

Traffic Assessment

Panorama Heights



May 18, 2007

Traffic Impact Assessment Panorama Heights

Prepared For:

City of Albuquerque
Transportation Development

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Traffic Impact Assessment

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AADT	Annual Average Daily Traffic
AAWDT	Annual Average Weekday Traffic
AAWET	Annual Average Weekend Traffic
g/C	Green time per signal Cycle length
HCM	Highway Capacity Manual
MCS	Highway Capacity Software
HTG	Harwick Transportation Group
ITE	Institute of Transportation Engineers
MRCOG	Mid-Region Council of Governments
mph	Miles per Hour
MTP	Metropolitan Transportation Plan (current document for year 2025)
MUTCD	Manual on Uniform Traffic Control Devices
NMDOT	New Mexico Department of Transportation
pcphpl	Passenger cars per hour per lane
PHF	Peak Hour Factor
STIP	Statewide Transportation Improvement Plan
v/c	Volume to Capacity ratio
vpd	Vehicles per Day
vph	Vehicles per Hour

1.0 INTRODUCTION

This traffic impact study has been prepared for a proposed replatting of Panorama Heights Tract L-1 which is zoned O-1, and addresses Tract M-1 which is zoned C-1 within the site. Combined, these properties have a total of approximately 8.6 acres. Tract L-1 will be replatted into three parcels with office and residential land uses. The proposed plat and a preliminary site plan may be found in Appendix A.

The site currently contains three vacant office buildings, a 7-story, 3-story, and 1-story building with 54,176 SF, 40,396 SF and 12,386 SF respectively. The 7-story building will likely be redeveloped to include both office and residential land uses. Redevelopment proposals have included full redevelopment to 35 residential units or partial redevelopment to residential land uses for three stories, yielding 15 residential units, and retention of approximately 30,000 SF of office space. The later land use was analyzed herein. The southern portion of the site is currently developed as a landscaped area for the office complex, and it is anticipated that this portion of the site will be redeveloped with office buildings following the replatting action. The landscape area includes Tract M-1, which will be developed per its C-1 zoning.

The study has been conducted in accordance with City of Albuquerque guidelines, per direction of the City of Albuquerque staff. The study area for this evaluation has been limited to the Indian School Rd intersections with Constitution Ave and Eastridge Dr, and the site access driveways. Given that the study area is essentially fully developed, the analyses are for the existing conditions and an existing Build condition.

1.1 ROADWAY NETWORK

The site is located on the southwest side of Indian School Road between the intersections of Eastridge Dr and Constitution Ave. Access to the property is currently provided from Eastridge Dr and Indian School Rd and will be available on Constitution Ave.

Indian School Rd is classified as a collector street with a posted speed limit of 35mph. This roadway has an urban section with curb, gutter, and sidewalk, and a raised median separates the two travel directions. There are two travel lanes in each direction and are nominally 12' wide. Turn lanes with raised channelization are provided at intersections to separate turning and through vehicles. Indian School Road north of Eastridge Dr transitions to a 3-lane section with one through lane in each direction, a continuous 2-way left turn lane and bike lanes.

Constitution Ave is classified as a collector street with a posted speed limit of 35 mph. This roadway has an urban section with curb, gutter, and sidewalk and two travel directions. There are directional bike lanes along the road.

Eastridge Dr is a local access street, providing access to commercial properties along each side of the road and has an unposted speed limit of 25 mph.

The site currently has two full access driveways from Eastridge Dr and one right-in, right-out access on Indian School Rd to serve the main parking area. Another driveway exists on Eastridge Dr close to the Indian School Rd intersection along with a right-in, right-out driveway on Indian School Rd that serves a visitor parking area between the 7-story and 3-story

2.0 TRAFFIC ANALYSIS METHODOLOGY

The *Highway Capacity Manual* (HCM 2000) defines operational measures of effectiveness for all types of roadways and junctions in terms of qualitative levels of service. This study is concerned with levels of service for unsignalized intersections, and the barometer for these intersection types are measured in terms of average vehicle delay.

Stop controlled intersections may be two-way stop controlled, all-way stop controlled, or roundabouts (yield controlled). Each unsignalized intersection considered herein was two-way stop control, meaning that primary street through-movements are not considered in the analyses because they should experience no intersection related delay. Unsignalized intersection levels of service are a function of the side street approaches and main street turn levels of service. For this reason, an overall intersection level of service is not calculated such as it is for signalized intersections, and the intersection level of service is typically considered that level of service experienced by the poorest approach LOS. Table 1 contains brief definitions of unsignalized intersection LOS and the control delay values.

Table 1
Unsignalized Intersection Levels of Service

Level of Service	Average Control Delay per Vehicle	Definition
A	≤ 10.0 sec	Little or no delay
B	10.1 sec to 15.0 sec	Short traffic delays
C	15.1 sec to 25.0 sec	Average traffic delays
D	25.1 sec to 35.0 sec	Long traffic delays
E	35.1 sec to 50.0 sec	Very long traffic delays, approaching capacity
F	> 50.0 sec	Over capacity, excessive delay

The unsignalized intersection analyses were evaluated using Synchro 6.0. While this program is primarily a signalized intersection tool, it also performs unsignalized intersection analyses that are consistent with the *Highway Capacity Manual* methodology and the output results are identical to those produced by the McTrans Highway Capacity Software.

LOS D is the desired approach level of service for urban unsignalized intersections; however, lower service levels are acceptable for low volume approaches, and approaches at intersections where signalization is not warranted.

A series of assumptions must be made for all level of service analyses. For this study, the following analysis assumptions were made, and they apply to existing and forecast analyses:

- Lane Width - Measured in Field (nominally 12 feet)
- Truck Percentage - Assumed 2%
- Peak Hour Factors - Measured in field, applied by approach average
- Saturation Flow Rate - 1900 pcphpl
- Roadway Grades - All analyses assume flat grades
- Conflicting Pedestrians - Minimal
- Area Type - Non CBD

4.0 TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT

4.1 TRIP GENERATION

There are two tracts existing in the Panorama Heights Subdivision that are being considered for subdivision. These tracts are L-1 and M-1 and are approximately 7.8 acres and .8 acres respectively. Tract L-1 is zoned O-1 and Tract M-1 is zoned C-1. Tract L-1 will be subdivided into three tracts, and cross lot access will be restricted between Tracts L-1-A and L-1-B, prohibiting a portion of the site from accessing Eastridge Dr. (See the Site Plat, Figure A-3 in Appendix A.)

The specific development for each lot is currently unknown and the traffic impact assessment was prepared assuming an estimated worst case scenario for trip generation. There are currently three existing office buildings on lot L-1 and after subdivision it is assumed that two new office buildings of 19,850 and 12,000 SF will be added. (A second proposal for residential units in the new area is also being considered, however, the office land use generates more trips and was analyzed herein.) No additions are proposed for the existing buildings, however, it is anticipated that at least 15 multi-family dwelling units will be incorporated into the existing 7-story office building. A 14,500 SF retail development was assumed for tract M-1 based upon its C-1 zoning. A composite site plan is shown in Appendix A, Figure A-2.

Table 3 contains the trip generation for the assumed development. Project trips were generated using the Institute of Transportation Engineers (ITE) *Trip Generation*, 7th Edition, and the trip generation data sheets are contained in Appendix B.

Table 3
Panorama Heights Trip Generation

LU Code	Development	Quantity	Daily	AM Enter	AM Exit	PM Enter	PM Exit
230	7 Story Apartments	15 DU	120	2	9	9	4
710	7 Story Office	30000 SF	528	63	9	19	93
710A	1 Story Office	12386 SF	136	17	2	3	15
710	3 Story Office	40396 SF	664	80	11	21	103
820	Commercial -Retail	14500 SF	1936	30	19	84	91
710A	New Office	19850 SF	219	27	4	5	25
710A	New Office	12000 SF	132	17	2	3	15
	New Site Trips		3735	236	56	144	346

No pass-by trips were assumed for the commercial – retail land use since specific businesses or business types are currently unknown.

4.2 TRIP DISTRIBUTION

The trip distribution for the site was generated using the Mid-Region Council of Governments (MRCOG) 2010 model year databank. The 2010 databank was consistent with the 2025 MTP approved model. The primary trip generation area was defined as west of the Sandia Mountains, south of the Sandoval County line, east the Rio Grande and north of the City's

5.0 TRAFFIC ANALYSIS

Traffic analyses were performed for the existing condition and the 2007 Build condition. The analyses include both capacity and queuing analyses for the AM and PM peak hours. The analyses included the study area intersections and the site driveways, except for the site driveway in front of the existing structures along Indian School Rd. This was not analyzed as it has parking for less than 20 vehicles and is primarily for short term parking at the site. The Eastridge Dr driveways were also combined into a single driveway for the analysis. There are two existing driveways on Eastridge Dr, and it is assumed that they will remain; however, for this analysis, they were combined into a single driveway to analyze a worst case scenario. The traffic analysis worksheets for each scenario are contained in Appendix C.

Unsignalized intersections with 2-way stop control were assessed for queue length using the methodology described in the *Highway Capacity Manual*, Chapter 17. The analysis uses HCM Equation 17-37, with the methodology described on pages 17-22 through 17-24. The Synchro program utilizes this equation to generate 95th percentile queue lengths for each unsignalized approach, and these results have been included with the level of service results. All design queue lengths are rounded up to the nearest 25' and are in units of feet.

5.1 EXISTING TRAFFIC (NO-BUILD)

Traffic analyses were performed for existing AM and PM peak hour conditions to establish a baseline for comparison with the Build condition. As stated in Section 2, all analyses were conducted using Synchro 6.0 and the results produced using the *Highway Capacity Manual* methodology. Table 5 contains the evaluation results including level of service [LOS], average vehicle delay [Delay] and the design queue lengths [Queue] for the two analyzed intersections. The existing buildings are vacant and therefore the current driveway intersections are not analyzed. Please note that Indian School Rd at Eastridge Dr is oriented north-south for analysis, and it is oriented east-west at Constitution Ave. The existing traffic level of service worksheets may be found in Appendix C.

Table 5
Existing Unsignalized Intersection Levels of Service

Intersection	AM Peak			PM Peak		
	LOS	Delay (sec)	Queue	LOS	Delay (sec)	Queue
Indian School & Eastridge						
EB Approach	B	11 s	25'	C	17 s	25'
WB Approach	B	14 s	50'	C	17 s	25'
NB LT	A	8 s	25'	A	8 s	25'
SB LT	A	8 s	25'	A	8 s	25'
Indian School & Constitution						
EB LT	A	8 s	25'	A	8 s	25'
WB LT	A	8 s	25'	A	9 s	25'
NB Approach	B	14 s	50'	C	22 s	25'
SB LT	A	0 s	25'	E	36 s	25'
SB Th	A	0 s	25'	B	13 s	25'
SB RT	B	13 s	25'	B	13 s	25'

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Traffic Impact Assessment

Two mitigation alternatives were proposed for the northbound Constitution Ave approach to Indian School Rd: 1) restriping the northbound approach to provide a separate left turn lane and 2) signalization of the intersection. Table 7 contains the operations results if the northbound approach is restriped to provide an exclusive left-turn lane and a through-right lane.

Table 7
Build Unsignalized Intersection Levels of Service – Mitigated

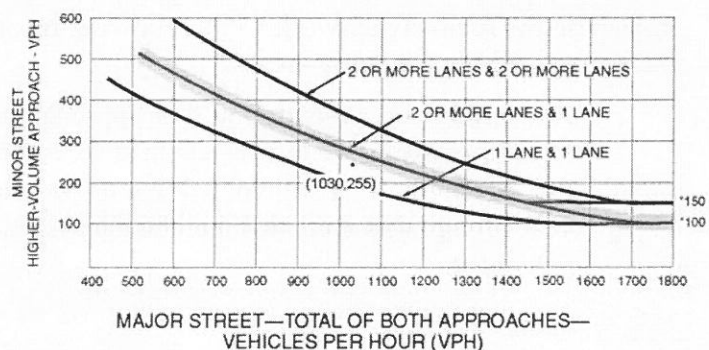
Intersection	AM Peak			PM Peak		
	LOS	Delay (sec)	Queue	LOS	Delay (sec)	Queue
<i>Indian School & Constitution</i>						
EB LT	A	8	25	A	8	25
WB LT	A	8	25	A	10	25
NB LT	C	23	50	F	84	100
NB Th-RT	B	10	25	B	13	50
SB LT	A	0	25	F	72	50
SB Th	A	0	25	C	16	25
SB RT	B	14	25	C	16	25

These operations are considered adequate even though the left-turn lane will continue to operate at LOS F. The queue reduction to 100' or four vehicles should not result in undue delay to left-turning vehicles, nor should it affect operations at the Constitution Ave-Driveway #3 intersection.

The intersection was also investigated to see if a MUTCD signalization warrant was met for the peak hour volumes. It is unlikely that signalization warrants other than the peak hour warrant would be met since the existing condition is not near to meeting warrants, and the site trips will be peak hour oriented. For the assessment, Indian School Rd has two or more lanes and Constitution Ave has a single approach lane. The graphic below shows the PM peak volumes plotted on the MUTCD graphic, with the evaluation curve highlighted.

The graphic indicates that the intersection volumes do not meet the MUTCD volumes. It is noted that it is standard practice to reduce right turns from the cross street volume when evaluating signal warrants, and that has not been done for this evaluation. If a right-turn reduction is applied, the data point will move farther below the line, further indication that signalization is not warranted. Signalization is not considered reasonable mitigation for this intersection.

Figure 4C-3. Warrant 3, Peak Hour



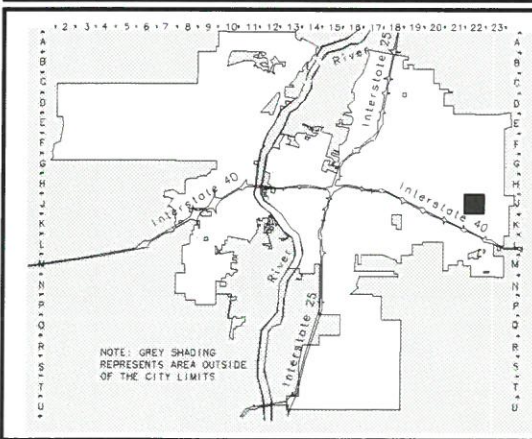
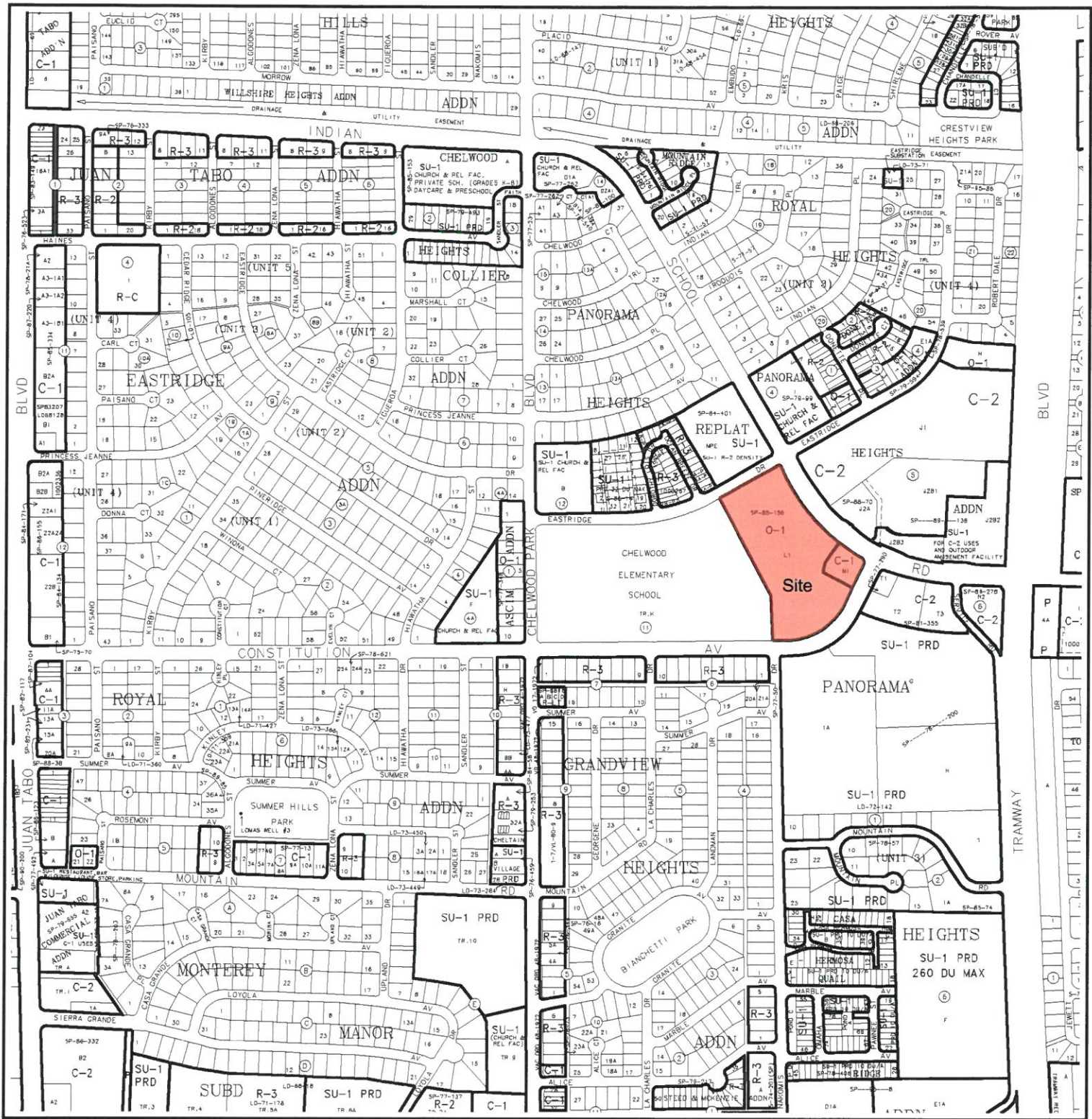
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Appendices

- Appendix A Vicinity and Site Maps
- Appendix B Traffic Volume, Trip Generation, Distribution and Assignment
- Appendix C Level of Service Analyses Worksheets

Appendix A

Vicinity and Site Maps



Abuque Geographic Information System
PLANNING DEPARTMENT
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Zone Atlas Page

J-22-Z

Map Amended through November 01, 2003



Figure A-2

Site Plan



Internal Site Lot Lines



Appendix B

Traffic Volume, Trip Generation, Distribution and Assignment

Turning Movement Count Data

Date: 5/3/2007

Day: Thursday

E-W Street: Eastridge Dr

N-S-Street: Indian School Rd

AM Peak Period

Time	Eastbound				Westbound				Northbound				Southbound			
	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum
6:30-6:45				0				0				0				0
6:45-7:00				0				0				0				0
7:00-7:15	1	0	2	3	13	8	7	28	4	26	2	32	5	19	2	26
7:15-7:30	0	1	2	3	18	12	12	42	3	33	6	42	0	17	2	19
7:30-7:45	2	0	8	10	8	10	17	35	0	69	5	74	3	27	0	30
7:45-8:00	0	1	8	9	9	3	6	18	7	68	2	77	1	30	1	32
8:00-8:15	0	1	6	7	13	5	9	27	19	49	3	71	1	40	1	42
8:15-8:30	5	0	9	14	10	2	5	17	15	26	6	47	1	36	3	40
8:30-8:45	2	0	4	6	7	1	6	14	13	49	4	66	4	29	1	34
8:45-9:00	0	0	6	6	4	2	7	13	3	57	4	64	2	41	6	49
Peak Hour	7	2	31	40	40	20	37	97	41	212	16	269	6	133	5	144
PHF	0.35	0.50	0.86	0.71	0.77	0.50	0.54	0.69	0.54	0.77	0.67	0.87	0.50	0.83	0.42	0.86

PM Peak Period

Time	Eastbound				Westbound				Northbound				Southbound			
	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum
4:00-4:15	0	7	8	15	5	2	4	11	10	46	8	64	3	72	2	77
4:15-4:30	1	2	7	10	6	2	4	12	2	47	16	65	11	64	1	76
4:30-4:45	1	3	3	7	13	0	8	21	4	52	16	72	9	54	0	63
4:45-5:00	1	4	6	11	9	1	3	13	6	51	18	75	9	63	1	73
5:00-5:15	2	3	8	13	7	7	8	22	9	52	10	71	10	70	2	82
5:15-5:30	6	8	6	20	7	2	15	24	7	67	16	90	16	76	1	93
5:30-5:45	1	4	7	12	11	2	5	18	7	64	20	91	12	68	4	84
5:45-6:00	4	5	4	13	7	1	4	12	10	47	21	78	9	62	1	72
6:00-6:15				0				0				0				0
6:15-6:30				0				0				0				0
Peak Hour	13	20	25	58	32	12	32	76	33	230	67	330	47	276	8	331
PHF	0.54	0.63	0.78	0.73	0.73	0.43	0.53	0.79	0.83	0.86	0.80	0.91	0.73	0.91	0.50	0.89

Existing Vols

AM Trip Assignment

[illegible]

PM Trip Assignment

[illegible]

Indian School Rd is oriented north-south except at Constitution Ave.
Constitution Ave is oriented north-south except at Dwy 4.

Assignment Summary

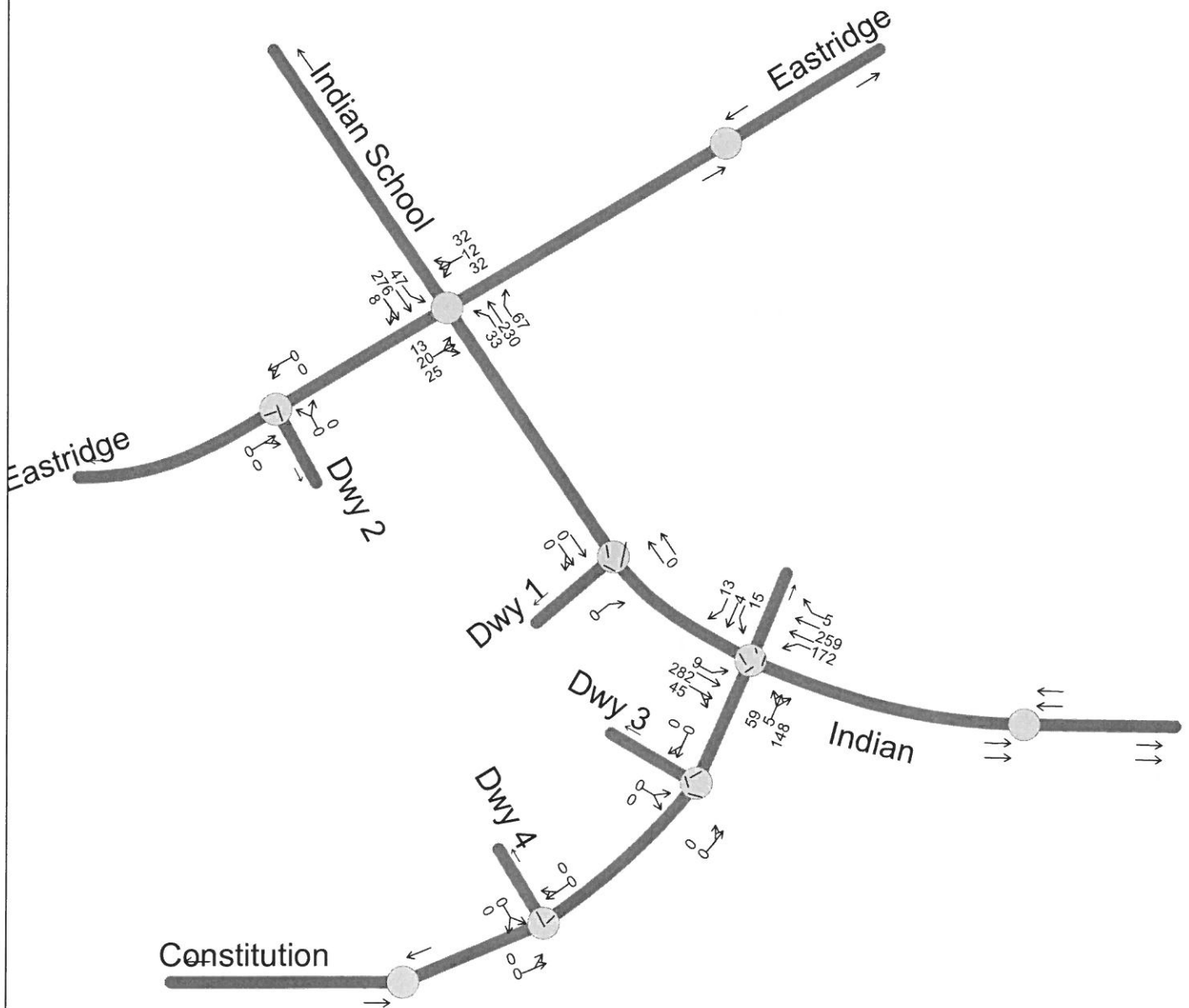
AM Trip Assignment

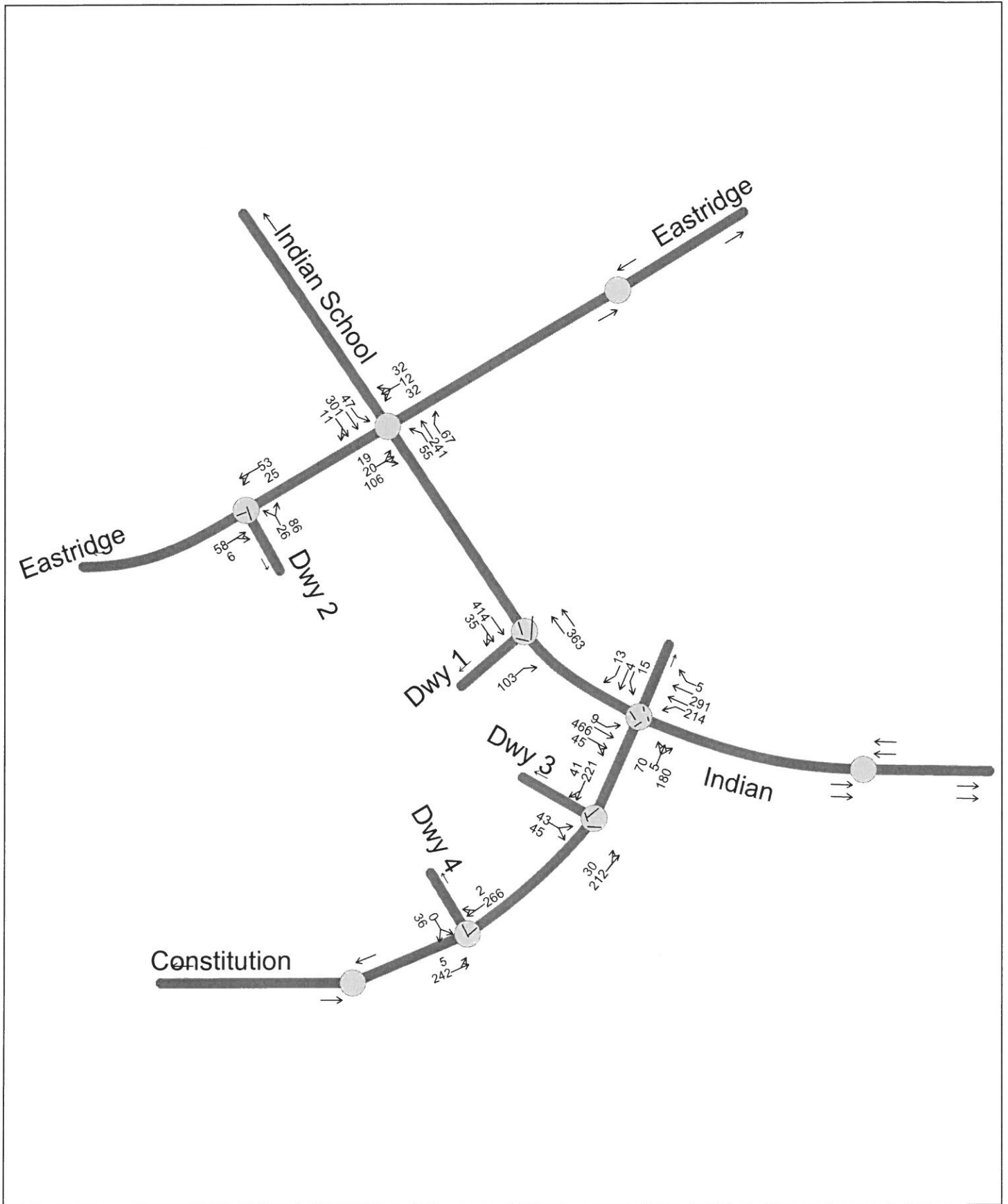
Intersection	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum
Indian School - Constitution	0	30	0	30	56	104	0	160	3	0	7	10
Indian School - Eastridge	1	0	14	15	0	0	0	0	59	3	0	62
Indian School - Dwy 1	0	0	16	16	0	0	0	0	0	62	0	62
Eastridge - Dwy 2	0	0	15	15	67	0	0	67	5	0	15	20
Constitution - Dwy 3	11	0	16	27	0	0	0	0	11	0	0	11
Constitution - Dwy 4	22	11	0	33	0	16	7	23	0	0	0	0

PM Trip Assignment

Intersection	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	Sum	LT	TH	RT	Sum	LT	TH	RT	Sum
Indian School - Constitution	0	184	0	184	42	32	0	74	11	0	32	43
Indian School - Eastridge	6	0	81	87	0	0	0	0	22	11	0	33
Indian School - Dwy 1	0	0	103	103	0	0	0	0	0	33	0	33
Eastridge - Dwy 2	0	0	6	6	25	0	0	25	26	0	86	112
Constitution - Dwy 3	43	0	45	88	0	0	0	0	30	0	0	30
Constitution - Dwy 4	5	30	0	35	0	45	2	47	0	0	0	0

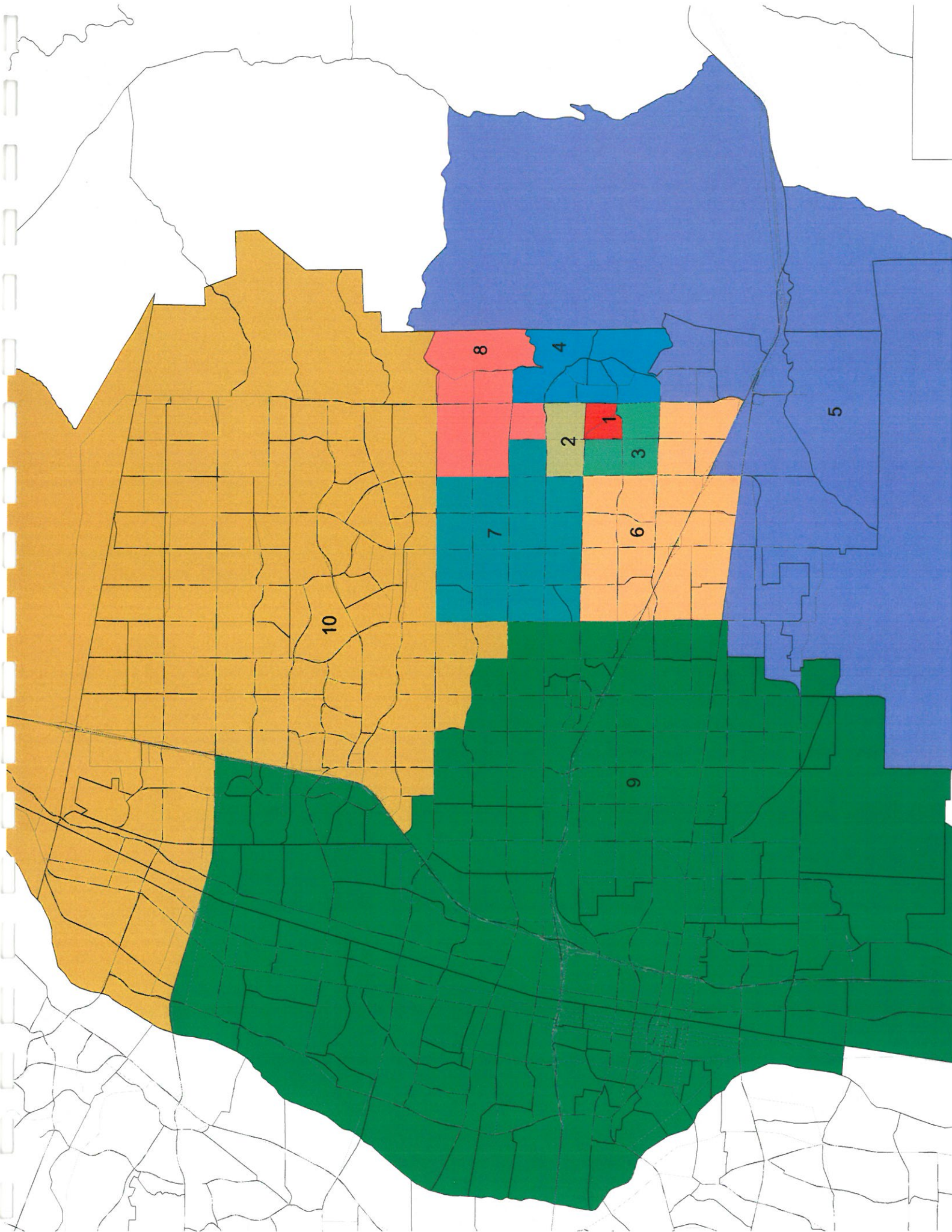
Indian School Rd is oriented north-south except at Constitution Ave.
 Constitution Ave is oriented north-south except at Dwy 4.





Trip Summary

LU	Land Use	ITE LU	Units	Quantity	Daily	Daily In	Daily Out	AM In	AM Out	PM In	PM Out
1	7 Story Apartments	230	DU	15	120	60	60	2	9	9	4
2	7 Story Office	710	SF	30000	528	264	264	63	9	19	93
3	1 Story Office	710A	SF	12386	136	68	68	17	2	3	15
4	3 Story Office	710	SF	40396	664	332	332	80	11	21	103
5	Commercial - Retail	820	SF	14500	1936	968	968	30	19	84	91
6	New Office	710A	SF	19850	219	110	110	27	4	5	25
7	New Office	710A	SF	12000	132	66	66	17	2	3	15
	Subtotal			153308	3735	1868	1868	236	56	144	346
	Eastridge Subtotal				784	392	392	82	20	31	112
	Ind School/Const Subtotal				2951	1476	1476	154	36	113	234
	Retail				1936	968	968	30	19	84	91
	Office				1015	508	508	124	17	29	143



Subarea Summaries

	1	2	3	4	5	6	7	8	9	10	SUM
Population	1403	3015	5970	6423	28040	25169	24312	9872	176256	104421	384881
Employment	1078	846	1130	744	23967	10170	10498	2047	231367	59447	341294
From:											
AM Pk O's	983	0	0	0	0	0	0	0	0	0	983
Off Pk O's	2935	0	0	0	0	0	0	0	0	0	2935
PM Pk O's	1309	0	0	0	0	0	0	0	0	0	1309
Daily O's	5227	0	0	0	0	0	0	0	0	0	5227
%s	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
AM Pk D's	0	13	35	17	100	94	61	17	427	128	893
Off Pk D's	0	56	197	116	228	274	199	66	1026	371	2533
PM Pk D's	0	26	101	66	105	120	87	34	395	171	1106
Daily D's	0	95	333	200	433	488	348	117	1847	670	4531
%s	0.0%	2.1%	7.4%	4.4%	9.6%	10.8%	7.7%	3%	41%	15%	
Distributions:											
Office-Residential	0.0%	2.1%	7.4%	4.4%	9.6%	10.8%	7.7%	2.6%	40.8%	14.8%	100%
Retail	8.3%	17.9%	35.5%	38.2%							100%

Subareas to/from site via:

1	Site	6
2	Indian School West	Constitution or Eastridge
3	Constitution or Eastridge	Indian School West
4	Indian School East	Indian School East
5	Indian School East	Indian School East
		Indian School East

Office-Residential is based upon the Origin-Destination percentages.

Retail is based upon population percentages in Subareas 1 through 4.

The distribution was bounded by the Rio Grande, Sandoval Co line, Sandia Mountains, and the City's south city limit.

Appendix C





















Level of Service Analyses Worksheets

<u>Level of Service Analysis</u>	<u>Pages</u>
Baseline AM	2
Baseline PM	2
Build AM	6
Build PM	6
Build AM - Mitigated	1
Build PM - Mitigated	1

HCM Unsignalized Intersection Capacity Analysis

2: Eastridge & Indian School





















5/23/2007

												
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)	7	2	31	40	20	37	41	212	16	6	133	5
Peak Hour Factor	0.71	0.71	0.71	0.69	0.69	0.69	0.87	0.87	0.87	0.86	0.86	0.86
Hourly flow rate (vph)	10	3	44	58	29	54	47	244	18	7	155	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	578	528	80	474	512	244	160			262		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	578	528	80	474	512	244	160			262		
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	99	95	87	93	93	97			99		
cM capacity (veh/h)	342	437	964	436	446	757	1416			1299		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	56	141	47	244	18	7	103	57				
Volume Left	10	58	47	0	0	7	0	0				
Volume Right	44	54	0	0	18	0	0	6				
cSH	699	523	1416	1700	1700	1299	1700	1700				
Volume to Capacity	0.08	0.27	0.03	0.14	0.01	0.01	0.06	0.03				
Queue Length (ft)	7	27	3	0	0	0	0	0				
Control Delay (s)	10.6	14.4	7.6	0.0	0.0	7.8	0.0	0.0				
Lane LOS	B	B	A			A						
Approach Delay (s)	10.6	14.4	1.2			0.3						
Approach LOS	B	B										
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			35.7%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Eastridge & Indian School





















5/23/2007

												
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)	13	20	25	32	12	32	33	230	67	47	276	8
Peak Hour Factor	0.73	0.73	0.73	0.79	0.79	0.79	0.91	0.91	0.91	0.89	0.89	0.89
Hourly flow rate (vph)	18	27	34	41	15	41	36	253	74	53	310	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	794	819	160	634	750	253	319			326		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	794	819	160	634	750	253	319			326		
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 %	93	90	96	87	95	95	97			96		
cM capacity (veh/h)	240	287	857	306	315	747	1238			1230		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	79	96	36	253	74	53	207	112				
Volume Left	18	41	36	0	0	53	0	0				
Volume Right	34	41	0	0	74	0	0	9				
cSH	379	410	1238	1700	1700	1230	1700	1700				
Volume to Capacity	0.21	0.23	0.03	0.15	0.04	0.04	0.12	0.07				
Queue Length (ft)	19	22	2	0	0	3	0	0				
Control Delay (s)	17.0	16.5	8.0	0.0	0.0	8.1	0.0	0.0				
Lane LOS	C	C	A			A						
Approach Delay (s)	17.0	16.5	0.8			1.1						
Approach LOS	C	C										
Intersection Summary												
Average Delay			4.0									
Intersection Capacity Utilization			33.3%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis










1: Eastridge & Indian School

5/23/2007

												
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)	8	2	45	40	20	37	100	215	16	6	153	13
Peak Hour Factor	0.71	0.71	0.71	0.69	0.69	0.69	0.87	0.87	0.87	0.86	0.86	0.86
Hourly flow rate (vph)	11	3	63	58	29	54	115	247	18	7	178	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	745	695	97	645	684	247	193			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	745	695	97	645	684	247	193			266		
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 %	95	99	93	81	91	93	92			99		
cM capacity (veh/h)	245	332	941	309	337	753	1378			1295		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	77	141	115	247	18	7	119	74				
Volume Left	11	58	115	0	0	7	0	0				
Volume Right	63	54	0	0	18	0	0	15				
cSH	636	407	1378	1700	1700	1295	1700	1700				
Volume to Capacity	0.12	0.34	0.08	0.15	0.01	0.01	0.07	0.04				
Queue Length (ft)	10	38	7	0	0	0	0	0				
Control Delay (s)	11.4	18.4	7.9	0.0	0.0	7.8	0.0	0.0				
Lane LOS	B	C	A			A						
Approach Delay (s)	11.4	18.4	2.4			0.3						
Approach LOS	B	C										
Intersection Summary												
Average Delay			5.6									
Intersection Capacity Utilization			36.8%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 3: Dwy 1 & Indian School










5/23/2007

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	16	0	331	218	65
Peak Hour Factor	0.92	0.92	0.85	0.85	0.88	0.88
Hourly flow rate (vph)	0	17	0	389	248	74
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	479	161	322			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	479	161	322			
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	98	100			
cM capacity (veh/h)	515	856	1235			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	17	195	195	165	156	
Volume Left	0	0	0	0	0	
Volume Right	17	0	0	0	74	
cSH	856	1700	1700	1700	1700	
Volume to Capacity	0.02	0.11	0.11	0.10	0.09	
Queue Length (ft)	2	0	0	0	0	
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	9.3	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay		0.2				
Intersection Capacity Utilization		18.1%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: Dwy 3 & Constitution





















5/23/2007

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	11	16	11	147	112	48
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	17	12	160	122	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	332	148	174			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	332	148	174			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	658	899	1403			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	29	172	174			
Volume Left	12	12	0			
Volume Right	17	0	52			
cSH	782	1403	1700			
Volume to Capacity	0.04	0.01	0.10			
Queue Length (ft)	3	1	0			
Control Delay (s)	9.8	0.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.8	0.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		26.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis










1: Eastridge & Indian School

5/23/2007

												
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)	19	20	106	32	12	32	55	241	67	47	301	11
Peak Hour Factor	0.73	0.73	0.73	0.79	0.79	0.79	0.91	0.91	0.91	0.89	0.89	0.89
Hourly flow rate (vph)	26	27	145	41	15	41	60	265	74	53	338	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	884	909	175	819	842	265	351			338		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	884	909	175	819	842	265	351			338		
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 %	87	89	83	78	94	94	95			96		
cM capacity (veh/h)	202	248	838	188	272	733	1205			1217		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	199	96	60	265	74	53	225	125				
Volume Left	26	41	60	0	0	53	0	0				
Volume Right	145	41	0	0	74	0	0	12				
cSH	481	295	1205	1700	1700	1217	1700	1700				
Volume to Capacity	0.41	0.33	0.05	0.16	0.04	0.04	0.13	0.07				
Queue Length (ft)	50	34	4	0	0	3	0	0				
Control Delay (s)	17.6	23.0	8.1	0.0	0.0	8.1	0.0	0.0				
Lane LOS	C	C	A			A						
Approach Delay (s)	17.6	23.0	1.2			1.1						
Approach LOS	C	C										
Intersection Summary												
Average Delay			6.0									
Intersection Capacity Utilization			36.6%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 3: Dwy 1 & Indian School










5/23/2007

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	103	0	363	414	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	112	0	395	450	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	666	244	488			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	666	244	488			
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	85	100			
cM capacity (veh/h)	392	757	1071			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	112	197	197	300	188	
Volume Left	0	0	0	0	0	
Volume Right	112	0	0	0	38	
cSH	757	1700	1700	1700	1700	
Volume to Capacity	0.15	0.12	0.12	0.18	0.11	
Queue Length (ft)	13	0	0	0	0	
Control Delay (s)	10.6	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	10.6	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		25.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

5: Dwy 3 & Constitution























5/23/2007

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	43	45	30	212	221	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	49	33	230	240	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	558	262	285			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	558	262	285			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	94	97			
cM capacity (veh/h)	478	776	1277			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	96	263	285			
Volume Left	47	33	0			
Volume Right	49	0	45			
cSH	595	1277	1700			
Volume to Capacity	0.16	0.03	0.17			
Queue Length (ft)	14	2	0			
Control Delay (s)	12.2	1.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.2	1.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		42.1%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

2: Indian School & Constitution

5/23/2007

																	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR					
Lane Configurations																	
Sign Control	Free			Free			Stop			Stop							
Grade	0%			0%			0%			0%							
Volume (veh/h)	1	195	36	132	309	2	65	4	88	0	0	2					
Peak Hour Factor	0.90	0.90	0.90	0.83	0.83	0.83	0.84	0.84	0.84	0.50	0.50	0.50					
Hourly flow rate (vph)	1	217	40	159	372	2	77	5	105	0	0	4					
Pedestrians																	
Lane Width (ft)																	
Walking Speed (ft/s)																	
Percent Blockage																	
Right turn flare (veh)												2					
Median type	None						None										
Median storage veh																	
Upstream signal (ft)																	
pX, platoon unblocked																	
vC, conflicting volume	375			257			743	932	128	908	949	186					
vC1, stage 1 conf vol																	
vC2, stage 2 conf vol																	
vCu, unblocked vol	375			257			743	932	128	908	949	186					
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9					
tC, 2 stage (s)																	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3					
p0 queue free %	100			88			72	98	88	100	100	100					
cM capacity (veh/h)	1180			1305			274	233	898	182	227	824					
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2						
Volume Total	1	144	112	159	186	186	2	77	110	0	4						
Volume Left	1	0	0	159	0	0	0	77	0	0	0						
Volume Right	0	0	40	0	0	0	2	0	105	0	4						
cSH	1180	1700	1700	1305	1700	1700	1700	274	799	1700	412						
Volume to Capacity	0.00	0.08	0.07	0.12	0.11	0.11	0.00	0.28	0.14	0.00	0.01						
Queue Length (ft)	0	0	0	10	0	0	0	28	12	0	1						
Control Delay (s)	8.1	0.0	0.0	8.1	0.0	0.0	0.0	23.3	10.2	0.0	13.8						
Lane LOS	A			A				C	B	A	B						
Approach Delay (s)	0.0			2.4				15.6			13.8						
Approach LOS								C				B					
Intersection Summary																	
Average Delay				4.4													
Intersection Capacity Utilization				29.5%	ICU Level of Service				A								
Analysis Period (min)				15													

