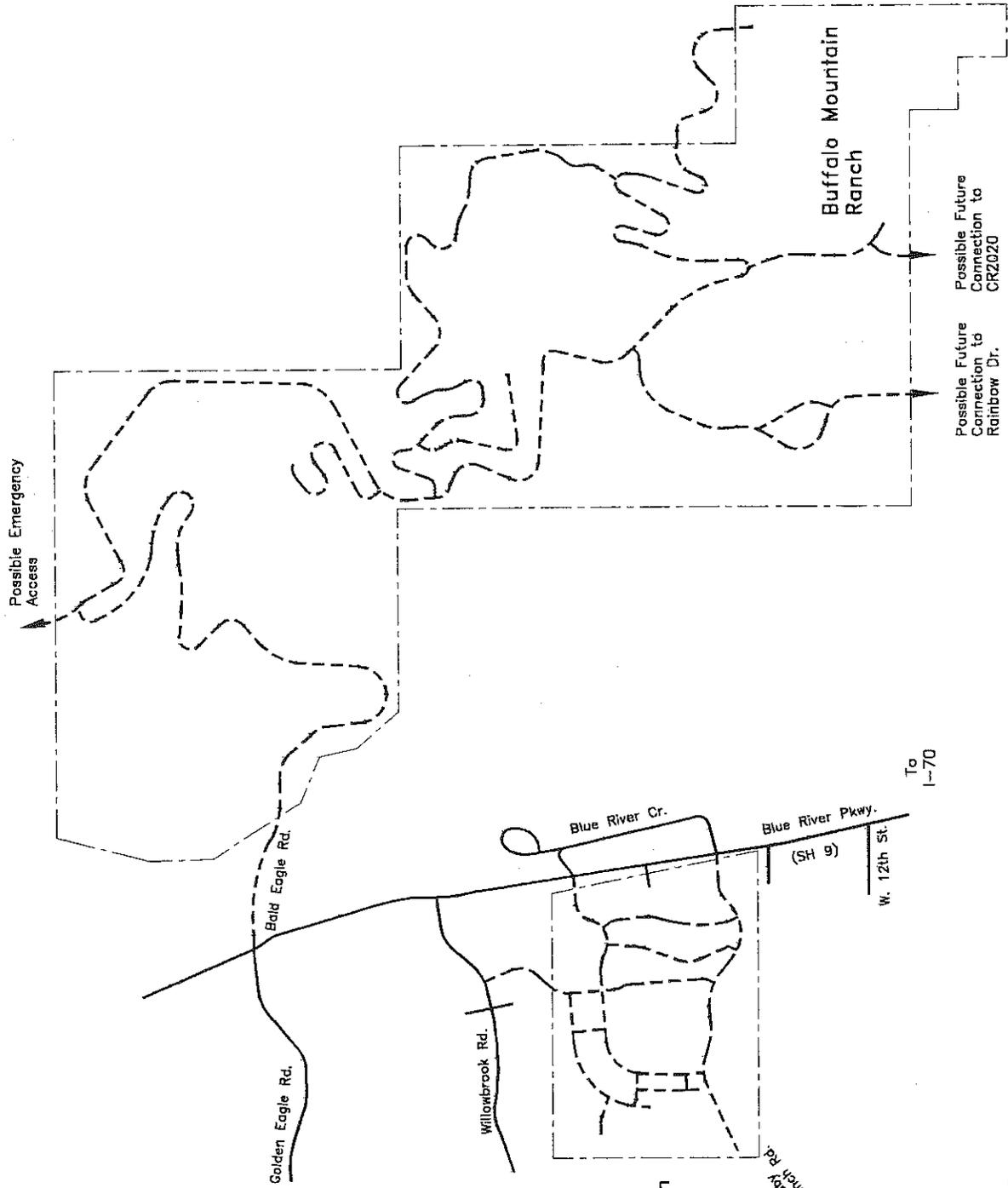
- (1) Source: "Trip Generation", Institute of Transportation Engineers, 6th Edition, 1997.
- (2) Land Use No. 820, Shopping Center
- (3) Land Use No. 565, Day Care Center
- (4) Land Use No. 210, Single-Family Homes
- (5) Land Use No. 230, Residential Condominium/Townhouse
- (6) Land Use No. 220, Apartment
- (7) Land Use No. 520, Elementary School

Table 2
Level of Service Analysis
Silver Mountain Village
Silverthorne, Colorado
LSC # 010210

Intersection	Approach	Levels of Service						Levels of Service						
		Year 2001		Year 2011		Year 2011		Year 2021		Year 2021		Year 2021		
		Background	PM	Background	AM	Background	PM	Background	AM	Background	PM	Background	AM	PM
Hollowbrook Road/SH 9	Unsignalized													
	NB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
	SB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
Blue River Circle/SH 9	EB Approach	B	B	B	B	B	B	C	C	D	D	D	D	F
	Unsignalized													
	NB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
	SB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
Ruby Ranch Road/SH 9	EB Approach	B	C	C	E	C	C	F	F	F	F	F	F	F
	WB Approach	B	C	C	D	D	D	E	E	E	E	E	E	F
	Unsignalized													
	NB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
Ruby Ranch Road/SH 9	SB Approach	A	A	A	A	A	A	A	A	A	A	A	A	A
	EB Approach	B	C	C	C	D	D	E	E	F	F	F	F	F
	WB Approach	B	B	C	E	E	E	F	F	F	F	F	F	F
	Unsignalized													
Ruby Ranch Road/SH 9	NB Approach	-	-	-	-	A	A	-	-	-	-	-	-	A
	SB Approach	-	-	-	-	A	A	-	-	-	-	-	-	A
	EB Approach	-	-	-	-	B	B	-	-	-	-	-	-	C



Approximate Scale
Scale: 1" = 1,000'



Silver Mountain Village

Figure 1

Site Location

March, 2001
Silver Mountain Village (LSC #010210)



Approximate Scale
Scale: 1" = 1,000'

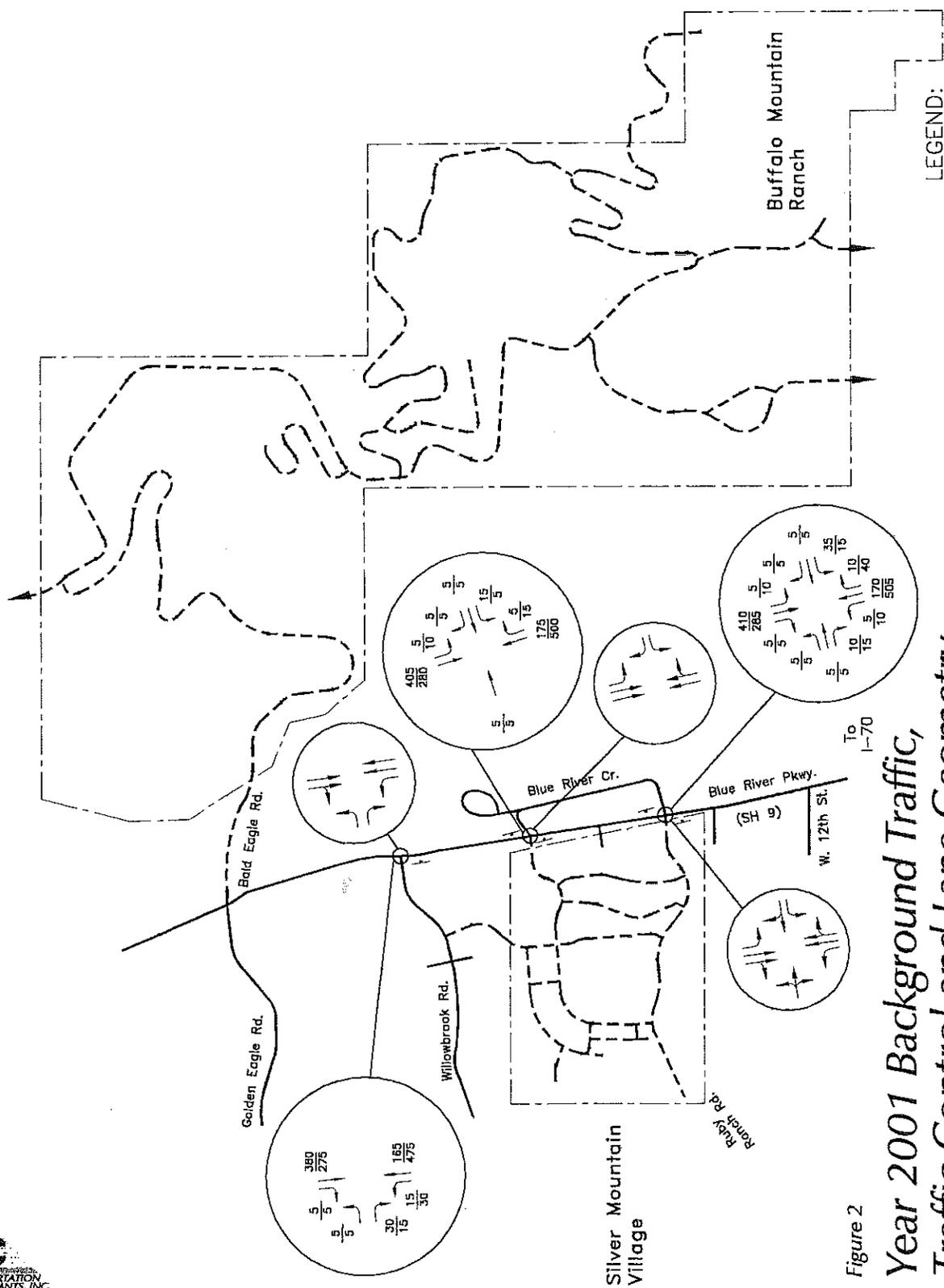


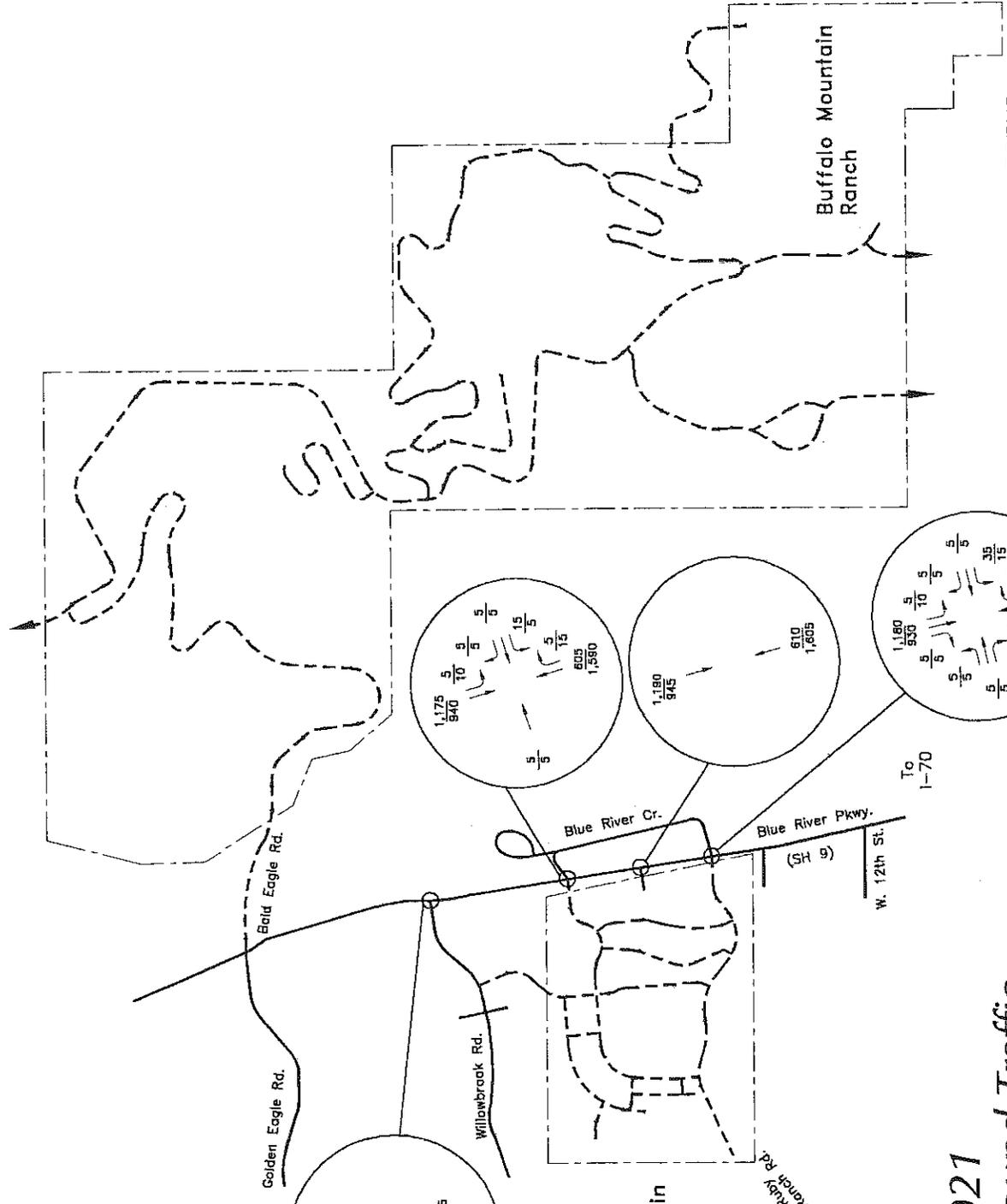
Figure 2
Year 2001 Background Traffic,
Traffic Control and Lane Geometry

March, 2001
Silver Mountain Village (LSC #010210)





Approximate Scale
Scale: 1" = 1,300'



LEGEND:

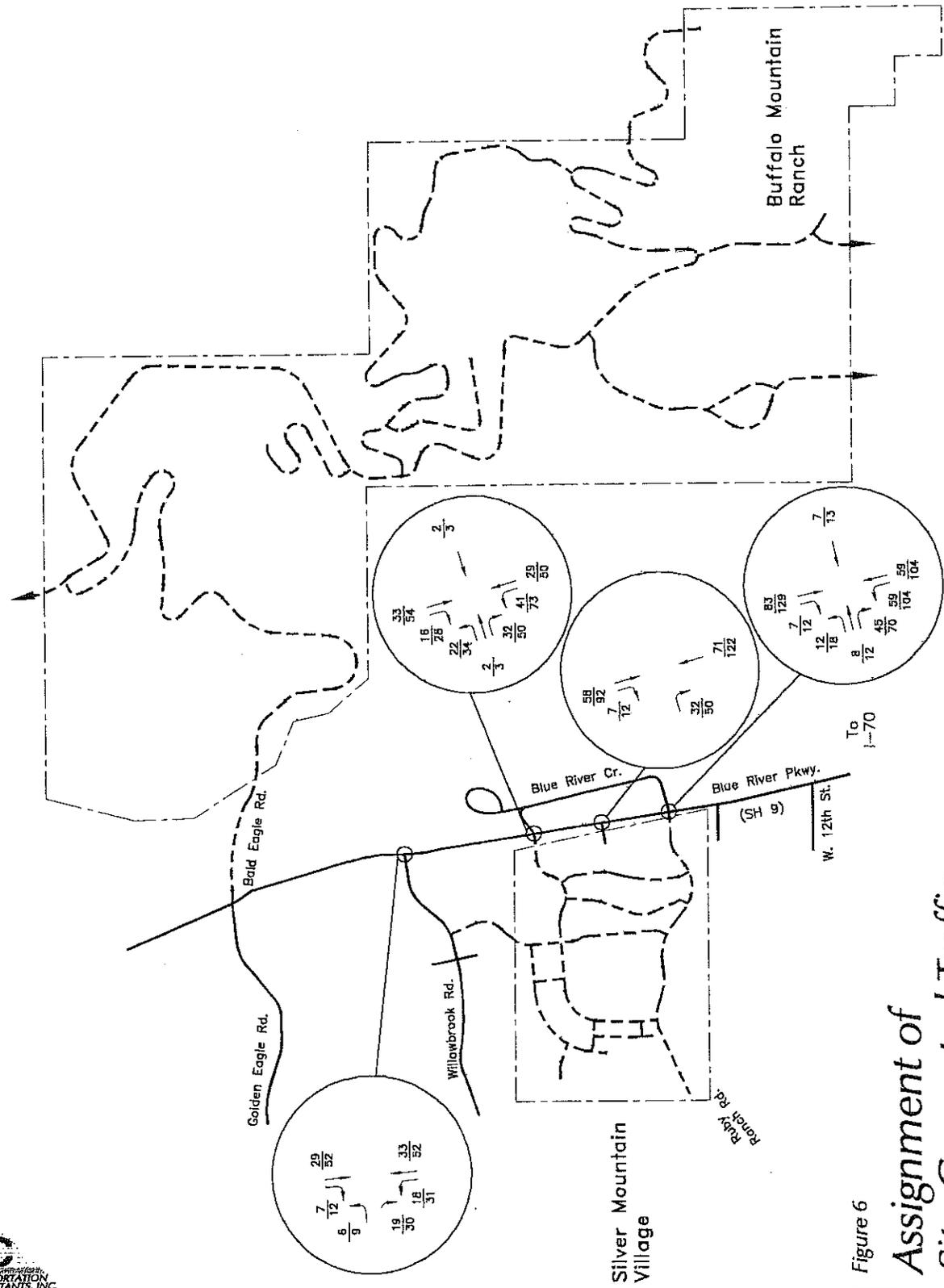
$\frac{26}{31}$ = AM Peak-Hour Traffic
 $\frac{31}{26}$ = PM Peak-Hour Traffic



Figure 4
**Year 2021
 Background Traffic**
 March, 2001
 Silver Mountain Village (LSC #010210)



Approximate Scale
 Scale: 1" = 1,300'



LEGEND:

$\frac{26}{31}$ = AM Peak-Hour Traffic
 $\frac{31}{31}$ = PM Peak-Hour Traffic

Figure 6
**Assignment of
 Site-Generated Traffic**

March, 2001
 Silver Mountain Village (LSC #010210)



Approximate Scale
Scale: 1" = 1,000'

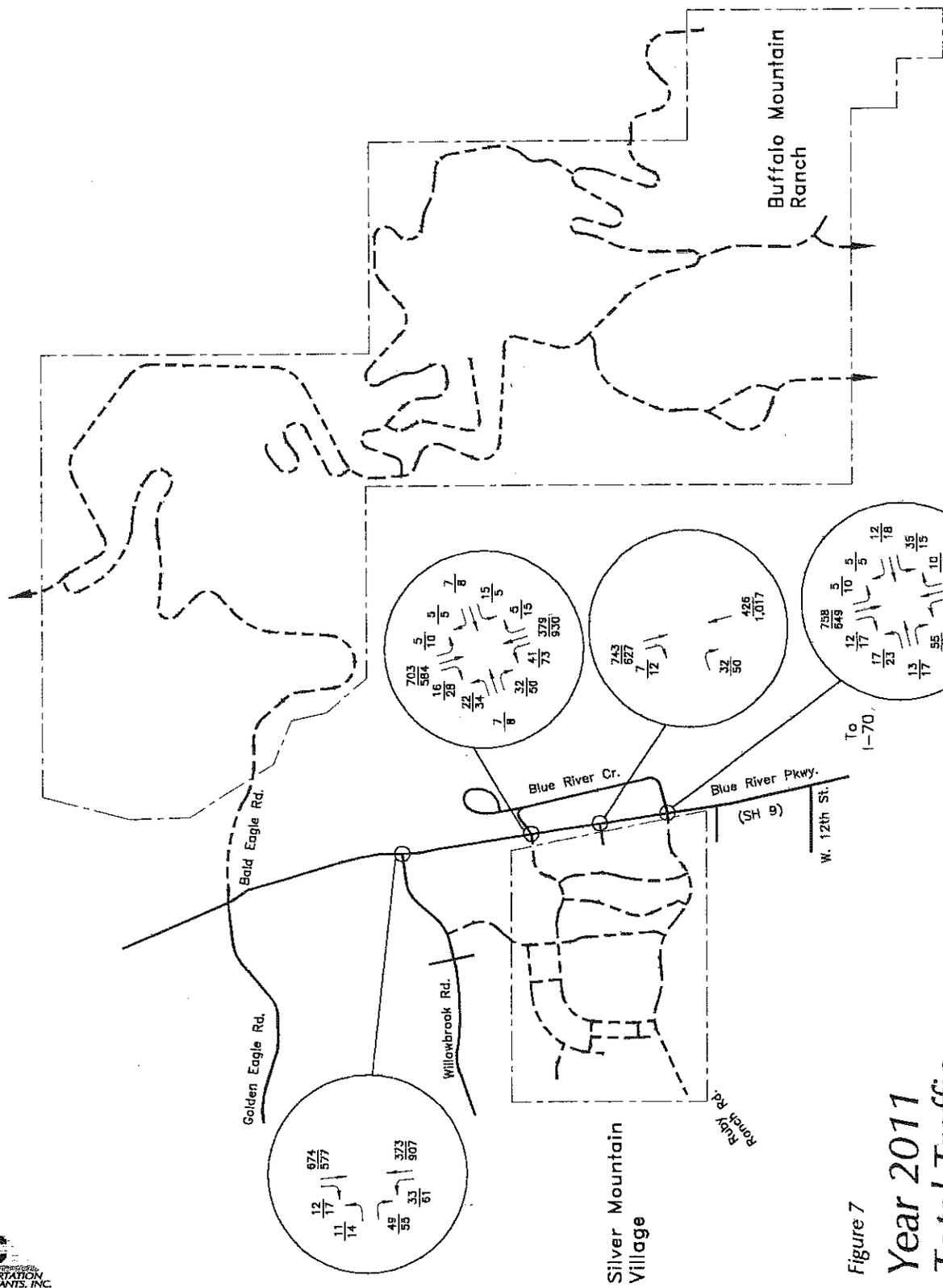


Figure 7
Year 2011
Total Traffic
 March, 2001
 Silver Mountain Village (LSC #010210)



Approximate Scale
Scale: 1" = 1,300'

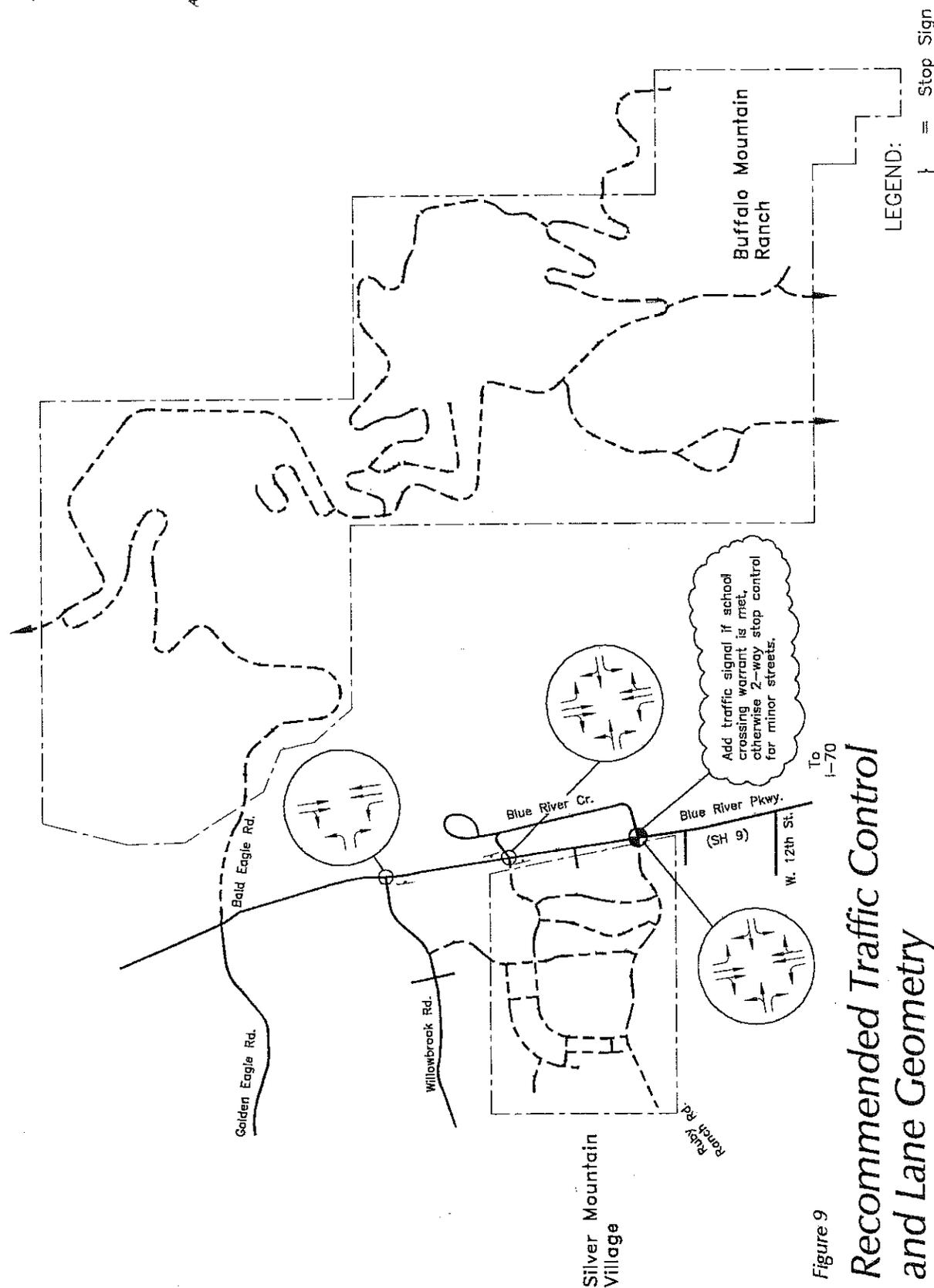


Figure 9

Recommended Traffic Control and Lane Geometry

March, 2001
Silver Mountain Village (LSC #010210)

Counter Measures

Site Code :
 N/S STREET: SH-9
 E/W STREET: GOLDEN EAGLE ROAD

PAGE: 1
 FILE: SH-9GOLD

Movements by: Primary

DATE: 1/26/01

Time Begin	From North				From East				From South				From West				Vehicle Total	PEDS Total
	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT		
6:30	0	0	22	0	0	0	0	1	0	0	11	0	0	3	0	0	37	0
6:45	0	0	29	1	0	0	0	0	0	0	15	3	0	4	0	0	52	0
HR TOTAL	0	0	51	1	0	0	0	1	0	0	26	3	0	7	0	0	89	0
7:00 AM	0	0	32	0	0	0	0	3	0	1	20	4	0	6	0	0	66	0
7:15	0	0	51	0	0	0	0	0	0	1	15	0	0	11	0	0	78	0
7:30	0	0	62	0	0	0	0	2	0	4	29	5	0	19	0	0	121	0
7:45	0	3	61	0	0	0	0	1	0	7	30	4	0	21	0	0	127	0
HR TOTAL	0	3	206	0	0	0	0	6	0	13	94	13	0	57	0	0	392	0
8:00 AM	0	0	51	0	0	0	0	2	0	8	31	14	0	18	1	0	125	0
8:15	0	0	56	0	0	0	1	4	0	4	23	5	0	13	0	0	106	0
8:30	0	0	67	0	0	0	0	1	0	2	29	8	1	11	0	1	119	1
8:45	0	0	48	0	0	0	0	0	0	2	34	6	0	23	0	1	114	0
HR TOTAL	0	0	222	0	0	0	1	7	0	16	117	33	1	65	1	2	464	1
9:00 AM	0	1	51	0	0	0	0	1	0	1	25	8	0	16	0	1	104	0
9:15	0	4	28	0	2	0	0	0	0	2	32	6	1	13	3	0	88	3
9:30	0	1	34	0	0	0	0	3	0	5	34	12	0	13	0	1	103	0
9:45	0	3	43	0	0	0	1	4	0	5	40	6	0	14	0	1	117	0
HR TOTAL	0	9	156	0	2	0	1	8	0	13	131	32	1	56	3	3	412	3
10:00 AM	0	0	38	0	0	0	1	3	0	7	29	8	0	7	0	1	94	0
10:15	0	4	40	0	0	1	0	3	0	4	37	8	0	12	0	1	110	0
10:30	0	1	30	0	0	0	0	4	0	3	21	6	2	6	2	1	74	2
10:45	0	0	41	0	0	1	0	2	0	1	34	7	0	10	0	2	98	0
HR TOTAL	0	5	149	0	0	2	1	12	0	15	121	29	2	35	2	5	376	2
11:00 AM	0	1	35	0	0	1	0	2	0	2	31	7	0	13	0	0	92	0
11:15	0	0	19	0	0	0	1	4	0	1	32	10	0	8	1	0	76	0
11:30	0	0	37	0	0	0	0	1	0	0	35	8	0	5	0	0	86	0
11:45	0	3	51	0	0	0	0	1	0	2	33	13	0	13	0	1	117	0
HR TOTAL	0	4	142	0	0	1	1	8	0	5	131	38	0	39	1	1	371	0
12:00 PM	0	2	32	0	0	0	1	5	0	2	28	7	0	14	0	1	92	0
12:15	0	0	47	0	0	0	0	3	0	3	26	9	0	10	0	0	98	0
12:30	0	1	33	0	0	0	0	2	0	1	43	9	0	9	0	0	98	0
12:45	0	1	34	1	0	1	0	3	0	3	43	11	0	9	1	1	108	0
HR TOTAL	0	4	146	1	0	1	1	13	0	9	140	36	0	42	1	2	396	0
1:00 PM	0	0	31	0	0	1	0	1	0	4	36	8	0	16	1	0	98	0
1:15	0	0	38	0	0	0	0	0	0	2	42	11	0	5	0	0	98	0
1:30	0	0	34	0	0	0	0	3	0	0	46	4	0	6	0	0	93	0
1:45	0	1	43	0	0	0	0	4	0	1	58	11	0	7	0	0	125	0
HR TOTAL	0	1	146	0	0	1	0	8	0	7	182	34	0	34	1	0	414	0

Counter Measures

Site Code :
 W/S STREET: SH-9
 E/W STREET: GOLDEN EAGLE ROAD

PAGE: 2
 FILE: SH-9GOLD

Movements by: Primary

DATE: 1/26/01

Time Begin	From North				From East				From South				From West				Vehicle Total	PEDS Total
	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT		
2:00 PM	0	0	29	0	0	0	0	0	0	2	41	8	0	11	0	1	92	0
2:15	0	0	38	0	0	0	1	3	0	7	51	5	0	7	1	0	113	0
2:30	0	3	41	0	0	1	0	3	0	3	55	8	0	6	0	0	120	0
2:45	0	0	33	0	0	0	0	7	0	2	50	10	0	12	0	0	114	0
HR TOTAL	0	3	141	0	0	1	1	13	0	14	197	31	0	36	1	1	439	0
3:00 PM	0	1	53	0	0	0	0	3	0	3	62	12	0	11	0	0	145	0
3:15	0	0	34	0	0	0	0	2	0	3	45	12	0	8	0	0	104	0
3:30	0	1	53	0	0	0	0	4	0	1	69	17	2	10	0	1	156	2
3:45	0	0	49	0	0	0	0	6	0	2	70	10	0	9	0	0	146	0
HR TOTAL	0	2	189	0	0	0	0	15	0	9	246	51	2	38	0	1	551	2
4:00 PM	0	1	49	0	0	0	1	2	0	5	68	15	0	9	0	0	150	0
4:15	0	0	44	0	0	0	0	1	0	2	81	17	0	11	0	0	156	0
4:30	0	0	42	0	0	0	2	3	0	1	84	15	0	11	0	0	158	0
4:45	0	3	42	1	0	0	2	2	0	3	76	21	0	13	0	0	163	0
HR TOTAL	0	4	177	1	0	0	5	8	0	11	309	68	0	44	0	0	627	0
5:00 PM	0	1	49	0	0	0	0	1	0	0	69	17	0	16	0	3	156	0
5:15	0	1	53	0	0	1	0	6	0	4	93	19	0	12	0	0	189	0
5:30	0	1	41	1	0	0	0	2	0	1	74	18	0	12	0	0	150	0
5:45	0	2	29	0	0	1	0	2	0	1	69	12	0	11	0	0	127	0
HR TOTAL	0	5	172	1	0	2	0	11	0	6	305	66	0	51	0	3	622	0
6:00 PM	0	2	43	0	0	0	0	1	0	2	84	9	0	10	0	0	151	0
6:15	0	0	27	0	0	0	0	3	0	0	81	15	0	6	0	0	132	0
DAY TOTAL	0	42	1967	4	2	8	11	114	0	120	2164	458	6	520	10	18	5436	8

Counter Measures

Site Code :
 W/S STREET: SH-9
 E/W STREET: GOLDEN EAGLE ROAD

PAGE: 1
 FILE: SH-9GOLD

Movements by: Primary

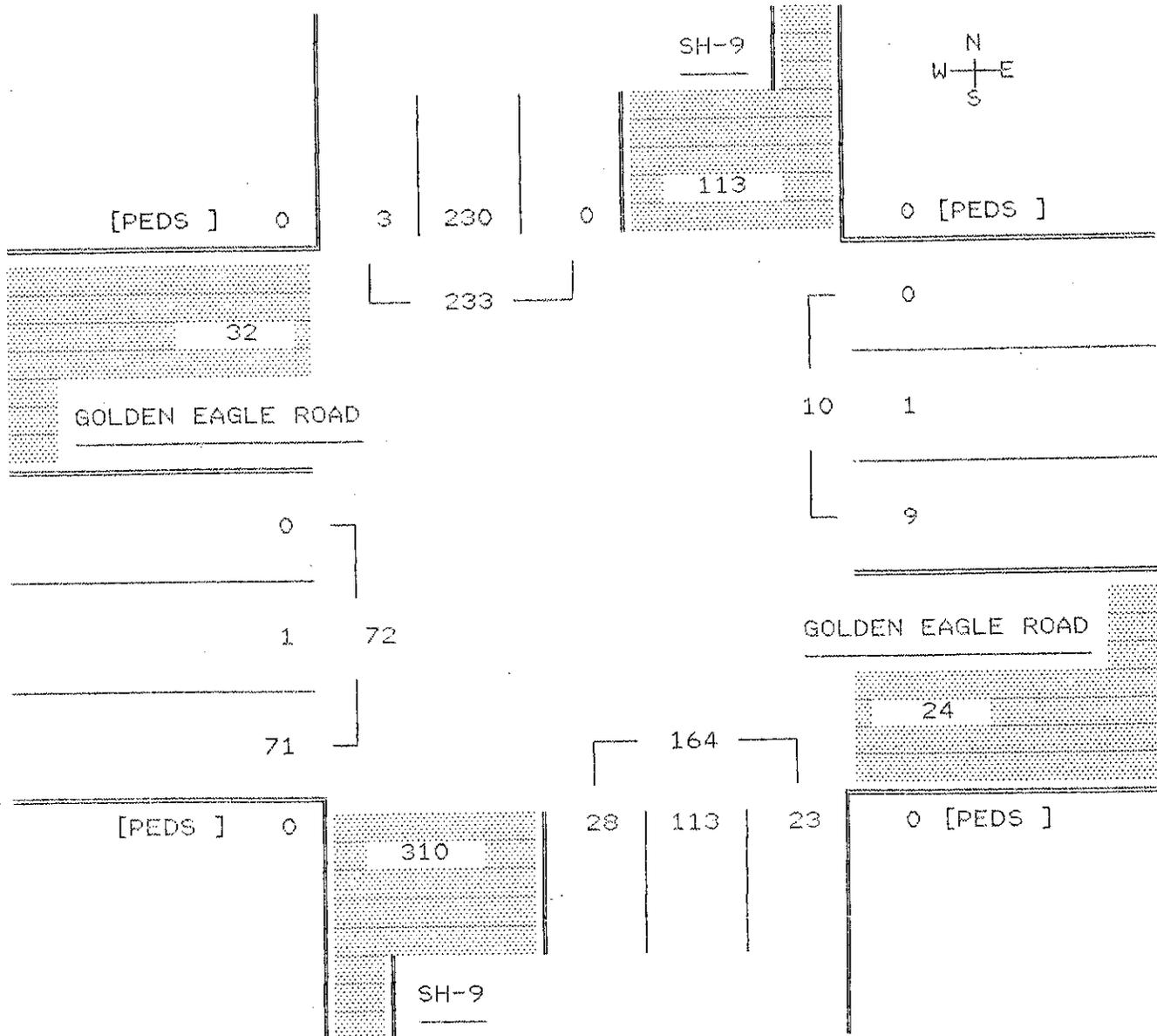
DATE: 1/26/01

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES					PERCENTS			
			PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	7:30 AM	0.91	0	3	230	0	233	-	1	99	0
East	7:30 AM	0.50	0	0	1	9	10	-	0	10	90
South	7:30 AM	0.77	0	23	113	28	164	-	14	69	17
West	7:30 AM	0.86	0	71	1	0	72	-	99	1	0

Entire Intersection

North	7:30 AM	0.91	0	3	230	0	233	-	1	99	0
East		0.50	0	0	1	9	10	-	0	10	90
South		0.77	0	23	113	28	164	-	14	69	17
West		0.86	0	71	1	0	72	-	99	1	0



Counter Measures

Site Code :
 N/S STREET: SH-9
 E/W STREET: GOLDEN EAGLE ROAD

PAGE: 1
 FILE: SH-9GOLD

Movements by: Primary

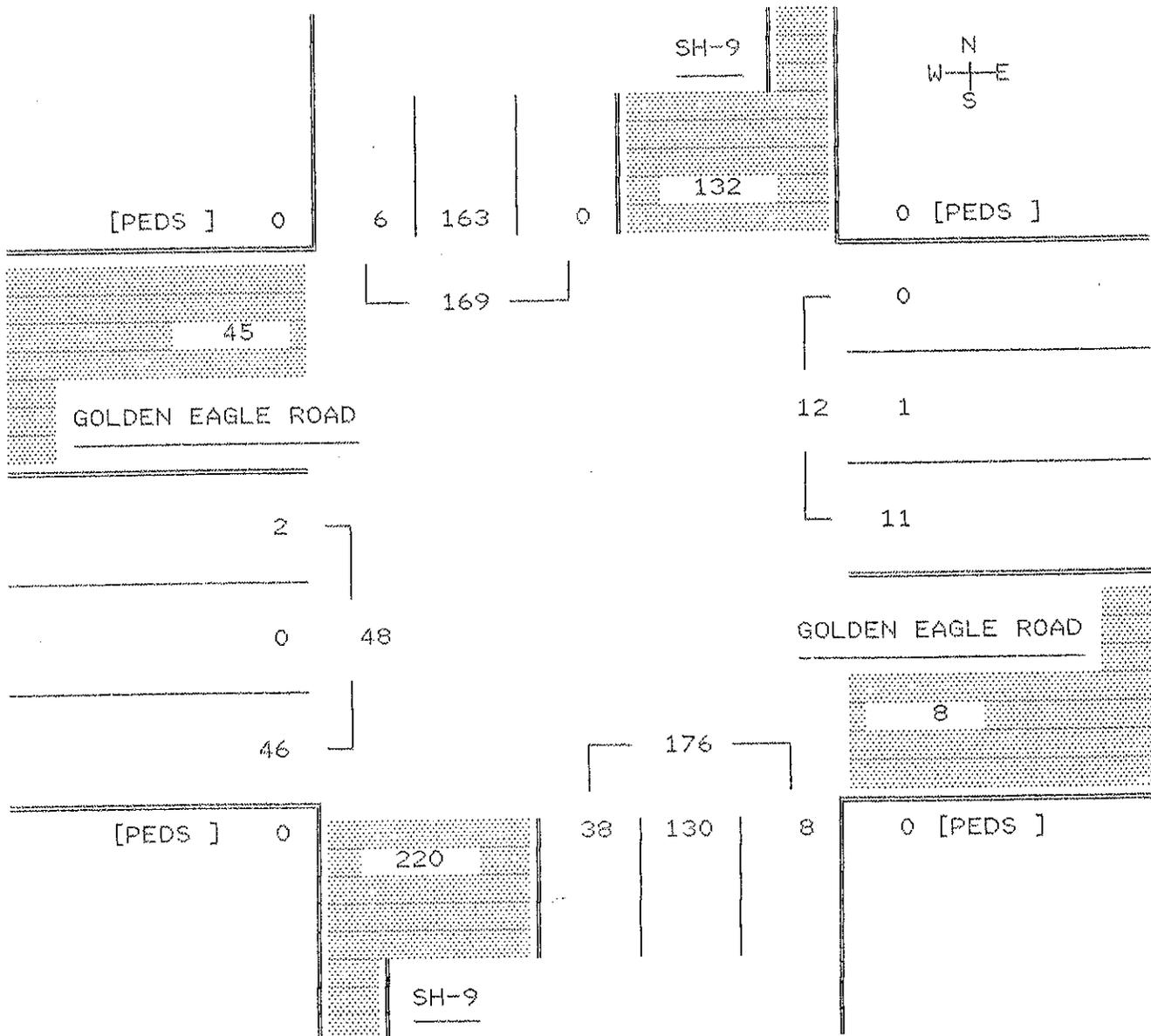
DATE: 1/26/01

PEAK PERIOD ANALYSIS FOR THE PERIOD: 11:30 AM - 1:30 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR VOLUMES PERCENTS			
			PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	11:30 AM	0.80	0	5	167	0	172	-	3	97	0
East	12:00 PM	0.63	0	1	1	13	15	-	7	7	87
South	12:30 PM	0.93	0	10	164	39	213	-	5	77	18
West	11:45 AM	0.80	0	46	0	2	48	-	96	0	4

Entire Intersection

North	11:45 AM	0.78	0	6	163	0	169	-	4	96	0
East		0.50	0	0	1	11	12	-	0	8	92
South		0.83	0	8	130	38	176	-	5	74	22
West		0.80	0	46	0	2	48	-	96	0	4



Counter Measures

Site Code :
M/S STREET: SH-9
E/W STREET: GOLDEN EAGLE ROAD

PAGE: 1
FILE: SH-9GOLD

Movements by: Primary

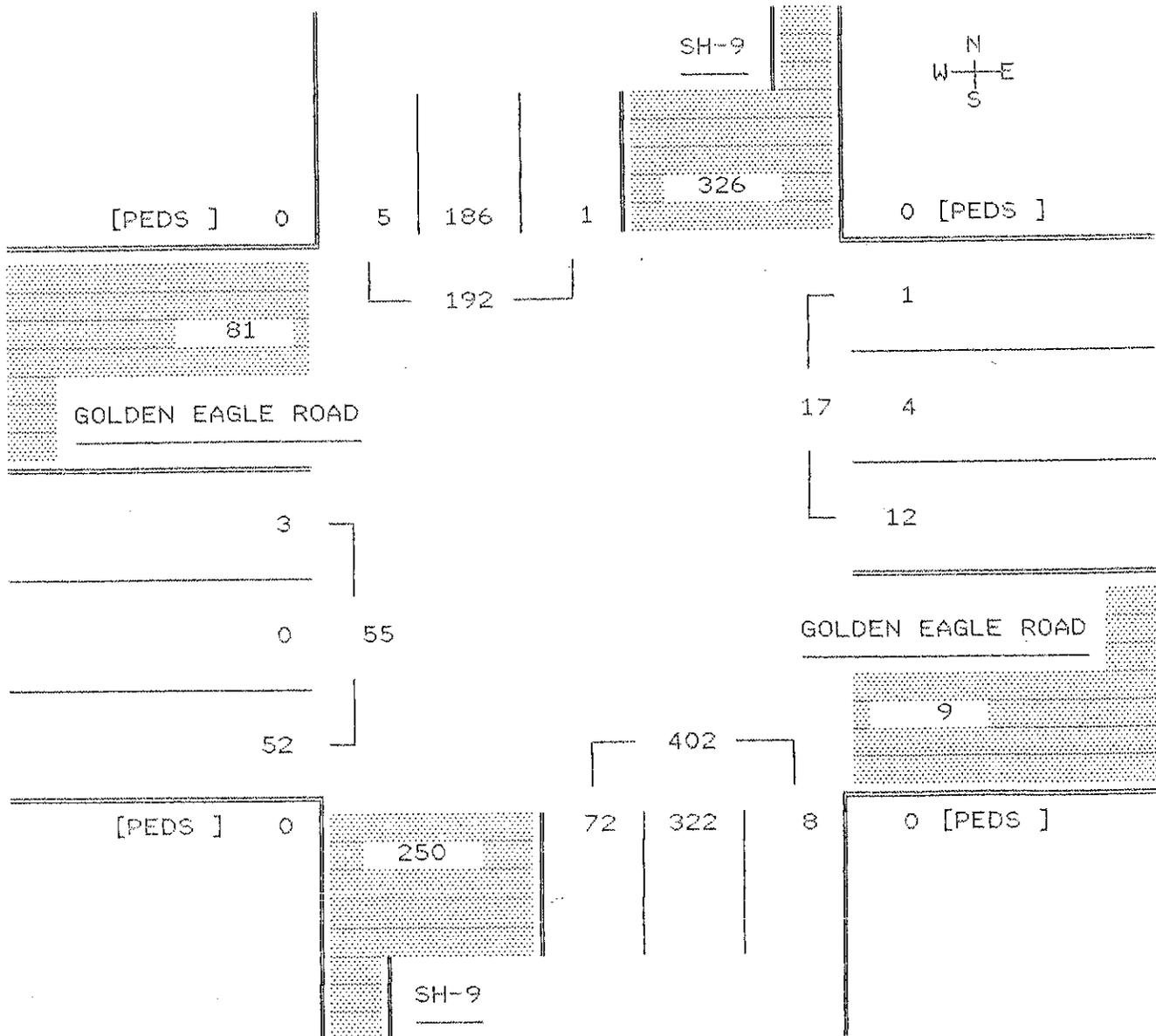
DATE: 1/26/01

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:30 PM - 6:30 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR VOLUMES PERCENTS			
			PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	4:45 PM	0.89	0	6	185	2	193	-	3	96	1
East	4:30 PM	0.61	0	1	4	12	17	-	6	24	71
South	4:30 PM	0.87	0	8	322	72	402	-	2	80	18
West	4:45 PM	0.74	0	53	0	3	56	-	95	0	5

Entire Intersection

North	4:30 PM	0.89	0	5	186	1	192	-	3	97	1
East		0.61	0	1	4	12	17	-	6	24	71
South		0.87	0	8	322	72	402	-	2	80	18
West		0.72	0	52	0	3	55	-	95	0	5



Blue River Pkwy

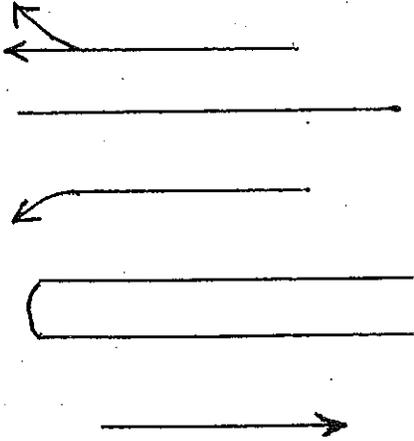
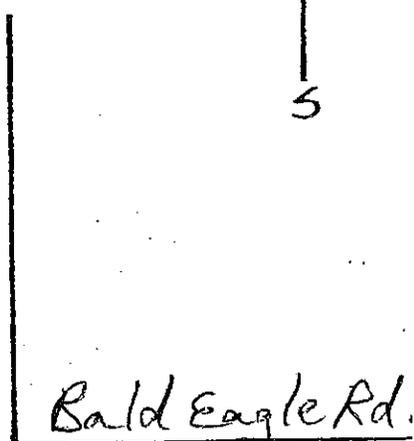
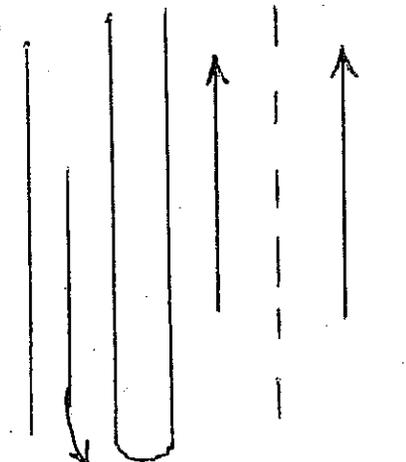
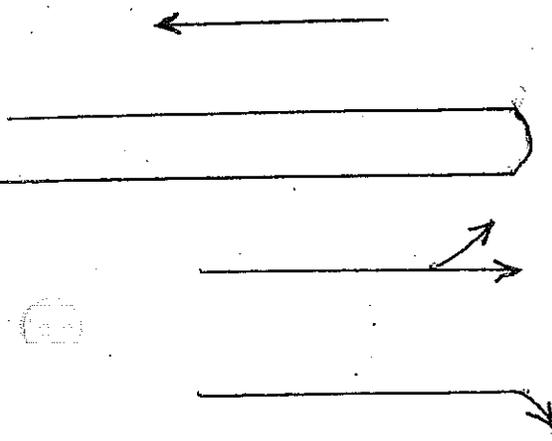
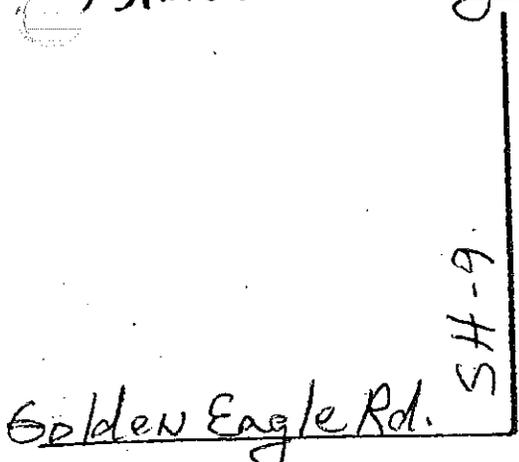
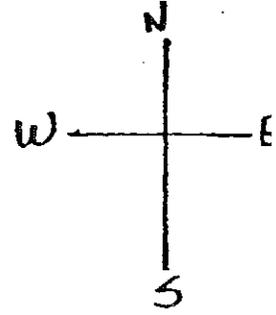
(SH-9)

Golden Eagle Rd/

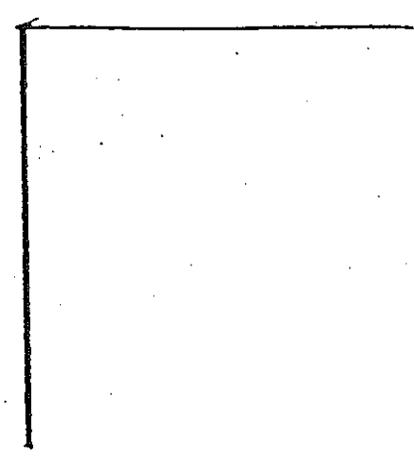
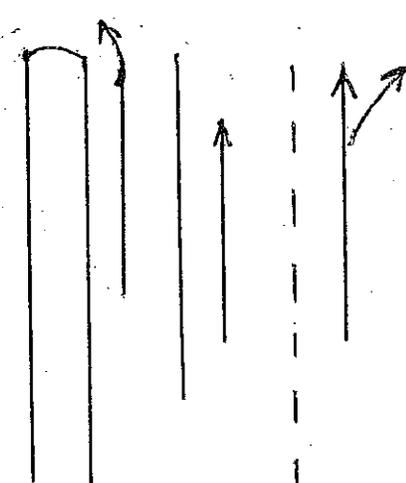
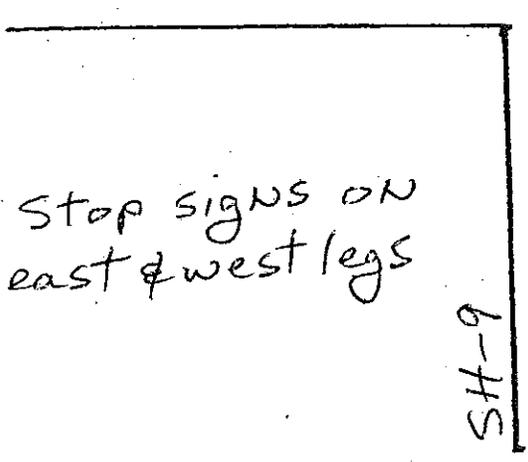
Bald Eagle Rd.

N/S STREET

STREET



stop signs on east & west legs



HCM Unsignalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↗	↕		↗	↕	
Sign Control	Stop			Stop			Free		Free		Free	
Grade	0%			0%			0%		0%		0%	
Volume (veh/h)	5	5	70	85	10	10	30	115	25	5	230	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	76	92	11	11	33	125	27	5	250	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC conflicting volume	408	481	128	418	470	76	255			152		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	92	80	98	99	98			100		
cM capacity (veh/h)	502	469	899	460	476	970	1307			1426		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	87	114	33	83	69	5	167	89
Volume Left	5	92	33	0	0	5	0	0
Volume Right	76	11	0	0	27	0	0	5
cSH	812	486	1307	1700	1700	1426	1700	1700
Volume to Capacity	0.11	0.23	0.02	0.05	0.04	0.00	0.10	0.05
Queue Length (ft)	9	23	2	0	0	0	0	0
Control Delay (s)	10.0	14.7	7.8	0.0	0.0	7.5	0.0	0.0
Lane LOS	A	B	A				A	
Approach Delay (s)	10.0	14.7	1.4				0.2	
Approach LOS	A	B						

Intersection Summary		
Average Delay	4.4	
Intersection Capacity Utilization	26.8%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙		↖	↑↑	↑↑	↘
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	30	15	165	380	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	33	16	179	413	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC conflicting volume	538	209	418			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	99			
cM capacity (veh/h)	466	797	1137			

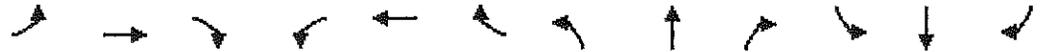
Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	16	90	90	275	143
Volume Left	5	16	0	0	0	0
Volume Right	33	0	0	0	0	5
cSH	723	1137	1700	1700	1700	1700
Volume to Capacity	0.05	0.01	0.05	0.05	0.16	0.08
Queue Length (ft)	4	1	0	0	0	0
Control Delay (s)	10.3	8.2	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.3	0.7			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization	21.6%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↑↑		↗	↑↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	5	0	15	5	5	0	175	5	5	405	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	5	0	16	5	5	0	190	5	5	440	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
vC, conflicting volume	554	647	220	427	644	98	440			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	100	97	99	99	100			100		
cM capacity (veh/h)	407	387	784	505	388	939	1116			1375		

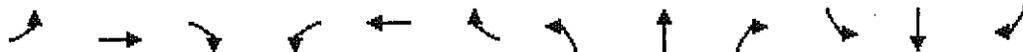
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	27	127	69	5	220	220
Volume Left	0	16	0	0	5	0	0
Volume Right	0	5	0	5	0	0	0
cSH	387	522	1700	1700	1375	1700	1700
Volume to Capacity	0.01	0.05	0.07	0.04	0.00	0.13	0.13
Queue Length (ft)	1	4	0	0	0	0	0
Control Delay (s)	14.4	12.3	0.0	0.0	7.6	0.0	0.0
Lane LOS	B	B			A		
Approach Delay (s)	14.4	12.3	0.0		0.1		
Approach LOS	B	B					

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization	22.2%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↑	↑↑		↑	↑↑	
Sign Control	Stop			Stop			Free	Free		Free	Free	
Grade	0%			0%			0%	0%		0%	0%	
Volume (veh/h)	5	5	10	35	5	5	5	170	10	5	410	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	11	38	5	5	5	185	11	5	446	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC, conflicting volume	571	666	226	448	663	98	451			196		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	99	92	99	99	100			100		
cM capacity (veh/h)	394	375	778	478	377	939	1106			1375		

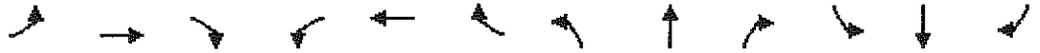
Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	22	49	5	123	72	5	297	154
Volume Left	5	38	5	0	0	5	0	0
Volume Right	11	5	0	0	11	0	0	5
cSH	515	490	1106	1700	1700	1375	1700	1700
Volume to Capacity	0.04	0.10	0.00	0.07	0.04	0.00	0.17	0.09
Queue Length (ft)	3	8	0	0	0	0	0	0
Control Delay (s)	12.3	13.2	8.3	0.0	0.0	7.6	0.0	0.0
Lane LOS	B	B	A			A		
Approach Delay (s)	12.3	13.2	0.2			0.1		
Approach LOS	B	B						

Intersection Summary		
Average Delay	1.4	
Intersection Capacity Utilization	22.5%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↕			↕			↖	↕		↖	↕		
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Volume (veh/h)	5	10	50	45	5	5	75	325	80	10	185	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (veh/h)	5	11	54	49	5	5	82	353	87	11	201	5	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None					None							
Median storage (veh)													
vC, conflicting volume	573	829	103	742	788	220	207			440			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2			
p0 queue free %	99	96	94	81	98	99	94			99			
cM capacity (veh/h)	373	284	932	263	300	784	1362			1116			

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	71	60	82	236	205	11	134	72
Volume Left	5	49	82	0	0	11	0	0
Volume Right	54	5	0	0	87	0	0	5
cSH	635	284	1362	1700	1700	1116	1700	1700
Volume to Capacity	0.11	0.21	0.06	0.14	0.12	0.01	0.08	0.04
Queue Length (ft)	9	19	5	0	0	1	0	0
Control Delay (s)	11.4	21.1	7.8	0.0	0.0	8.3	0.0	0.0
Lane LOS	B	C	A			A		
Approach Delay (s)	11.4	21.1	1.2			0.4		
Approach LOS	B	C						

Intersection Summary		
Average Delay		3.2
Intersection Capacity Utilization	30.2%	ICU Level of Service
		A

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	15	30	475	275	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	16	33	516	299	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC conflicting volume	625	152	304			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	97			
cM capacity (veh/h)	406	867	1253			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	22	33	258	258	199	105
Volume Left	5	33	0	0	0	0
Volume Right	16	0	0	0	0	5
cSH	675	1253	1700	1700	1700	1700
Volume to Capacity	0.03	0.03	0.15	0.15	0.12	0.06
Queue Length (ft)	2	2	0	0	0	0
Control Delay (s)	10.5	7.9	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.5	0.5			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization	24.3%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis
 3: Blue River Circle & SH 9

3/8/2001



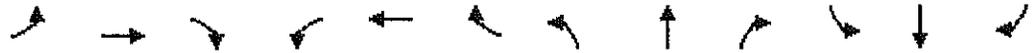
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↑↑		↗	↑↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	5	0	5	5	5	0	500	15	10	280	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	5	0	5	5	5	0	543	16	11	304	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC, conflicting volume	606	886	152	728	878	280	304			560		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	98	100	98	98	99	100			99		
cM capacity (veh/h)	369	279	867	304	282	717	1253			1007		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	16	362	197	11	152	152
Volume Left	0	5	0	0	11	0	0
Volume Right	0	5	0	16	0	0	0
cSH	279	365	1700	1700	1007	1700	1700
Volume to Capacity	0.02	0.04	0.21	0.12	0.01	0.09	0.09
Queue Length (ft)	1	4	0	0	1	0	0
Control Delay (s)	18.2	15.3	0.0	0.0	8.6	0.0	0.0
Lane LOS	C	C			A		
Approach Delay (s)	18.2	15.3	0.0	0.3			
Approach LOS	C	C					

Intersection Summary		
Average Delay	0.5	
Intersection Capacity Utilization	25.5%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↑	↑↑		↑	↑↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	505	10	10	285	5	5	5	15	15	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	11	549	11	11	310	5	5	5	16	16	5	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
VC conflicting volume	215	73	5	345	68	11	11			22		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	32	99	96	62	99	100			99		
cM capacity (veh/h)	501	805	1076	258	811	1067	1607			1592		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	571	326	5	4	18	16	4	7
Volume Left	11	11	5	0	0	16	0	0
Volume Right	11	5	0	0	16	0	0	5
cSH	800	760	1607	1700	1700	1592	1700	1700
Volume to Capacity	0.71	0.43	0.00	0.00	0.01	0.01	0.00	0.00
Queue Length (ft)	154	54	0	0	0	1	0	0
Control Delay (s)	19.9	13.3	7.2	0.0	0.0	7.3	0.0	0.0
Lane LOS	C	B	A			A		
Approach Delay (s)	19.9	13.3	1.4			4.4		
Approach LOS	C	B						

Intersection Summary		
Average Delay		16.6
Intersection Capacity Utilization	46.1%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↗	↕		↗	↕	
Sign Control	Stop			Stop			Free	Free		Free	Free	
Grade	0%			0%			0%	0%		0%	0%	
Volume (veh/h)	5	5	70	105	10	15	30	235	80	10	475	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	76	114	11	16	33	255	87	11	516	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage veh												
vC, conflicting volume	755	948	261	723	908	171	522			342		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	90	57	96	98	97			99		
cM capacity (veh/h)	274	249	738	268	263	843	1041			1213		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	87	141	33	170	172	11	344	178
Volume Left	5	114	33	0	0	11	0	0
Volume Right	76	16	0	0	87	0	0	5
cSH	600	291	1041	1700	1700	1213	1700	1700
Volume to Capacity	0.14	0.49	0.03	0.10	0.10	0.01	0.20	0.10
Queue Length (ft)	13	63	2	0	0	1	0	0
Control Delay (s)	12.0	28.5	8.6	0.0	0.0	8.0	0.0	0.0
Lane LOS	B	D	A			A		
Approach Delay (s)	12.0	28.5	0.7			0.2		
Approach LOS	B	D						

Intersection Summary		
Average Delay	4.8	
Intersection Capacity Utilization	35.7%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		↑	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	30	15	340	645	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	33	16	370	701	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC, conflicting volume	921	353	707			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0, queue free %	98	95	98			
cM capacity (veh/h)	265	643	888			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	16	185	185	467	239
Volume Left	5	16	0	0	0	0
Volume Right	33	0	0	0	0	5
cSH	534	888	1700	1700	1700	1700
Volume to Capacity	0.07	0.02	0.11	0.11	0.27	0.14
Queue Length (ft)	6	1	0	0	0	0
Control Delay (s)	12.3	9.1	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.3	0.4			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay	0.5					
Intersection Capacity Utilization	29.6%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↑↑		↕	↑↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	5	0	15	5	5	0	350	5	5	670	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	5	0	16	5	5	0	380	5	5	728	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
vC, conflicting volume	937	1125	364	761	1122	193	728			386		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0, queue free %	100	97	100	94	97	99	100			100		
cM capacity (veh/h)	213	203	633	288	204	816	871			1169		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	27	254	132	5	364	364
Volume Left	0	16	0	0	5	0	0
Volume Right	0	5	0	5	0	0	0
cSH	203	302	1700	1700	1169	1700	1700
Volume to Capacity	0.03	0.09	0.15	0.08	0.00	0.21	0.21
Queue Length (ft)	2	7	0	0	0	0	0
Control Delay (s)	23.2	18.1	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	C			A		
Approach Delay (s)	23.2	18.1	0.0		0.1		
Approach LOS	C	C					

Intersection Summary		
Average Delay	0.6	
Intersection Capacity Utilization	30.1%	ICU Level of Service
		A

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↖	↕		↖	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	5	10	35	5	5	5	345	10	5	675	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	11	38	5	5	5	375	11	5	734	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
vC, conflicting volume	954	1144	370	783	1141	193	739			386		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	97	98	86	97	99	99			100		
cM capacity (veh/h)	206	196	628	271	197	816	863			1169		

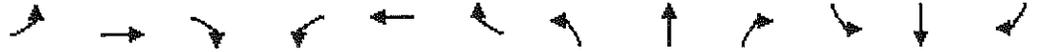
Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	22	49	5	250	136	5	489	250
Volume Left	5	38	5	0	0	5	0	0
Volume Right	11	5	0	0	11	0	0	5
cSH	304	280	863	1700	1700	1169	1700	1700
Volume to Capacity	0.07	0.17	0.01	0.15	0.08	0.00	0.29	0.15
Queue Length (ft)	6	16	0	0	0	0	0	0
Control Delay (s)	17.7	20.5	9.2	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	C	A			A		
Approach Delay (s)	17.7	20.5	0.1			0.1		
Approach LOS	C	C						

Intersection Summary		
Average Delay		1.2
Intersection Capacity Utilization	30.5%	ICU Level of Service
		A

HCM Unsignalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	10	50	105	5	10	75	670	115	15	380	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	11	54	114	5	11	82	728	125	16	413	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage veh												
vC, conflicting volume	989	1465	209	1253	1405	427	418			853		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
IC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0, queue free %	97	91	93	0	96	98	93			98		
cM capacity (veh/h)	178	116	797	104	126	576	1137			782		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	71	130	82	486	368	16	275	143
Volume Left	5	114	82	0	0	16	0	0
Volume Right	54	11	0	0	125	0	0	5
cSH	366	112	1137	1700	1700	782	1700	1700
Volume to Capacity	0.19	1.16	0.07	0.29	0.22	0.02	0.16	0.08
Queue Length (ft)	18	206	6	0	0	2	0	0
Control Delay (s)	17.2	208.7	8.4	0.0	0.0	9.7	0.0	0.0
Lane LOS	C	F	A			A		
Approach Delay (s)	17.2	208.7	0.7			0.4		
Approach LOS	C	F						

Intersection Summary			
Average Delay	18.6		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis

2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	15	30	855	525	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	16	33	929	571	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
VC conflicting volume	1103	288	576			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	97			
cM capacity (veh/h)	199	709	993			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	22	33	465	465	380	196
Volume Left	5	33	0	0	0	0
Volume Right	16	0	0	0	0	5
cSH	432	993	1700	1700	1700	1700
Volume to Capacity	0.05	0.03	0.27	0.27	0.22	0.12
Queue Length (ft)	4	3	0	0	0	0
Control Delay (s)	13.8	8.7	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	13.8	0.3			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	35.7%			ICU Level of Service		A

HCM Unsignalized Intersection Capacity Analysis
 3: Blue River Circle & SH 9

3/8/2001



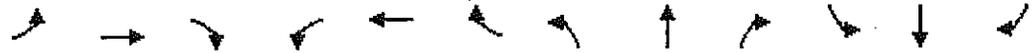
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Sign Control		Stop			Stop			Free			Free		
Grade		0%			0%			0%			0%		
Volume (veh/h)	0	5	0	5	5	5	0	880	15	10	530	0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (veh/h)	0	5	0	5	5	5	0	957	16	11	576	0	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None					None							
Median storage (veh)													
vC, conflicting volume	1084	1571	288	1277	1562	486	576			973			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2			
p0 queue free %	100	95	100	95	95	99	100			98			
cM capacity (veh/h)	161	108	709	117	109	527	993			704			

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	16	638	335	11	288	288
Volume Left	0	5	0	0	11	0	0
Volume Right	0	5	0	16	0	0	0
cSH	108	153	1700	1700	704	1700	1700
Volume to Capacity	0.05	0.11	0.38	0.20	0.02	0.17	0.17
Queue Length (ft)	4	9	0	0	1	0	0
Control Delay (s)	40.2	31.3	0.0	0.0	10.2	0.0	0.0
Lane LOS	E	D			B		
Approach Delay (s)	40.2	31.3	0.0		0.2		
Approach LOS	E	D					

Intersection Summary	
Average Delay	0.5
Intersection Capacity Utilization	37.0%
ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis
 4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↖	↕		↖	↕	
Sign Control	Stop			Stop				Free			Free	
Grade	0%			0%				0%			0%	
Volume (veh/h)	5	5	15	15	5	5	10	885	40	10	520	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	16	16	5	5	11	962	43	11	565	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
vC conflicting volume	1101	1617	285	1329	1598	503	571			1005		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	95	98	84	95	99	99			98		
cM capacity (veh/h)	155	100	711	104	103	514	998			685		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	27	27	11	641	364	11	377	194
Volume Left	5	16	11	0	0	11	0	0
Volume Right	16	5	0	0	43	0	0	5
cSH	242	123	998	1700	1700	685	1700	1700
Volume to Capacity	0.11	0.22	0.01	0.38	0.21	0.02	0.22	0.11
Queue Length (ft)	9	20	1	0	0	1	0	0
Control Delay (s)	21.8	42.4	8.6	0.0	0.0	10.3	0.0	0.0
Lane LOS	C	E	A			B		
Approach Delay (s)	21.8	42.4	0.1			0.2		
Approach LOS	C	E						

Intersection Summary		
Average Delay	1.2	
Intersection Capacity Utilization	38.0%	ICU Level of Service A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↗↔		↗	↗↔	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.98		1.00	0.98		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1636			1763		1770	3465		1770	3537	
Flt Permitted		0.98			0.80		0.23	1.00		0.42	1.00	
Satd. Flow (perm)		1612			1463		432	3465		773	3537	
Volume (vph)	5	5	70	105	10	15	30	490	80	10	980	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	5	76	114	11	16	33	533	87	11	1065	5
Lane Group Flow (vph)	0	86	0	0	141	0	33	620	0	11	1070	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.7			10.7		33.9	33.9		33.9	33.9	
Effective Green, g (s)		10.7			10.7		33.9	33.9		33.9	33.9	
Actuated g/C Ratio		0.20			0.20		0.64	0.64		0.64	0.64	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		328			298		278	2233		498	2280	
v/s Ratio Prot								0.18			0.30	
v/s Ratio Perm		0.05			0.10		0.08			0.01		
v/c Ratio		0.26			0.47		0.12	0.28		0.02	0.47	
Uniform Delay, d1		17.6			18.5		3.6	4.0		3.4	4.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			1.2		0.2	0.1		0.0	0.2	
Delay (s)		18.1			19.7		3.8	4.1		3.4	4.9	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		18.1			19.7			4.1			4.9	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay		6.3		HCM Level of Service		A						
HCM Volume to Capacity ratio		0.47										
Actuated Cycle Length (s)		52.6		Sum of lost time (s)		8.0						
Intersection Capacity Utilization		50.8%		ICU Level of Service		A						
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	30	15	595	1150	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	33	16	647	1250	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type: None						
Median storage (veh)						
vC, conflicting volume	1609	628	1255			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2-stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	92	97			
cM capacity (veh/h)	93	426	550			

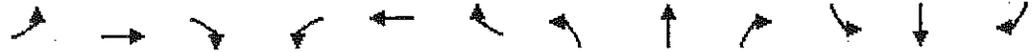
Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	16	323	323	833	422
Volume Left	5	16	0	0	0	0
Volume Right	33	0	0	0	0	5
cSH	281	550	1700	1700	1700	1700
Volume to Capacity	0.14	0.03	0.19	0.19	0.49	0.25
Queue Length (ft)	12	2	0	0	0	0
Control Delay (s)	19.8	11.7	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	19.8	0.3			0.0	
Approach LOS	C					

Intersection Summary						
Average Delay	0.5					
Intersection Capacity Utilization	44.7%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↑↑		↗	↑↑	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	5	0	15	5	5	0	605	5	5	1175	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	5	0	16	5	5	0	658	5	5	1277	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC, conflicting volume	1625	1951	639	1312	1948	332	1277			663		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	91	100	85	91	99	100			99		
cM capacity (veh/h)	63	63	419	108	63	664	539			922		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	27	438	225	5	639	639
Volume Left	0	16	0	0	5	0	0
Volume Right	0	5	0	5	0	0	0
cSH	63	111	1700	1700	922	1700	1700
Volume to Capacity	0.09	0.24	0.26	0.13	0.01	0.38	0.38
Queue Length (ft)	7	22	0	0	0	0	0
Control Delay (s)	67.3	47.6	0.0	0.0	8.9	0.0	0.0
Lane LOS	F	E			A		
Approach Delay (s)	67.3	47.6	0.0		0.0		
Approach LOS	F	E					

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization	45.3%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	5	10	35	5	5	5	600	10	5	1180	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	11	38	5	5	5	652	11	5	1283	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC conflicting volume	1641	1970	644	1334	1967	332	1288			663		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	91	97	62	91	99	99			99		
cM capacity (veh/h)	60	61	416	100	61	664	534			922		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	22	49	5	435	228	5	855	433
Volume Left	5	38	5	0	0	5	0	0
Volume Right	11	5	0	0	11	0	0	5
cSH	106	103	534	1700	1700	922	1700	1700
Volume to Capacity	0.21	0.48	0.01	0.26	0.13	0.01	0.50	0.25
Queue Length (ft)	18	52	1	0	0	0	0	0
Control Delay (s)	47.7	68.5	11.8	0.0	0.0	8.9	0.0	0.0
Lane LOS	E	F	B				A	
Approach Delay (s)	47.7	68.5	0.1				0.0	
Approach LOS	E	F						

Intersection Summary		
Average Delay	2.2	
Intersection Capacity Utilization	45.6%	ICU Level of Service: A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↗		↗	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Fr't		0.90			0.99		1.00	0.99		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1663			1764		1770	3498		1770	3536	
Flt Permitted		0.98			0.79		0.31	1.00		0.11	1.00	
Satd. Flow (perm)		1634			1459		582	3498		203	3536	
Volume (vph)	5	10	50	105	5	10	75	1380	115	15	785	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	54	114	5	11	82	1500	125	16	853	5
Lane Group Flow (vph)	0	70	0	0	130	0	82	1625	0	16	858	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.7			11.7		48.5	48.5		48.5	48.5	
Effective Green, g (s)		11.7			11.7		48.5	48.5		48.5	48.5	
Actuated g/C Ratio		0.17			0.17		0.71	0.71		0.71	0.71	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		280			250		414	2488		144	2515	
v/s Ratio Prot								c0.46			0.24	
v/s Ratio Perm		0.04			c0.09		0.14			0.08		
v/c Ratio		0.25			0.52		0.20	0.65		0.11	0.34	
Uniform Delay, d1		24.5			25.7		3.3	5.3		3.1	3.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			1.9		0.2	0.6		0.3	0.1	
Delay (s)		24.9			27.6		3.5	5.9		3.4	3.8	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		24.9			27.6			5.8			3.8	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	6.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		Y	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	15	30	1565	935	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	16	33	1701	1016	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
vC conflicting volume	1935	511	1022			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	97	95			
cM capacity (veh/h)	55	508	675			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	22	33	851	851	678	344
Volume Left	5	33	0	0	0	0
Volume Right	16	0	0	0	0	5
cSH	166	675	1700	1700	1700	1700
Volume to Capacity	0.13	0.05	0.50	0.50	0.40	0.20
Queue Length (ft)	11	4	0	0	0	0
Control Delay (s)	30.0	10.6	0.0	0.0	0.0	0.0
Lane LOS	D	B				
Approach Delay (s)	30.0	0.2			0.0	
Approach LOS	D					

Intersection Summary						
Average Delay	0.4					
Intersection Capacity Utilization	57.0%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	5	0	5	5	5	0	1590	15	10	940	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	5	0	5	5	5	0	1728	16	11	1022	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None						None					
Median storage veh												
vC, conflicting volume	1916	2788	511	2272	2780	872	1022			1745		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
IC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
IC, 2-stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0, queue free %	100	70	100	67	70	98	100			97		
cM capacity (veh/h)	30	18	508	16	18	294	675			356		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	5	16	1152	592	11	511	511
Volume Left	0	5	0	0	11	0	0
Volume Right	0	5	0	16	0	0	0
cSH	18	25	1700	1700	356	1700	1700
Volume to Capacity	0.30	0.65	0.68	0.35	0.03	0.30	0.30
Queue Length (ft)	21	50	0	0	2	0	0
Control Delay (s)	278.3	290.2	0.0	0.0	15.4	0.0	0.0
Lane LOS	F	F			C		
Approach Delay (s)	278.3	290.2	0.0		0.2		
Approach LOS	F	F					

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	58.3%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis
 4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↗	↕		↗	↕	
Sign Control	Stop			Stop			Free		Free			
Grade	0%			0%			0%		0%			
Volume (veh/h)	5	5	15	15	5	5	10	1595	40	10	930	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	5	5	16	16	5	5	11	1734	43	11	1011	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC conflicting volume	1932	2834	508	2323	2815	889	1016			1777		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	81	67	97	0	68	98	98			97		
cM capacity (veh/h)	28	16	510	14	17	286	678			346		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	27	27	11	1156	621	11	674	342
Volume Left	5	16	11	0	0	11	0	0
Volume Right	16	5	0	0	43	0	0	5
cSH	49	18	678	1700	1700	346	1700	1700
Volume to Capacity	0.56	1.52	0.02	0.68	0.37	0.03	0.40	0.20
Queue Length (ft)	53	96	1	0	0	2	0	0
Control Delay (s)	147.3	711.0	10.4	0.0	0.0	15.7	0.0	0.0
Lane LOS	F	F	B				C	
Approach Delay (s)	147.3	711.0	0.1				0.2	
Approach LOS	F	F						

Intersection Summary		
Average Delay	8.2	
Intersection Capacity Utilization	59.3%	ICU Level of Service A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↖	↕		↖	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frts		0.88			0.99		1.00	0.96		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1633			1764		1770	3400		1770	3534	
Flt Permitted		0.98			0.80		0.45	1.00		0.53	1.00	
Satd. Flow (perm)		1609			1463		839	3400		985	3534	
Volume (vph)	5	5	79	114	10	15	40	255	90	10	493	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	5	86	124	11	16	43	277	98	11	536	5
Lane Group Flow (vph)	0	96	0	0	151	0	43	375	0	11	541	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.3			9.3		27.7	27.7		27.7	27.7	
Effective Green, g (s)		9.3			9.3		27.7	27.7		27.7	27.7	
Actuated g/C Ratio		0.21			0.21		0.62	0.62		0.62	0.62	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		333			302		516	2093		606	2175	
v/s Ratio Prot								0.11			0.15	
v/s Ratio Perm		0.06			0.10		0.05			0.01		
v/c Ratio		0.29			0.50		0.08	0.18		0.02	0.25	
Uniform Delay, d1		15.1			15.8		3.5	3.7		3.4	3.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			1.3		0.1	0.0		0.0	0.1	
Delay (s)		15.5			17.1		3.6	3.8		3.4	4.0	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		15.5			17.1			3.8			4.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵		↵	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	11	49	33	373	674	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	12	53	36	405	733	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
VC conflicting volume	1014	373	746			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	91	96			
cM capacity (veh/h)	225	625	858			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	65	36	203	203	488	257
Volume Left	12	36	0	0	0	0
Volume Right	53	0	0	0	0	13
cSH	471	858	1700	1700	1700	1700
Volume to Capacity	0.14	0.04	0.12	0.12	0.29	0.15
Queue Length (ft)	12	3	0	0	0	0
Control Delay (s)	13.9	9.4	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	13.9	0.8			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay	1.0					
Intersection Capacity Utilization	31.3%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



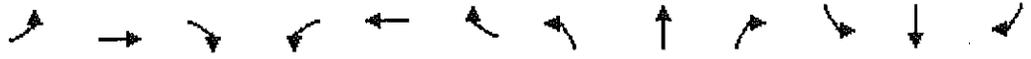
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕		↕		↕	
Sign Control	Stop			Stop			Free		Free		Free	
Grade	0%			0%			0%		0%		0%	
Volume (veh/h)	22	7	32	15	7	5	41	379	5	5	703	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	24	8	35	16	8	5	45	412	5	5	764	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
vC, conflicting volume	1088	1290	391	935	1296	209	782			417		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	95	94	91	95	99	95			100		
cM capacity (veh/h)	155	153	608	191	152	797	832			1138		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	66	29	251	211	5	509	272
Volume Left	24	16	45	0	5	0	0
Volume Right	35	5	0	5	0	0	17
cSH	254	206	832	1700	1138	1700	1700
Volume to Capacity	0.26	0.14	0.05	0.12	0.00	0.30	0.16
Queue Length (ft)	25	12	4	0	0	0	0
Control Delay (s)	24.1	25.4	2.2	0.0	8.2	0.0	0.0
Lane LOS	C	D	A		A		
Approach Delay (s)	24.1	25.4	1.2		0.1		
Approach LOS	C	D					

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis
 4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↖	↕		↖	↕	
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	17	13	55	35	12	5	64	404	10	5	758	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	18	14	60	38	13	5	70	489	11	5	824	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
vC conflicting volume	1212	1430	418	1073	1432	225	837			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	88	90	71	89	99	91			100		
cM capacity (veh/h)	117	121	583	133	121	778	793			1107		

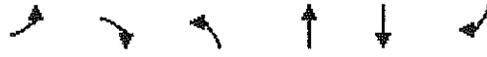
Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	92	57	70	293	157	5	549	288
Volume Left	18	38	70	0	0	5	0	0
Volume Right	60	5	0	0	11	0	0	13
cSH	245	141	793	1700	1700	1107	1700	1700
Volume to Capacity	0.38	0.40	0.09	0.17	0.09	0.00	0.32	0.17
Queue Length (ft)	42	43	7	0	0	0	0	0
Control Delay (s)	28.3	46.8	10.0	0.0	0.0	8.3	0.0	0.0
Lane LOS	D	E	A			A		
Approach Delay (s)	28.3	46.8	1.3			0.1		
Approach LOS	D	E						

Intersection Summary		
Average Delay	4.0	
Intersection Capacity Utilization	43.4%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

15: SH 9 &

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↓	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	32	0	426	743	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	35	0	463	808	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC, conflicting volume	1043	408	815			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
pD, queue free %	100	94	100			
cM capacity (veh/h)	225	593	808			

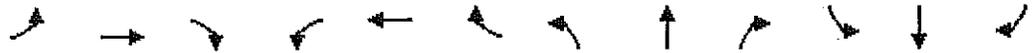
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	232	232	538	277
Volume Left	0	0	0	0	0
Volume Right	35	0	0	0	8
cSH	593	1700	1700	1700	1700
Volume to Capacity	0.06	0.14	0.14	0.32	0.16
Queue Length (ft)	5	0	0	0	0
Control Delay (s)	11.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.4	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.89			0.99		1.00	0.98		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1652			1765		1770	3456		1770	3533	
Flt Permitted		0.98			0.79		0.49	1.00		0.29	1.00	
Satd. Flow (perm)		1629			1455		914	3456		535	3533	
Volume (vph)	5	10	66	121	5	10	90	701	130	15	412	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	72	132	5	11	98	762	141	16	448	5
Lane Group Flow (vph)	0	88		0	148		0	98		0	453	
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	4		8		8		2		2		6	
Permitted Phases	4		8		8		2		2		6	
Actuated Green, G (s)	11.0		11.0		11.0		31.1	31.1		31.1	31.1	
Effective Green, g (s)	11.0		11.0		11.0		31.1	31.1		31.1	31.1	
Actuated g/C Ratio	0.22		0.22		0.22		0.62	0.62		0.62	0.62	
Clearance Time (s)	4.0		4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0		3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	358		319		319		567	2145		332	2193	
v/s Ratio Prot							c0.26				0.13	
v/s Ratio Perm	0.05		c0.10		c0.10		0.11			0.03		
v/c Ratio	0.25		0.46		0.46		0.17	0.42		0.05	0.21	
Uniform Delay, d1	16.1		17.0		17.0		4.0	4.9		3.7	4.1	
Progression Factor	1.00		1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4		1.1		1.1		0.1	0.1		0.1	0.0	
Delay (s)	16.5		18.1		18.1		4.2	5.0		3.8	4.2	
Level of Service	B		B		B		A	A		A	A	
Approach Delay (s)	16.5		18.1		18.1		4.9				4.2	
Approach LOS	B		B		B		A				A	
Intersection Summary												
HCM Average Control Delay	6.5		6.5		6.5		HCM Level of Service		A			
HCM Volume to Capacity ratio	0.43		0.43		0.43							
Actuated Cycle Length (s)	50.1		50.1		50.1		Sum of lost time (s)		8.0			
Intersection Capacity Utilization	53.8%		53.8%		53.8%		ICU Level of Service		A			
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↙		↖	↑↑	↑↓	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	14	55	61	907	577	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	15	60	66	986	627	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
vC, conflicting volume	1262	323	646			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
IC, single (s)	6.8	6.9	4.1			
IC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	91	93			
cM capacity (veh/h)	150	673	936			

Direction Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	75	66	493	493	418	228
Volume Left	15	66	0	0	0	0
Volume Right	60	0	0	0	0	18
cSH	395	936	1700	1700	1700	1700
Volume to Capacity	0.19	0.07	0.29	0.29	0.25	0.13
Queue Length (ft)	17	6	0	0	0	0
Control Delay (s)	16.2	9.1	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	16.2	0.6			0.0	
Approach LOS	C					

Intersection Summary						
Average Delay	1.0					
Intersection Capacity Utilization	38.4%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↑↓			↖	↑↑
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	34	8	50	5	8	5	73	930	15	10	584	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	37	9	54	5	9	5	79	1011	16	11	635	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
	None						None					
Median storage veh												
vC conflicting volume	1346	1858	333	1576	1865	514	665			1027		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	59	87	92	90	87	99	91			98		
cM capacity (veh/h)	90	65	663	56	65	506	920			672		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	100	20	585	522	11	423	242
Volume Left	37	5	79	0	11	0	0
Volume Right	54	5	0	16	0	0	30
cSH	160	81	920	1700	672	1700	1700
Volume to Capacity	0.63	0.24	0.09	0.31	0.02	0.25	0.14
Queue Length (ft)	86	21	7	0	1	0	0
Control Delay (s)	59.2	63.1	2.2	0.0	10.4	0.0	0.0
Lane LOS	F	F	A		B		
Approach Delay (s)	59.2	63.1	1.2		0.2		
Approach LOS	F	F					

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	69.2%	ICU Level of Service	B

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔			↔			↑	↑↑		↑	↑↑		
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Volume (veh/h)	23	17	85	15	18	5	114	989	40	10	649	17	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (veh/h)	25	18	92	16	20	5	124	1075	43	11	705	18	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None					None							
Median storage (veh)													
vC, conflicting volume	1537	2103	362	1821	2090	559	724			1118			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2			
p0, queue free %	45	57	85	33	55	99	86			98			
cM capacity (veh/h)	45	43	635	24	44	472	874			620			

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	136	41	124	717	402	11	470	254
Volume Left	25	16	124	0	0	11	0	0
Volume Right	92	5	0	0	43	0	0	18
cSH	120	37	874	1700	1700	620	1700	1700
Volume to Capacity	1.13	1.13	0.14	0.42	0.24	0.02	0.28	0.15
Queue Length (ft)	204	106	12	0	0	1	0	0
Control Delay (s)	190.4	356.8	9.8	0.0	0.0	10.9	0.0	0.0
Lane LOS	F	F	A			B		
Approach Delay (s)	190.4	356.8	1.0			0.2		
Approach LOS	F	F						

Intersection Summary		
Average Delay	19.5	
Intersection Capacity Utilization	55.9%	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

5: SH 9 &

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	50	0	1017	627	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	54	0	1105	682	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
VC conflicting volume	1241	347	695			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	100			
cM capacity (veh/h)	167	649	897			

Direction Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	553	553	454	240
Volume Left	0	0	0	0	0
Volume Right	54	0	0	0	13
cSH	649	1700	1700	1700	1700
Volume to Capacity	0.08	0.33	0.33	0.27	0.14
Queue Length (ft)	7	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↕		↖	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.88			0.99		1.00	0.98		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1633			1764		1770	3459		1770	3537	
Flt Permitted		0.98			0.79		0.22	1.00		0.40	1.00	
Satd. Flow (perm)		1611			1455		418	3459		743	3537	
Volume (vph)	5	5	79	114	10	15	40	510	90	10	998	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	5	86	124	11	16	43	554	98	11	1085	5
Lane Group Flow (vph)	0	96	0	0	151	0	43	652	0	11	1090	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.7			10.7		32.9	32.9		32.9	32.9	
Effective Green, g (s)		10.7			10.7		32.9	32.9		32.9	32.9	
Actuated g/C Ratio		0.21			0.21		0.64	0.64		0.64	0.64	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		334			302		267	2205		474	2255	
v/s Ratio Prot								0.19			c0.31	
v/s Ratio Perm		0.06			c0.10		0.10			0.01		
v/c Ratio		0.29			0.50		0.16	0.30		0.02	0.48	
Uniform Delay, d1		17.2			18.1		3.8	4.2		3.4	4.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			1.3		0.3	0.1		0.0	0.2	
Delay (s)		17.7			19.4		4.1	4.3		3.5	5.1	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		17.7			19.4			4.2			5.0	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay			6.4				HCM Level of Service				A	
HCM Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			51.6				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			51.9%				ICU Level of Service			A		
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis
 2: Wollowbrook Road & SH 9

3/8/2001



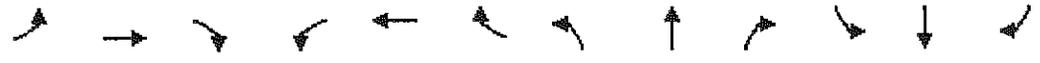
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		↑↑		↑↑	
Sign Control	Stop			Free		Free
Grade	0%			0%		0%
Volume (veh/h)	11	49	33	628	1179	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	12	53	36	683	1282	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type: None						
Median storage (veh)						
vC conflicting volume	1701	647	1295			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2-stage (s)						
tF (s)	3.5	3.3	2.2			
pD queue free %	85	87	93			
cM capacity (veh/h)	77	413	531			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	65	36	341	341	854	440
Volume Left	12	36	0	0	0	0
Volume Right	53	0	0	0	0	13
cSH	230	531	1700	1700	1700	1700
Volume to Capacity	0.28	0.07	0.20	0.20	0.50	0.26
Queue Length (ft)	28	5	0	0	0	0
Control Delay (s)	26.7	12.3	0.0	0.0	0.0	0.0
Lane LOS	D	B				
Approach Delay (s)	26.7	0.6			0.0	
Approach LOS	D					

Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization	46.5%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis
 3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Sign Control		Stop			Stop			Free			Free		
Grade		0%			0%			0%			0%		
Volume (veh/h)	22	7	32	15	7	5	41	634	5	5	1208	16	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (veh/h)	24	8	35	16	8	5	45	689	5	5	1313	17	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None					None							
Median storage (veh)													
vC, conflicting volume	1776	2116	665	1487	2122	347	1330			695			
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1			
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2			
p0 queue free %	43	83	91	74	83	99	91			99			
cM capacity (veh/h)	42	45	402	64	45	649	515			897			

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	66	29	389	350	5	875	455
Volume Left	24	16	45	0	5	0	0
Volume Right	35	5	0	5	0	0	17
cSH	81	68	515	1700	897	1700	1700
Volume to Capacity	0.82	0.43	0.09	0.21	0.01	0.51	0.27
Queue Length (ft)	104	42	7	0	0	0	0
Control Delay (s)	144.5	93.6	2.7	0.0	9.0	0.0	0.0
Lane LOS	F	F	A		A		
Approach Delay (s)	144.5	93.6	1.4		0.0		
Approach LOS	F	F					

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↖	↕	↖	↕		
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	17	13	55	35	12	5	64	659	10	5	1263	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	18	14	60	38	13	5	70	716	11	5	1373	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
vC, conflicting volume	1899	2257	693	1625	2258	364	1386				727	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0, queue free %	30	59	85	0	62	99	86				99	
cM capacity (veh/h)	26	35	386	35	35	633	490				872	

Direction Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	92	57	70	478	250	5	915	471
Volume Left	18	38	70	0	0	5	0	0
Volume Right	60	5	0	0	11	0	0	13
cSH	73	38	490	1700	1700	872	1700	1700
Volume to Capacity	1.26	1.47	0.14	0.28	0.15	0.01	0.54	0.28
Queue Length (ft)	180	147	12	0	0	0	0	0
Control Delay (s)	290.1	474.9	13.6	0.0	0.0	9.2	0.0	0.0
Lane LOS	F	F	B			A		
Approach Delay (s)	290.1	474.9	12				0.0	
Approach LOS	F	F						

Intersection Summary			
Average Delay	23.4		
Intersection Capacity Utilization	58.6%	ICU Level of Service	A

HCM Unsignalized Intersection Capacity Analysis

5: SH 9 &

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	32	0	681	1248	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	35	0	740	1357	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC, conflicting volume	1730	682	1364			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0, queue free %	100	91	100			
cM capacity (veh/h)	79	392	500			

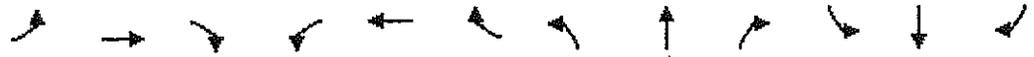
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	35	370	370	904	460
Volume Left	0	0	0	0	0
Volume Right	35	0	0	0	8
cSH	392	1700	1700	1700	1700
Volume to Capacity	0.09	0.22	0.22	0.53	0.27
Queue Length (ft)	7	0	0	0	0
Control Delay (s)	15.1	0.0	0.0	0.0	0.0
Lane LOS	C				
Approach Delay (s)	15.1	0.0		0.0	
Approach LOS	C				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A

HCM Signalized Intersection Capacity Analysis

1: Golden Eagle Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.89			0.99		1.00	0.99		1.00	1.00	
Flt Protected		1.00			0.96		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1652			1765		1770	3495		1770	3536	
Flt Permitted		0.98			0.73		0.30	1.00		0.10	1.00	
Satd. Flow (perm)		1630			1355		552	3495		180	3536	
Volume (vph)	5	10	66	121	5	10	90	1411	130	15	817	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	72	132	5	11	98	1534	141	16	888	5
Lane Group Flow (vph)	0	88	0	0	148	0	98	1675	0	16	893	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.2			13.2		49.2	49.2		49.2	49.2	
Effective Green, g (s)		13.2			13.2		49.2	49.2		49.2	49.2	
Actuated g/C Ratio		0.19			0.19		0.70	0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		306			254		386	2443		126	2471	
v/s Ratio Prot							0.48					0.25
v/s Ratio Perm		0.05			0.11		0.18			0.09		
v/c Ratio		0.29			0.58		0.25	0.69		0.13	0.36	
Uniform Delay, d1		24.6			26.1		3.9	6.1		3.5	4.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			3.4		0.3	0.8		0.5	0.1	
Delay (s)		25.1			29.5		4.2	6.9		4.0	4.4	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		25.1			29.5		6.8			4.4		
Approach LOS		C			C		A			A		
Intersection Summary												
HCM Average Control Delay		7.7			HCM Level of Service		A					
HCM Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		70.4			Sum of lost time (s)		8.0					
Intersection Capacity Utilization		75.1%			ICU Level of Service		C					
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Wollowbrook Road & SH 9

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y		↵	↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	14	55	61	1617	987	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	15	60	66	1758	1073	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC, conflicting volume	2093	546	1091			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	88	90			
cM capacity (veh/h)	40	482	635			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	75	66	879	879	715	376
Volume Left	15	66	0	0	0	0
Volume Right	60	0	0	0	0	18
cSH	150	635	1700	1700	1700	1700
Volume to Capacity	0.50	0.10	0.52	0.52	0.42	0.22
Queue Length (ft)	60	9	0	0	0	0
Control Delay (s)	51.1	11.3	0.0	0.0	0.0	0.0
Lane LOS	F	B				
Approach Delay (s)	51.1	0.4			0.0	
Approach LOS	F					

Intersection Summary						
Average Delay	1.5					
Intersection Capacity Utilization	59.8%		ICU Level of Service		A	

HCM Unsignalized Intersection Capacity Analysis

3: Blue River Circle & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕↔		↕	↕↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	34	8	50	5	8	5	73	1640	15	10	994	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	37	9	54	5	9	5	79	1783	16	11	1080	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
VC conflicting volume	2177	3075	565	2570	3082	899	1111			1799		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	14	89	0	13	98	87			97		
cM capacity (veh/h)	6	10	475	3	10	282	624			339		

Direction Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	100	20	971	908	11	720	391
Volume Left	37	5	79	0	11	0	0
Volume Right	54	5	0	16	0	0	30
cSH	14	7	624	1700	339	1700	1700
Volume to Capacity	7.28	2.87	0.13	0.53	0.03	0.42	0.23
Queue Length (ft)	Err	91	11	0	2	0	0
Control Delay (s)	Err	1882.3	3.8	0.0	16.0	0.0	0.0
Lane LOS	F	F	A		C		
Approach Delay (s)	Err	1882.3	2.0		0.2		
Approach LOS	F	F					

Intersection Summary			
Average Delay		333.6	
Intersection Capacity Utilization	102.9%	ICU Level of Service	F

HCM Unsignalized Intersection Capacity Analysis

4: Ruby Ranch Road & SH 9

3/8/2001



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↕		↖	↕	
Sign Control		Stop			Stop			Free		Free		
Grade		0%			0%			0%		0%		
Volume (veh/h)	23	17	85	15	18	5	114	1727	40	10	1037	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	25	18	92	16	20	5	124	1877	43	11	1127	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage (veh)												
vC, conflicting volume	2360	3327	573	2834	3314	960	1146			1921		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	80	0	0	98	80			96		
cM capacity (veh/h)	0	6	463	0	6	257	606			304		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	136	41	124	1251	669	11	751	394
Volume Left	25	16	124	0	0	11	0	0
Volume Right	92	5	0	0	43	0	0	18
cSH	0	0	606	1700	1700	304	1700	1700
Volume to Capacity	Err	Err	0.20	0.74	0.39	0.04	0.44	0.23
Queue Length (ft)	Err	Err	19	0	0	3	0	0
Control Delay (s)	Err	Err	12.5	0.0	0.0	17.3	0.0	0.0
Lane LOS	F	F	B			C		
Approach Delay (s)	Err	Err	0.8			0.2		
Approach LOS	F	F						

Intersection Summary		
Average Delay		Err
Intersection Capacity Utilization	78.0%	ICU Level of Service
		C

HCM Unsignalized Intersection Capacity Analysis

5: SH 9 &

3/8/2001



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	50	0	1699	1059	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	54	0	1847	1151	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
vC, conflicting volume	2081	582	1164			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	88	100			
cM capacity (veh/h)	46	456	596			

Direction Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	923	923	767	397
Volume Left	0	0	0	0	0
Volume Right	54	0	0	0	13
cSH	456	1700	1700	1700	1700
Volume to Capacity	0.12	0.54	0.54	0.45	0.23
Queue Length (ft)	10	0	0	0	0
Control Delay (s)	14.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	14.0	0.0		0.0	
Approach LOS	B				

Intersection Summary					
Average Delay	0.2				
Intersection Capacity Utilization	54.4%		ICU Level of Service		A

