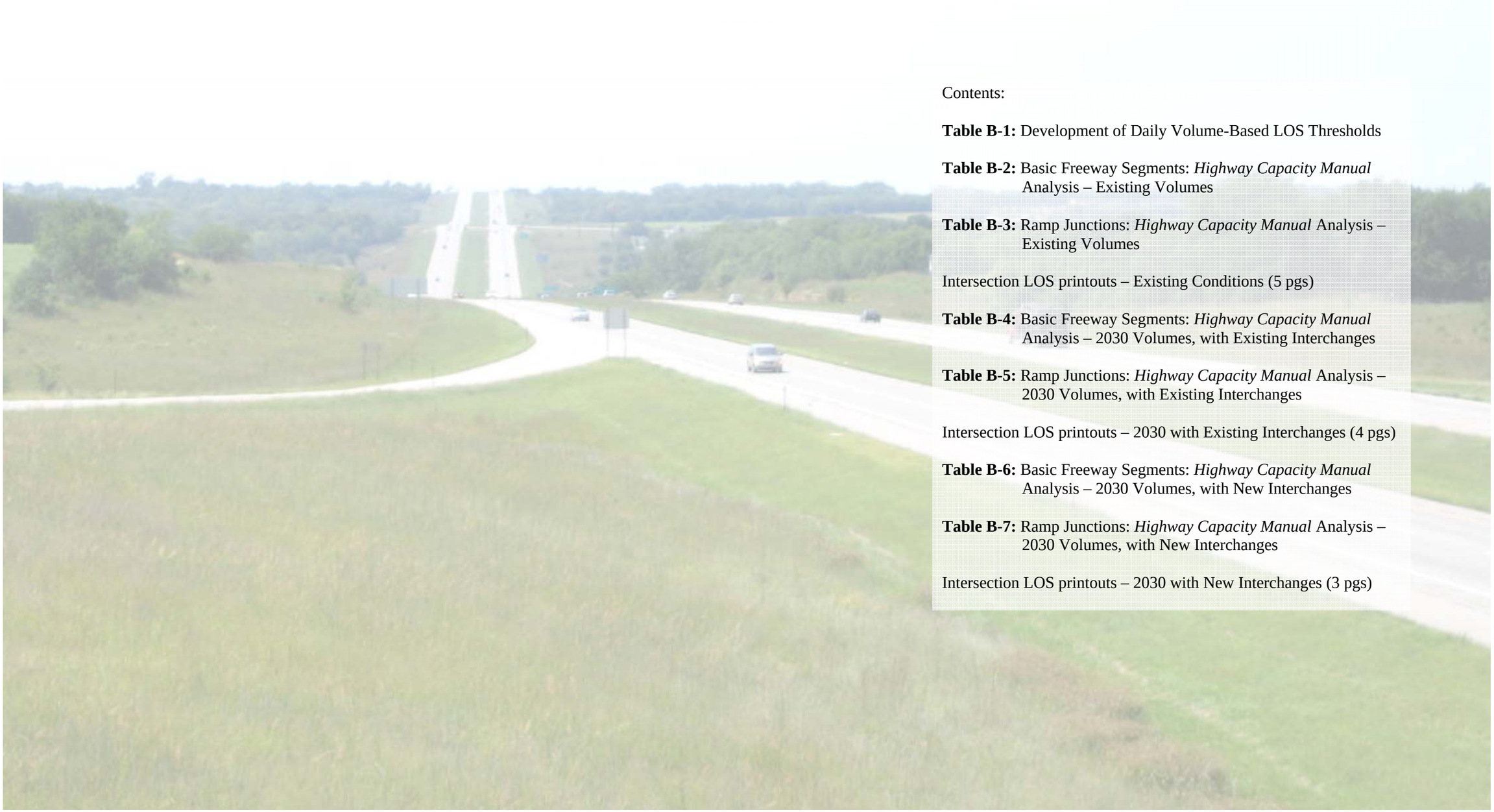
Appendix B: Traffic and Level-of-Service Calculations



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Intersection LOS printouts – Existing Conditions (5 pgs)

Table B-4: Basic Freeway Segments: *Highway Capacity Manual* Analysis – 2030 Volumes, with Existing Interchanges

Table B-5: Ramp Junctions: *Highway Capacity Manual* Analysis – 2030 Volumes, with Existing Interchanges

Intersection LOS printouts – 2030 with Existing Interchanges (4 pgs)

Table B-6: Basic Freeway Segments: *Highway Capacity Manual* Analysis – 2030 Volumes, with New Interchanges

Table B-7: Ramp Junctions: *Highway Capacity Manual* Analysis – 2030 Volumes, with New Interchanges

Intersection LOS printouts – 2030 with New Interchanges (3 pgs)

Table B-1: Development of Daily Volume-Based LOS Thresholds

Freeways

Assumptions

Input Parameters	Urban	Rural
BaseFree-flow speed (mph)	60	75
Lane width	12	12
Shoulder width	>6	>6
Terrain (level, rolling, mountainous)	level	level
% Trucks	5%	10%
Et	1.5	1.5
Fhv	0.976	0.952
PHF	0.9	0.85
Interchanges per mile	1.5	0.5
Population factor	1.0	1.0
Base Free-flow Speed (mph)	60	75
Lane Width Adjt. (Ex 23-4, HCM 2000)	0.0	0.0
Lateral Clearance Adjt. (Ex 23-5)	0.0	0.0
Interchange Density (Ex 23-7)	5.0	0.0

Free-Flow Speeds (mph)

	Lanes	Adjt.	FFS
Urban			
	2	4.5	50.5
	3	3.0	52.0
	4	1.5	53.5
	5	0.0	55.0
Rural			
	2	0.0	75.0
	3	0.0	75.0
	4	0.0	75.0
	5	0.0	75.0

(For all rural freeways use 0.0, Exhibit 23-6, HCM 2000)

Maximum Density (pc/mi/ln)

LOS	Density
A	11
B	18
C	26
D	35
E	45

K Factor = 0.09
D Factor = 0.55

Adjusted Service Volumes One-way (vehicles/hour)

	Lanes	LOS-A	LOS-B	LOS-C	LOS-D	LOS-E
Urban						
	2	976	1596	2306	3104	3991
	3	1507	2466	3561	4794	6164
	4	2067	3382	4885	6577	8456
	5	2656	4346	6278	8451	10866
Rural						
	2	1336	2186	3157	4250	5464
	3	2004	3279	4736	6375	8196
	4	2671	4371	6314	8500	10929
	5	3339	5464	7893	10625	13661

Daily Volumes Two-Way (vehicles/day)

	Lanes	LOS-A	LOS-B	LOS-C	LOS-D	LOS-E
Urban						
	4	19,700	32,200	46,500	62,700	80,600
	6	30,400	49,800	71,900	96,800	124,500
	8	41,700	68,300	98,600	132,800	170,800
	10	53,600	87,800	126,800	170,700	219,500
Rural						
	4	26,900	44,100	63,700	85,800	110,300
	6	40,400	66,200	95,600	128,700	165,500
	8	53,900	88,300	127,500	171,700	220,700
	10	67,400	110,300	159,400	214,600	275,900

Note: Daily volume thresholds rounded down to the nearest 100.

Urban Streets

Assumptions

Input Parameters	Class I	Class II	Class III	Class IV
Signal Density	0.8	3	5	10
Free-Flow Speed	50	40	35	30
Cycle Length	110	90	80	70
Effective green ratio	0.45	0.45	0.45	0.45
Adj. Sat. flow rate	1850	1800	1750	1700
Arrival type	3	4	4	5
Unit extension	3	3	3	3
Initial queue	0	0	0	0
Other delay	0	0	0	0
Peak-hour factor	0.9	0.9	0.9	0.9
% lefts	10	10	10	10
% rights	10	10	10	10
Left-turn bays	Yes	Yes	Yes	Yes
Lane utilization factor		1.00/0.952/0.908		

Urban Street Class Based on Functional and Design Categories

Exhibit 10-3, Highway Capacity Manual 2000

Design Category	Functional Category	
	Principal	Minor
High-Speed	I	N/A
Suburban	II	II
Intermediate	II	III or IV
Urban	III or IV	IV

K Factor = 0.10
D Factor = 0.60

Adjusted Service Volumes One-way (vehicles/hour)

	Lanes	LOS-A	LOS-B	LOS-C	LOS-D	LOS-E
Class I Urban Street	1	N/A	841	910	998	1115
	2	N/A	1683	1820	1986	2230
	3	N/A	2524	2720	2984	3355
	4	N/A	3375	3629	3972	4471
Class II Urban Street	1	N/A	N/A	655	832	871
	2	N/A	N/A	1438	1663	1741
	3	N/A	N/A	2230	2495	2612
	4	N/A	N/A	3023	3326	3483
Class III Urban Street	1	N/A	N/A	470	763	832
	2	N/A	N/A	1008	1565	1653
	3	N/A	N/A	1526	2358	2485
	4	N/A	N/A	2093	3150	3316
Class IV Urban Street	1	N/A	N/A	528	763	783
	2	N/A	N/A	1174	1536	1585
	3	N/A	N/A	1859	2318	2377
	4	N/A	N/A	2553	3091	3179

Daily Volumes Two-Way (vehicles/day)

	Lanes	LOS-A	LOS-B	LOS-C	LOS-D	LOS-E
Class I Urban Street	2	N/A	14,000	15,100	16,600	18,500
	4	N/A	28,000	30,300	33,100	37,100
	6	N/A	42,000	45,300	49,700	55,900
	8	N/A	56,200	60,400	66,200	74,500
Class II Urban Street	2	N/A	N/A	10,900	13,800	14,500
	4	N/A	N/A	23,900	27,700	29,000
	6	N/A	N/A	37,100	41,500	43,500
	8	N/A	N/A	50,300	55,400	58,000
Class III Urban Street	2	N/A	N/A	7,800	12,700	13,800
	4	N/A	N/A	16,800	26,000	27,500
	6	N/A	N/A	25,400	39,300	41,400
	8	N/A	N/A	34,800	52,500	55,200
Class IV Urban Street	2	N/A	N/A	8,800	12,700	13,000
	4	N/A	N/A	19,500	25,600	26,400
	6	N/A	N/A	30,900	38,600	39,600
	8	N/A	N/A	42,500	51,500	52,900

Note: Daily volume thresholds rounded down to the nearest 100.

Table B-2: Basic Freeway Segments: *Highway Capacity Manual* Analysis - Existing Volumes

Location	Inputs										Results			
	Volume (vph)	Peak-Hour			Heavy Vehs		RVs		Driver	Free-flow	Existing			
	Existing	Factor	Lanes	Terrain	%	Auto Equiv	%	Auto Equiv	Pop. Factor	Speed (mph)*	Flow Rate (pcphpl)	Avg. pax-car speed (mph)	Density (pax-car/ lane/mi)	LOS
P.M. Peak Hour														
East Hills to 1750	1091	0.83	2		1.4%	1.5	0%	1.2	1.0	65	661	65	10.2	A
1750 to 1900 off	1116	*0.83*	2	7950' @ 0.00%	1.4%	1.5	0%	1.2	1.0	70	676	70	9.7	A
1900 on to Church off	1085	*0.89*	2	4100' @ 0.00%, 3750' @ +1.79%, 2800' @ -0.72%, 3300' @ +0.70%, 1850' @ -0.28%	*1.4%*	1.5	0%	1.2	1.0	70	613	70	8.8	A
Church on to 1400 off	1053	0.89	2	6950' @ -0.28%, 575' @ -2.43%	*1.3%*	1.5	0%	1.2	1.0	70	595	70	8.5	A
1400 on to Evening Star off	1100	0.89	2	2055' @ -2.43%, 2270' @ +1.18%, 950' @ +2.96%, 1000' @ +0.50%, 1150' @ +1.60%, 2200' @ +0.50%, 538' @ +1.18%	1.3%	1.5	0%	1.2	1.0	70	621	70	8.9	A
Evening Star on to Edgerton off	1093	0.89	2	662' @ +1.18%, 1400' @ -0.84%, 3400' @ -0.30%, 2354' @ -0.50%	1.3%	1.5	0%	1.2	1.0	70	617	70	8.8	A
Edgerton on to Lexington off	1094	0.89	2	546' @ -0.50%, 2300' @ +1.21%, 2050' @ +3.00%, 3650' @ -3.00%, 1100' @ +2.31%, 710' @ -3.00%	1.3%	1.5	0%	1.2	1.0	70	618	70	8.8	A
Lexington on to Kill Creek off	1344	0.89	2	2792' @ -3.00%, 3000' @ +3.00%, 2125' @ +1.10%	1.3%	1.5	0%	3.0	1.0	70	759	70	10.8	A
Kill Creek on to Cedar Creek off	1441	0.89	2	4500' @ +1.10%, 5650' @ -2.82%, 4300' @ +0.17%, 6580' @ +2.89%	1.3%	2.5	0%	3.0	1.0	70	822	70	11.7	B
Cedar Creek on to K-7 off	1546	*0.92*	2	420' @ +2.89%, 3590' @ -1.50%, 4037' @ +1.88%, 1685' @ +0.40%	*1.5%*	1.5	0%	1.2	1.0	70	849	70	12.1	B
K-7 on to Woodland off	2123	*0.94*	2	118' @ +0.40%, 1750' @ +0.57%, 800' @ -0.3%, 2150' @ +0.60%, 2550' @ -1.70%, 3115' @ -0.76%	*2.0%*	1.5	0%	1.2	1.0	70	1141	70	16.3	B
Woodland on to Ridgeview off	2316	0.94	2	2385' @ -3.55%, 2700' @ +3.06%, 225' @ -3.04%	2.0%	1.5	0%	1.2	1.0	70	1244	70	17.8	B
Ridgeview on to Renner off	2418	0.94	2		2.0%	1.5	0%	1.2	1.0	65	1299	65	20.0	C
Renner on to I-435 off	2993	*0.94*	2		*2.9%*	1.5	0%	1.2	1.0	65	1616	64.8	24.9	C
K-10 Westbound														
I-435 on to Renner off	3041	*0.86*	2		*2.9%*	1.5	0%	1.2	1.0	65	1795	63.9	28.1	D
Renner on to Ridgeview off	3450	0.86	2		2.9%	1.5	0%	1.2	1.0	65	2036	60.8	33.5	D
Ridgeview on to Woodland off	3124	0.86	2	225' @ +3.04%, 2700' @ -3.06%, 2385' @ +3.55%	2.9%	2.0	0%	2.5	1.0	70	1871	67	27.9	D
Woodland on to K-7 off	2794	*0.95*	2	3115' @ +0.76%, 2550' @ +1.70%, 2150' @ -0.60%, 800' @ +0.30%, 1750' @ -0.57%, 118' @ -0.40%	*1.2%*	1.5	0%	1.2	1.0	70	1478	69.9	21.2	C
K-7 on to Cedar Creek off	1959	*0.90*	2	1685' @ -0.40%, 4037' @ -1.88%, 3590' @ +1.50%, 420' @ -2.89%	*1.2%*	1.5	0%	1.2	1.0	70	1094	70	15.6	B
Cedar Creek on to Kill Creek off	1916	0.90	2	6580' @ -2.89%, 4300' @ -0.17%, 5650' @ +2.62%, 4500' @ -1.10%	1.2%	1.5	0%	1.2	1.0	70	1070	70	15.3	B
Kill Creek on to Lexington off	1685	0.90	2	2125' @ -1.10%, 3000' @ -3.00%, 2792' @ +3.00%	1.2%	1.5	0%	3.0	1.0	70	941	70	13.4	B
Lexington on to Edgerton off	1664	0.90	2	742' @ -2.31%, 3650' @ +3.00%, 2050' @ -3.00%, 2300' @ -1.21%, 546' @ +0.50%	1.2%	1.5	0%	3.0	1.0	70	929	70	13.3	B
Edgerton on to Evening Star off	1648	0.90	2	2354' @ +0.50%, 3400' @ +0.30%, 1400' @ +0.84%, 662' @ -1.18%	1.2%	1.5	0%	1.2	1.0	70	920	70	13.1	B
Evening Star on to 1400 off	1653	0.90	2	538' @ -1.18%, 2200' @ -0.50%, 1150' @ -1.60%, 1000' @ -0.50%, 950' @ -2.96%, 2270' @ -1.18%, 2055' @ +2.43%	1.2%	1.5	0%	1.2	1.0	70	923	70	13.2	B
1400 on to Church off	1549	*0.90*	2	575' @ +2.43%, 6950' @ +0.28%	*1.2%*	1.5	0%	1.2	1.0	70	865	70	12.4	B
Church on to 1900 off	1442	*0.92*	2	1850' @ +0.28%, 3300' @ -0.70%, 2800' @ +0.72%, 3750' @ -1.79%, 4100' @ 0.00%	*0.9%*	1.5	0%	1.2	1.0	70	788	70	11.3	B
1900 on to 1750	1433	0.92	2	7950' @ 0.00%	0.9%	1.5	0%	1.2	1.0	65	783	65	12.0	B

xxx - From field data
xxx - Actual grade entered into HCS

Table B-3: Ramp Junctions: *Highway Capacity Manual* Analysis - Existing Volumes

1/14/05

Location	Inputs																																	Results					Basic Ramp Capacity Check	
	Freeway Mainline Data											Ramp Data												Adjacent Ramp Data (6-lane freeways only)										Existing						
	Lanes	Free-flow speed (mph)	Volume (vph) Existing	Peak-Hour Factor	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Side	Lanes	Free-flow speed (mph)	Volume (vph) Existing	Accel or decel length (ft)	Terrain*	Peak-Hour Factor	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Volume (vph) Existing	Peak-Hour Factor	Position	Type	Separation Dist (ft)	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Density (pc/mi/ln)	LOS	Speed (mph) Ramp Influ. Area	Speed (mph) Outer Lanes	Speed (mph) All Vehs.	Basic Capacity	Volume Exceeds Basic Capacity?
P.M. Peak Hour																																								
K-10 Eastbound																																								
1900 off	2	70	1116	0.83	7230' @ 0.00%	1.4	1.5	0%	1.2	1.0	right	1	35	96	660	690' @ 3.00%	0.73	0.0%	1.5	0.0%	1.2	1.00											9.9	A	57.7	n/a	57.7		
1900 on	2	70	1020	0.89	3270' @ 0.00%	1.4	1.5	0%	1.2	1.0	right	1	35	65	840	860' @ -3.00%	0.63	1.7%	1.5	0.0%	1.2	1.00											10.0	A	62.3	n/a	62.3		
Church off	2	70	1085	0.89	1130' @ -0.28%	1.4	1.5	0%	1.2	1.0	right	1	35	160	610	635' @ 3.00%	0.83	2.3%	1.5	0.0%	1.2	1.00											9.3	A	57.5	n/a	57.5		
Church on	2	70	925	0.89	6000' @ -0.28%	1.3	1.5	0%	1.2	1.0	right	1	35	128	750	740' @ -3.00%	0.94	0.9%	1.5	0.0%	1.2	1.00											9.9	A	62.1	n/a	62.1		
1400 off	2	70	1053	0.89	8230' @ -0.28%	1.3	1.5	0%	1.2	1.0	right	1	35	12	800	795' @ -3.00%	0.75	0.0%	1.5	0.0%	1.2	1.00											7.3	A	58.0	n/a	58.0		
1400 on	2	70	1041	0.89	1320' @ -2.43%	1.3	1.5	0%	1.2	1.0	right	1	35	59	970	950' @ 3.00%	0.81	3.4%	1.5	0.0%	1.2	1.00											9.1	A	62.5	n/a	62.5		
Evening Star off	2	70	1100	0.89	1670' @ +0.50%	1.3	1.5	0%	1.2	1.0	right	1	35	16	816	425' @ -1.32%	0.61	0.0%	1.5	0.0%	1.2	1.00											7.6	A	58.0	n/a	58.0		
Evening Star on	2	70	1084	0.89	1040' @ -0.84%	1.3	1.5	0%	1.2	1.0	right	1	35	9	1013	550' @ 2.87%	0.44	0.0%	1.5	0.0%	1.2	1.00											8.8	A	62.6	n/a	62.6		
Edgerton off	2	70	1093	0.89	1200' @ -0.50%	1.3	1.5	0%	1.2	1.0	right	1	35	6	858	325' @ -1.64%	0.50	0.0%	1.5	0.0%	1.2	1.00											7.1	A	58.0	n/a	58.0		
Edgerton on	2	70	1087	0.89	1930' @ +1.21%	1.3	1.5	0%	1.2	1.0	right	1	35	7	927	425' @ 2.34%	0.67	0.0%	1.5	0.0%	1.2	1.00											9.3	A	62.5	n/a	62.5		
Lexington off	2	70	1094	0.89	3580' @ -3.00%	1.3	1.5	0%	1.2	1.0	right	1	35	82	651	180' @ -4.47%	0.89	2.4%	1.5	0.0%	1.2	1.00											9.0	A	57.8	n/a	57.8		
Lexington on	2	70	1012	0.89	3655' @ -3.00%	1.3	1.5	0%	1.2	1.0	right	1	35	332	1370	860' @ 4.47%	0.84	29.4%	1.5	0.0%	1.2	1.00											9.1	A	63.2	n/a	63.2		
Kill Creek off	2	70	1344	0.89	1145' @ +1.10%	1.3	1.5	0%	1.2	1.0	right	1	35	44	655	390' @ 4.91%	0.54	11.6%	1.5	0.0%	2.5	1.00											11.4	B	57.8	n/a	57.8		
Kill Creek on	2	70	1300	0.89	3660' @ +1.10%	1.3	1.5	0%	1.2	1.0	right	1	35	141	860	75' @ 1.78%	0.87	3.6%	1.5	0.0%	1.2	1.00											12.7	B	62.1	n/a	62.1		
Cedar Creek off	2	70	1441	0.89	5720' @ +2.89%	1.3	2.5	0%	3.0	1.0	right	1	35	33	680	690' @ -3.00%	0.85	2.9%	1.5	0.0%	1.2	1.00											12.3	B	57.9	n/a	57.9		
Cedar Creek on	2	70	1408	0.92	3115' @ -1.50%	1.5	1.5	0%	1.2	1.0	right	1	35	138	860	860' @ 3.00%	0.80	2.2%	1.5	0.0%	1.2	1.00											13.4	B	62.1	n/a	62.1		
Woodland off	2	70	2123	0.94	2300' @ -0.76%	2.0	1.5	0%	1.2	1.0	right	1	35	53	600	250' @ -5.74%	0.75	5.9%	1.5	0.0%	1.2	1.00											18.5	B	57.8	n/a	57.8		
Woodland on	2	70	2070	0.94	1540' @ -3.55%	2.0	1.5	0%	1.2	1.0	right	1	35	246	835	860' @ 3.00%	0.94	3.6%	1.5	0.0%	1.2	1.00											19.5	B	61.3	n/a	61.3		
Ridgeview off	2	70	2316	0.94	1900' @ +3.06%	2.0	2.0	0%	2.5	1.0	right	1	35	183	710	690' @ 3.00%	0.95	1.6%	1.5	0.0%	1.2	1.00											19.5	B	57.5	n/a	57.5		
Ridgeview on	2	70	2133	0.94	level	2.0	1.5	0%	1.2	1.0	right	1	35	285	840	860' @ -3.00%	0.83	3.2%	1.5	0.0%	1.2	1.00											20.6	C	61.1	n/a	61.1		
Renner off	2	65	2418	0.94	level	2.0	1.5	0%	1.2	1.0	right	1	35	200	500	2100' @ -3.00%	0.65	1.6%	1.5	0.0%	1.2	1.00											22.1	C	54.5	n/a	54.5		
K-10 Westbound																																								
Renner on	2	65	2956	0.86	level	2.9	1.5	0%	1.2	1.0	right	1	35	494	500	1600' @ 3.00%	0.75	0.6%	1.5	0.0%	1.2	1.00											34.4	D	52.7	n/a	52.7		
Ridgeview off	2	70	3450	0.86	level	2.9	1.5	0%	1.2	1.0	right	1	35	539	550	540' @ 3.00%	0.91	1.7%	1.5	0.0%	1.2	1.00											34.3	D	56.5	n/a	56.5		
Ridgeview on	2	70	2911	0.86	1850' @ -3.06%	2.9	1.5	0%	1.2	1.0	right	1	35	213	500	900' @ -3.00%	0.73	1.9%	1.5	0.0%	1.2	1.00											31.3	D	57.4	n/a	57.4		
Woodland off	2	70	3124	0.86	1309' @ +3.55%	2.9	2.0	0%	2.5	1.0	right	1	35	369	590	580' @ -3.00%	0.98	0.5%	1.5	0.0%	1.2	1.00											31.1	D	57.1	n/a	57.1		
Woodland on	2	70	2755	0.95	2330' @ +0.76%	1.2	1.5	0%	1.2	1.0	right	1	35	39	1390	150' @ 3.98%	0.70	28.2%	1.5	0.0%	1.2	1.00											20.0	B	61.6	n/a	61.6		
Cedar Creek off	2	70	1959	0.90	3040' @ +1.50%	1.2	1.5	0%	1.2	1.0	right	1	35	109	640	635' @ -3.00%	0.89	0.0%	1.5	0.0%	1.2	1.00											17.3	B	57.7	n/a	57.7		
Cedar Creek on	2	70	1850	0.90	5800' @ -2.89%	1.2	1.5	0%	1.2	1.0	right	1	35	66	850	860' @ 3.00%	0.89	0.0%	1.5	0.0%	1.2	1.00											16.8	B	61.7	n/a	61.7		
Kill Creek off	2	70	1916	0.90	3675' @ -1.10%	1.2	1.5	0%	1.2	1.0	right	1	35	273	660	275' @ -1.55%	0.84	2.3%	1.5	0.0%	1.2	1.00											16.7	B	57.2	n/a	57.2		
Kill Creek on	2	70	1643	0.90	1125' @ -1.10%	1.2	1.5	0%	1.2	1.0	right	1	35	42	860	350' @ -4.77%	0.83	3.0%	1.5	0.0%	1.2	1.00											14.8	B	62.0	n/a	62.0		
Lexington off	2	70	1685	0.90	2389' @ +3.00%	1.2	1.5	0%	1.2	1.0	right	1	35	184	910	540' @ -2.58%	0.91	1.5%	1.5	0.0%	1.2	1.00											12.2	B	57.5	n/a	57.5		
Lexington on	2	70	1501	0.90	3142' @ +3.00%	1.2	1.5	0%	3.0	1.0	right	1	35	163	822	225' @ 1.28%	0.82	2.0%	1.5	0.0%	1.2	1.00											14.9	B	61.9	n/a	61.9		
Edgerton off	2	70	1664	0.90	1780' @ -1.21%	1.2	1.5	0%	1.2	1.0	right	1	35	20	816	370' @ -4.29%	0.88	0.0%	1.5	0.0%	1.2	1.00											12.9	B	58.0	n/a	58.0		
Edgerton on	2	70	1644	0.90	1500' @ +0.50%	1.2	1.5	0%	1.2	1.0	right	1	35	4	1013	425' @ 4.75%	0.50	0.0%	1.5	0.0%	2.5	1.00											13.5	B	62.3	n/a	62.3		
Evening Star off	2	70	1648	0.90	750' @ +0.84%	1.2	1.5	0%	1.2	1.0	right	1	35	12	858	425' @ -3.84%	0.75	6.7%	1.5	0.0%	1.2	1.00											12.4	B	58.0	n/a	58.0		
Evening Star on	2	70	1636	0.90	1820' @ -0.50%	1.2	1.5	0%	1.2	1.0	right	1	35	17	880	420' @ 2.21%	0.63	0.0%	1.5	0.0%	1.2	1.00											14.4	B	62.0	n/a	62.0		
1400 off	2	70	1653	0.90	1200' @ +2.43%	1.2	1.5	0%	1.2	1.0	right	1	35	129	740	740' @ -3.00%	0.94	0.7%	1.5	0.0%	1.2	1.00											13.5	B	57.7	n/a	57.7		
1400 on	2	70	1524	0.90	6680' @ +0.28%	1.2	1.5	0%	1.2	1.0	right	1	35	25	780	795' @ 3.00%	0.63	0.0%	1.5	0.0%	1.2	1.00											14.2	B	61.9	n/a	61.9		
Church off	2	70	1549	0.90	7770' @ +0.28%	1.2	1.5	0%	1.2	1.0	right	1	35	188	600	580' @ 3.00%	0.88	1.6%	1.5	0.0%	1.2	1.00											13.7	B	57.5	n/a	57.5		
Church on	2	70	1361	0.92	1030' @ +0.28%	0.9	1.5	0%	1.2	1.0	right	1	35	81	970	950' @ -3.00%	0.78	1.2%	1.5	0.0%	1.2	1.00											11.8	B	62.4	n/a	62.4		
1900 off	2	70	1442	0.92	3380' @ 0.00%	0.9	1.5	0%	1.2	1.0	right	1	35	81	650	635' @ 3.00%	0.84	2.7%	1.5	0.0%	1.2	1.00											11.9	B	57.8	n/a	57.8		
1900 on	2	70	1361	0.92	7120' @ 0.00%	0.9	1.5	0%	1.2	1.0	right	1	35	72	850	860' @ -3.00%	0.83	5.0%	1.5	0.0%	1.2	1.00											12.4	B	62.1	n/a	62.1		

* A ramp grade of 3% (or -3%) was estimated on ramps for which there was no ramp data available on the as-built plans.

HCM Unsignalized Intersection Capacity Analysis
2: K-10 & East Hills

1/10/2005

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)	48	1051	14	2	1378	6	12	0	6	33	0	197
Peak Hour Factor	0.63	0.90	0.58	0.50	0.89	0.63	0.43	0.25	0.50	0.55	0.25	0.52
Hourly flow rate (vph)	76	1168	24	4	1548	10	28	0	12	60	0	379
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							Raised			Raised		
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1558			1192			2102	2886	584	2305	2901	774
vC1, stage 1 conf vol							1320	1320		1556	1556	
vC2, stage 2 conf vol							782	1566		748	1344	
vCu, unblocked vol	1558			1192			2102	2886	584	2305	2901	774
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			99			0	100	97	43	100	0
cM capacity (veh/h)	421			581			0	81	455	106	117	341

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1	SB 2
Volume Total	76	584	584	24	4	774	774	10	40	60	379
Volume Left	76	0	0	0	4	0	0	0	28	60	0
Volume Right	0	0	0	24	0	0	0	10	12	0	379
cSH	421	1700	1700	1700	581	1700	1700	1700	0	106	341
Volume to Capacity	0.18	0.34	0.34	0.01	0.01	0.46	0.46	0.01	Err	0.57	1.11
Queue Length (ft)	16	0	0	0	1	0	0	0	Err	67	363
Control Delay (s)	15.4	0.0	0.0	0.0	11.2	0.0	0.0	0.0	Err	76.7	117.2
Lane LOS	C				B				F	F	F
Approach Delay (s)	0.9				0.0				Err	111.7	
Approach LOS									F	F	

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: K-10 & 1750 Rd

1/10/2005

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)	17	1074	0	5	1365	63	0	2	3	39	2	21
Peak Hour Factor	0.85	0.95	0.25	0.41	0.89	0.84	0.25	0.50	0.38	0.88	0.50	0.66
Hourly flow rate (vph)	20	1131	0	12	1534	75	0	4	8	44	4	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type								Raised			Raised	
Median storage veh)								1			1	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1609			1131			1964	2804	565	2173	2729	767
vC1, stage 1 conf vol							1171	1171		1558	1558	
vC2, stage 2 conf vol							793	1633		615	1171	
vCu, unblocked vol	1609			1131			1964	2804	565	2173	2729	767
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			100	95	98	50	96	91
cM capacity (veh/h)	402			614			119	87	468	89	99	345

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	20	565	565	0	12	767	767	75	12	80
Volume Left	20	0	0	0	12	0	0	0	0	44
Volume Right	0	0	0	0	0	0	0	75	8	32
cSH	402	1700	1700	1700	614	1700	1700	1700	189	137
Volume to Capacity	0.05	0.33	0.33	0.00	0.02	0.45	0.45	0.04	0.06	0.58
Queue Length (ft)	4	0	0	0	2	0	0	0	5	74
Control Delay (s)	14.4	0.0	0.0	0.0	11.0	0.0	0.0	0.0	25.3	62.6
Lane LOS	B				B				D	F
Approach Delay (s)	0.3				0.1				25.3	62.6
Approach LOS									D	F

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: K10 WB ramps & E 1900 Rd

1/10/2005

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	0	0	63	2	16	25	84	0	0	72	45
Peak Hour Factor	0.25	0.25	0.25	0.76	0.25	0.88	0.62	0.82	0.25	0.25	0.61	0.62
Hourly flow rate (vph)	0	0	0	83	8	18	40	102	0	0	118	73
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	360	337	154	337	374	102	191			102		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	360	337	154	337	374	102	191			102		
tC, single (s)	7.1	6.5	6.2	7.1	7.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.9	3.3	2.2			2.2		
p0 queue free %	100	100	100	86	98	98	97			100		
cM capacity (veh/h)	567	570	897	607	418	958	1395			1502		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	109	143	191
Volume Left	83	40	0
Volume Right	18	0	73
cSH	624	1395	1700
Volume to Capacity	0.17	0.03	0.11
Queue Length (ft)	16	2	0
Control Delay (s)	12.0	2.3	0.0
Lane LOS	B	A	
Approach Delay (s)	12.0	2.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: K10 EB ramps & E 1900 Rd

1/10/2005

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)	67	0	29	0	0	0	0	42	9	56	79	0
Peak Hour Factor	0.63	0.25	0.80	0.25	0.25	0.25	0.25	0.84	0.75	0.69	0.79	0.25
Hourly flow rate (vph)	106	0	36	0	0	0	0	50	12	81	100	0
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	318	324	100	355	318	56	100			62		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	318	324	100	355	318	56	100			62		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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 %	83	100	96	100	100	100	100			95		
cM capacity (veh/h)	613	565	961	558	570	1016	1505			1541		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	143	62	181
Volume Left	106	0	81
Volume Right	36	12	0
cSH	675	1700	1541
Volume to Capacity	0.21	0.04	0.05
Queue Length (ft)	20	0	4
Control Delay (s)	11.8	0.0	3.6
Lane LOS	B		A
Approach Delay (s)	11.8	0.0	3.6
Approach LOS	B		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: K10 WB ramps & Church 1/10/2005

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	0	0	128	0	60	48	216	0	0	164	33
Peak Hour Factor	0.25	0.25	0.25	0.89	0.25	0.83	0.75	0.89	0.25	0.25	0.93	0.55
Hourly flow rate (vph)	0	0	0	144	0	72	64	243	0	0	176	60
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	649	577	206	577	607	243	236			243		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	649	577	206	577	607	243	236			243		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	100	65	100	91	95			100		
cM capacity (veh/h)	338	410	839	412	394	801	1343			1336		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	216	307	236
Volume Left	144	64	0
Volume Right	72	0	60
cSH	492	1343	1700
Volume to Capacity	0.44	0.05	0.14
Queue Length (ft)	55	4	0
Control Delay (s)	17.9	2.0	0.0
Lane LOS	C	A	
Approach Delay (s)	17.9	2.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		5.9	
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
7: K10 EB ramps & Church 1/10/2005

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)	72	0	88	0	0	0	0	192	91	37	255	0
Peak Hour Factor	0.82	0.25	0.84	0.25	0.25	0.25	0.25	0.84	0.86	0.75	0.96	0.25
Hourly flow rate (vph)	88	0	105	0	0	0	0	229	106	49	266	0
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	646	699	266	751	646	281	266			334		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	646	699	266	751	646	281	266			334		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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 %	76	100	86	100	100	100	100			96		
cM capacity (veh/h)	370	352	775	277	377	762	1310			1236		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	193	334	315
Volume Left	88	0	49
Volume Right	105	106	0
cSH	517	1700	1236
Volume to Capacity	0.37	0.20	0.04
Queue Length (ft)	43	0	3
Control Delay (s)	16.0	0.0	1.6
Lane LOS	C		A
Approach Delay (s)	16.0	0.0	1.6
Approach LOS	C		

Intersection Summary			
Average Delay		4.3	
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
8: K10 WB ramps & E 1400 Rd 1/10/2005

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	0	0	3	0	126	10	28	0	0	75	15
Peak Hour Factor	0.25	0.25	0.25	0.38	0.25	0.92	1.00	0.70	0.25	0.25	0.90	0.75
Hourly flow rate (vph)	0	0	0	8	0	137	10	40	0	0	83	20
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	290	153	93	153	163	40	103			40		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	290	153	93	153	163	40	103			40		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	100	99	100	87	99			100		
cM capacity (veh/h)	575	737	969	814	728	1034	1501			1583		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	145	50	103
Volume Left	8	10	0
Volume Right	137	0	20
cSH	1019	1501	1700
Volume to Capacity	0.14	0.01	0.06
Queue Length (ft)	12	1	0
Control Delay (s)	9.1	1.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	1.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		4.7	
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
9: K10 EB ramps & E 1400 Rd 1/10/2005

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	0	7	0	0	0	0	33	2	57	21	0
Peak Hour Factor	0.63	0.25	0.58	0.25	0.25	0.25	0.25	0.82	0.50	0.82	0.71	0.25
Hourly flow rate (vph)	8	0	12	0	0	0	0	40	4	70	30	0
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	211	213	30	223	211	42	30			44		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	211	213	30	223	211	42	30			44		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	99	100	100	100	100			96		
cM capacity (veh/h)	725	657	1051	704	659	1034	1597			1551		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	20	44	99
Volume Left	8	0	70
Volume Right	12	4	0
cSH	892	1700	1551
Volume to Capacity	0.02	0.03	0.04
Queue Length (ft)	2	0	4
Control Delay (s)	9.1	0.0	5.3
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	5.3
Approach LOS	A		

Intersection Summary			
Average Delay		4.3	
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
10: K10 WB ramps & Evening Star 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			-2%			0%			0%	
Volume (veh/h)	0	0	0	5	1	6	10	8	0	0	4	6
Peak Hour Factor	0.25	0.25	0.25	0.48	0.25	0.50	0.53	0.42	0.25	0.25	0.63	0.75
Hourly flow rate (vph)	0	0	0	10	4	12	19	19	0	0	6	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						1						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	75	67	10	67	71	19	14			19		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	75	67	10	67	71	19	14			19		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.7	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	99	99			100		
cM capacity (veh/h)	898	818	1077	882	814	1065	1617			1611		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	26	38	14
Volume Left	10	19	0
Volume Right	12	0	8
cSH	1582	1617	1700
Volume to Capacity	0.02	0.01	0.01
Queue Length (ft)	1	1	0
Control Delay (s)	7.3	3.7	0.0
Lane LOS	A	A	
Approach Delay (s)	7.3	3.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		4.2	
Intersection Capacity Utilization		17.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
11: K10 EB ramps & Evening Star 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		-1%			0%			0%			0%	
Volume (veh/h)	4	2	10	0	0	0	0	13	1	6	3	0
Peak Hour Factor	0.63	0.25	0.50	0.25	0.25	0.25	0.25	0.59	0.25	0.33	0.75	0.25
Hourly flow rate (vph)	6	8	20	0	0	0	0	22	4	18	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	64	66	4	78	64	24	4			26		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	64	66	4	78	64	24	4			26		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	98	100	100	100	100			99		
cM capacity (veh/h)	926	819	1085	884	821	1058	1631			1601		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	26	22
Volume Left	6	0	18
Volume Right	20	4	0
cSH	1864	1700	1601
Volume to Capacity	0.02	0.02	0.01
Queue Length (ft)	1	0	1
Control Delay (s)	7.0	0.0	6.0
Lane LOS	A		A
Approach Delay (s)	7.0	0.0	6.0
Approach LOS	A		

Intersection Summary			
Average Delay		4.5	
Intersection Capacity Utilization		15.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
12: K10 WB ramps & Edgerton 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			-2%			0%			0%	
Volume (veh/h)	0	0	0	6	0	14	4	4	0	0	5	0
Peak Hour Factor	0.25	0.25	0.25	0.54	0.25	0.80	1.00	0.63	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	0	0	0	11	0	18	4	6	0	0	20	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)						1						
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	43	34	20	34	34	6	20			6		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43	34	20	34	34	6	20			6		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	100	99	100	98	100			100		
cM capacity (veh/h)	947	860	1064	976	860	1082	1609			1628		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	10	20
Volume Left	11	4	0
Volume Right	18	0	0
cSH	1769	1609	1700
Volume to Capacity	0.02	0.00	0.01
Queue Length (ft)	1	0	0
Control Delay (s)	7.1	2.8	0.0
Lane LOS	A	A	
Approach Delay (s)	7.1	2.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		3.9	
Intersection Capacity Utilization		13.8%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
13: K10 EB ramps & Edgerton 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			-3%			3%	
Volume (veh/h)	1	0	5	0	0	0	0	7	1	6	5	0
Peak Hour Factor	0.25	0.25	0.63	0.25	0.25	0.25	0.25	0.70	0.25	0.58	0.48	0.25
Hourly flow rate (vph)	4	0	8	0	0	0	0	10	4	10	10	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	43	45	10	47	43	12	10			14		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43	45	10	47	43	12	10			14		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	99	100	100	100	100			99		
cM capacity (veh/h)	960	845	1077	947	847	1074	1622			1617		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	14	21
Volume Left	4	0	10
Volume Right	8	4	0
cSH	1619	1700	1617
Volume to Capacity	0.01	0.01	0.01
Queue Length (ft)	1	0	0
Control Delay (s)	7.2	0.0	3.6
Lane LOS	A		A
Approach Delay (s)	7.2	0.0	3.6
Approach LOS	A		

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		15.6%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
14: K10 WB ramps & Lexington 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			3%			1%			-1%	
Volume (veh/h)	84	66	34	161	53	54	13	133	43	62	254	97
Peak Hour Factor	0.78	0.79	0.65	0.80	0.74	0.75	0.65	0.83	0.57	0.82	0.84	0.85
Hourly flow rate (vph)	108	84	52	201	72	72	20	160	75	76	302	114
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	739	786	208	582	806	118	416			236		
vC1, stage 1 conf vol	511	511		238	238							
vC2, stage 2 conf vol	228	276		344	568							
vCu, unblocked vol	739	786	208	582	806	118	416			236		
tC, single (s)	7.6	6.5	7.3	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.6	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	56	71	93	27	74	92	98			94		
cM capacity (veh/h)	244	287	750	274	277	912	1153			1343		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	244	273	72	20	107	129	76	202	215
Volume Left	108	201	0	20	0	0	76	0	0
Volume Right	52	0	72	0	0	75	0	0	114
cSH	312	275	912	1153	1700	1700	1343	1700	1700
Volume to Capacity	0.78	0.99	0.08	0.02	0.06	0.08	0.06	0.12	0.13
Queue Length (ft)	155	250	6	1	0	0	4	0	0
Control Delay (s)	47.9	93.0	9.3	8.2	0.0	0.0	7.8	0.0	0.0
Lane LOS	E	F	A	A			A		
Approach Delay (s)	47.9	75.6		0.6			1.2		
Approach LOS	E	F							

Intersection Summary			
Average Delay	28.8		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
15: K10 EB ramps & Lexington 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		-2%			0%			2%			-2%	
Volume (veh/h)	80	0	2	3	1	17	30	93	3	14	135	301
Peak Hour Factor	0.87	0.25	0.50	0.38	0.25	0.47	0.50	0.73	0.38	0.58	0.88	0.79
Hourly flow rate (vph)	92	0	4	8	4	36	60	127	8	24	153	381
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1									
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	614	647	267	378	834	68	534			135		
vC1, stage 1 conf vol	392	392		251	251							
vC2, stage 2 conf vol	222	255		127	583							
vCu, unblocked vol	614	647	267	378	834	68	534			135		
tC, single (s)	7.6	6.5	6.9	7.5	6.5	6.9	4.1			4.8		
tC, 2 stage (s)	6.6	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.6		
p0 queue free %	72	100	99	98	98	96	94			98		
cM capacity (veh/h)	325	333	737	426	265	988	1044			1231		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	96	48	60	85	50	24	102	432
Volume Left	92	8	60	0	0	24	0	0
Volume Right	4	36	0	0	8	0	0	381
cSH	336	685	1044	1700	1700	1231	1700	1700
Volume to Capacity	0.29	0.07	0.06	0.05	0.03	0.02	0.06	0.25
Queue Length (ft)	29	6	5	0	0	1	0	0
Control Delay (s)	19.9	10.7	8.7	0.0	0.0	8.0	0.0	0.0
Lane LOS	C	B	A			A		
Approach Delay (s)	19.9	10.7	2.7			0.3		
Approach LOS	C	B						

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
16: K10 WB ramps & Kill Creek 1/10/2005

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	0	0	87	2	184	25	68	0	0	112	15
Peak Hour Factor	0.25	0.25	0.25	0.75	0.50	0.89	0.75	0.78	0.25	0.25	0.78	0.75
Hourly flow rate (vph)	0	0	0	116	4	207	33	87	0	0	144	20
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	516	307	154	307	317	87	164			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	516	307	154	307	317	87	164			87		
tC, single (s)	7.1	6.5	6.2	7.1	7.0	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.4	3.3	2.2			2.2		
p0 queue free %	100	100	100	82	99	79	98			100		
cM capacity (veh/h)	364	596	898	630	515	974	1427			1522		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	327	121	164
Volume Left	116	33	0
Volume Right	207	0	20
cSH	808	1427	1700
Volume to Capacity	0.40	0.02	0.10
Queue Length (ft)	49	2	0
Control Delay (s)	12.4	2.2	0.0
Lane LOS	B	A	
Approach Delay (s)	12.4	2.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
17: K10 EB ramps & Kill Creek 1/10/2005

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	0	31	0	0	0	0	80	52	89	110	0
Peak Hour Factor	0.60	0.25	0.52	0.25	0.25	0.25	0.25	0.88	0.93	0.84	0.84	0.25
Hourly flow rate (vph)	22	0	60	0	0	0	0	91	56	106	131	0
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	462	490	131	521	462	119	131			147		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	462	490	131	521	462	119	131			147		
tC, single (s)	7.1	6.5	6.4	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	93	100	100	100	100			93		
cM capacity (veh/h)	485	446	882	413	463	938	1467			1435		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	81	147	237
Volume Left	22	0	106
Volume Right	60	56	0
cSH	724	1700	1435
Volume to Capacity	0.11	0.09	0.07
Queue Length (ft)	9	0	6
Control Delay (s)	10.6	0.0	3.8
Lane LOS	B		A
Approach Delay (s)	10.6	0.0	3.8
Approach LOS	B		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
18: K10 WB ramps & Cedar Creek 1/10/2005

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	0	0	109	0	0	62	1	0	0	0	4
Peak Hour Factor	0.25	0.25	0.25	0.89	0.25	0.25	0.86	0.25	0.25	0.25	0.25	1.00
Hourly flow rate (vph)	0	0	0	122	0	0	72	4	0	0	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	148	148	0	148	152	4	4			4		
vC1, stage 1 conf vol	0	0		148	148							
vC2, stage 2 conf vol	148	148		0	4							
vCu, unblocked vol	148	148	0	148	152	4	4			4		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	78	100	100	96			100		
cM capacity (veh/h)	557	503	1091	556	501	1085	1631			1631		

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	122	76	0	4
Volume Left	122	72	0	0
Volume Right	0	0	0	4
cSH	556	1631	1700	1700
Volume to Capacity	0.22	0.04	0.00	0.00
Queue Length (ft)	21	3	0	0
Control Delay (s)	13.3	6.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	13.3	6.9	0.0	
Approach LOS	B			

Intersection Summary				
Average Delay		10.6		
Intersection Capacity Utilization	22.9%	ICU Level of Service		A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
19: K10 EB ramps & Cedar Creek 1/10/2005

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	0	25	0	0	0	0	55	137	1	108	0
Peak Hour Factor	0.75	0.25	0.78	0.25	0.25	0.25	0.25	0.73	0.80	0.25	0.81	0.25
Hourly flow rate (vph)	11	0	32	0	0	0	0	75	171	4	133	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	217	388	133	249	217	75	133			247		
vC1, stage 1 conf vol	141	141		75	75							
vC2, stage 2 conf vol	75	247		173	141							
vCu, unblocked vol	217	388	133	249	217	75	133			247		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	96	100	100	100	100			100		
cM capacity (veh/h)	555	436	910	519	505	992	1464			1331		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	43	75	171	4	133
Volume Left	11	0	0	4	0
Volume Right	32	0	171	0	0
cSH	785	1700	1700	1331	1700
Volume to Capacity	0.05	0.04	0.10	0.00	0.08
Queue Length (ft)	4	0	0	0	0
Control Delay (s)	9.8	0.0	0.0	7.7	0.0
Lane LOS	A			A	
Approach Delay (s)	9.8	0.0		0.2	
Approach LOS	A				

Intersection Summary				
Average Delay		1.1		
Intersection Capacity Utilization	25.1%	ICU Level of Service		A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
20: K10 WB ramps & Woodland 1/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			3%			-3%	
Volume (veh/h)	0	0	0	36	2	331	10	46	0	0	222	27
Peak Hour Factor	0.25	0.25	0.25	0.75	0.50	0.96	0.50	0.67	0.25	0.25	0.92	0.84
Hourly flow rate (vph)	0	0	0	48	4	345	20	69	0	0	241	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	678	366	137	229	382	34	273			69		
vC1, stage 1 conf vol	257	257		109	109							
vC2, stage 2 conf vol	421	109		121	273							
vCu, unblocked vol	678	366	137	229	382	34	273			69		
tC, single (s)	7.5	6.5	6.9	7.6	6.5	6.9	5.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.6	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.7			2.2		
p0 queue free %	100	100	100	91	99	67	98			100		
cM capacity (veh/h)	234	438	893	527	426	1038	1001			1545		

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	397	20	34	34	161	113
Volume Left	48	20	0	0	0	0
Volume Right	345	0	0	0	0	32
cSH	917	1001	1700	1700	1700	1700
Volume to Capacity	0.43	0.02	0.02	0.02	0.09	0.07
Queue Length (ft)	55	2	0	0	0	0
Control Delay (s)	11.9	8.7	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.9	2.0			0.0	
Approach LOS	B					

Intersection Summary				
Average Delay		6.4		
Intersection Capacity Utilization	42.9%	ICU Level of Service		A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
21: K10 EB ramps & Woodland 1/10/2005

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)	43	1	9	0	0	0	0	13	25	220	38	0
Peak Hour Factor	0.60	0.25	0.45	0.25	0.25	0.25	0.25	0.50	0.63	0.92	0.73	0.25
Hourly flow rate (vph)	72	4	20	0	0	0	0	26	40	239	52	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	543	596	26	572	576	33	52			66		
vC1, stage 1 conf vol	530	530		46	46							
vC2, stage 2 conf vol	13	66		526	530							
vCu, unblocked vol	543	596	26	572	576	33	52			66		
tC, single (s)	7.6	6.5	7.1	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.6	5.5		6.5	5.5							
tF (s)	3.6	4.0	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	99	98	100	100	100	100			84		
cM capacity (veh/h)	279	287	1015	279	296	1040	1567			1534		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	96	17	48	239	26	26
Volume Left	72	0	0	239	0	0
Volume Right	20	0	40	0	0	0
cSH	329	1700	1700	1534	1700	1700
Volume to Capacity	0.29	0.01	0.03	0.16	0.02	0.02
Queue Length (ft)	30	0	0	14	0	0
Control Delay (s)	20.4	0.0	0.0	7.8	0.0	0.0
Lane LOS	C			A		
Approach Delay (s)	20.4	0.0		6.4		
Approach LOS	C					

Intersection Summary				
Average Delay		8.4		
Intersection Capacity Utilization	42.9%	ICU Level of Service		A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
22: K-10 WB Ramps & Ridgeview 1/10/2005

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	0	0	537	1	1	212	3	0	0	2	0
Peak Hour Factor	0.25	0.25	0.25	0.91	0.25	0.25	0.74	0.38	0.25	0.25	0.50	0.25
Hourly flow rate (vph)	0	0	0	590	4	4	286	8	0	0	4	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	591	585	4	585	585	8	4			8		
vC1, stage 1 conf vol	4	4		581	581							
vC2, stage 2 conf vol	587	581		4	4							
vCu, unblocked vol	591	585	4	585	585	8	4			8		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	99	100	82			100		
cM capacity (veh/h)	274	277	1085	276	273	1080	1618			1626		

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	598	286	8	4
Volume Left	590	286	0	0
Volume Right	4	0	0	0
cSH	277	1618	1700	1700
Volume to Capacity	2.16	0.18	0.00	0.00
Queue Length (ft)	1127	16	0	0
Control Delay (s)	561.4	7.7	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	561.4	7.5		0.0
Approach LOS	F			

Intersection Summary				
Average Delay	377.0			
Intersection Capacity Utilization	67.2%	ICU Level of Service	C	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
23: K10 EB ramps & Ridgeview 1/10/2005

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)	1	0	182	0	0	0	0	214	278	7	532	0
Peak Hour Factor	0.25	0.25	0.97	0.25	0.25	0.25	0.25	0.75	0.86	0.35	0.91	0.25
Hourly flow rate (vph)	4	0	188	0	0	0	0	285	323	20	585	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		Raised			Raised							
Median storage veh)		0			0							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	910	1233	585	1098	910	285	585			609		
vC1, stage 1 conf vol	625	625		285	285							
vC2, stage 2 conf vol	285	609		812	625							
vCu, unblocked vol	910	1233	585	1098	910	285	585			609		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	63	100	100	100	100			98		
cM capacity (veh/h)	271	219	511	146	276	758	1000			980		

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	192	285	323	20	585
Volume Left	4	0	0	20	0
Volume Right	188	0	323	0	0
cSH	502	1700	1700	980	1700
Volume to Capacity	0.38	0.17	0.19	0.02	0.34
Queue Length (ft)	44	0	0	2	0
Control Delay (s)	16.5	0.0	0.0	8.8	0.0
Lane LOS	C			A	
Approach Delay (s)	16.5	0.0		0.3	
Approach LOS	C				

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	60.4%	ICU Level of Service	B	
Analysis Period (min)	15			

HCM Signalized Intersection Capacity Analysis
24: K10 WB ramps & Renner 12/29/2004

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	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1900	1455	1805	1723		1787	3574	1615	1805	3456	
Flt Permitted	0.68	1.00	1.00	0.74	1.00		0.42	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	1296	1900	1455	1409	1723		785	3574	1615	893	3456	
Volume (vph)	7	14	64	205	29	39	344	368	3	7	350	121
Peak-hour factor, PHF	0.58	0.58	0.76	0.69	0.66	0.54	0.72	0.74	0.75	0.88	0.78	0.74
Adj. Flow (vph)	12	24	84	297	44	72	478	497	4	8	449	164
RTOR Reduction (vph)	0	0	61	0	52	0	0	0	2	0	73	0
Lane Group Flow (vph)	12	24	23	297	64	0	478	497	2	8	540	0
Heavy Vehicles (%)	0%	0%	11%	0%	0%	0%	1%	1%	0%	0%	0%	1%
Turn Type	Perm		Perm	Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		
Actuated Green, G (s)	10.9	10.9	10.9	10.9	10.9		21.1	21.1	21.1	21.1	21.1	
Effective Green, g (s)	10.9	10.9	10.9	10.9	10.9		21.1	21.1	21.1	21.1	21.1	
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27		0.53	0.53	0.53	0.53	0.53	
Clearance Time (s)	4.0	4.0	4.0	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	3.0	3.0	3.0	
Lane Grp Cap (vph)	353	518	396	384	470		414	1885	852	471	1823	
v/s Ratio Prot		0.01			0.07			0.14			0.18	
v/s Ratio Perm	0.01		0.06	c0.21			c0.61		0.00	0.01		
v/c Ratio	0.03	0.05	0.06	0.77	0.14		1.15	0.26	0.00	0.02	0.30	
Uniform Delay, d1	10.7	10.7	10.8	13.4	11.0		9.4	5.2	4.5	4.5	5.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.0	0.1	9.4	0.1		93.7	0.3	0.0	0.1	0.4	
Delay (s)	10.7	10.8	10.8	22.8	11.1		103.1	5.5	4.5	4.6	5.7	
Level of Service	B	B	B	C	B		F	A	A	A	A	
Approach Delay (s)		10.8			19.5			53.2			5.7	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
25: K10 EB ramps & Renner 12/29/2004

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-4%	4%	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1805	1583	3536	3646	3468	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1805	1583	3536	3646	3468	1583
Volume (vph)	34	165	546	681	390	229
Peak-hour factor, PHF	0.75	0.69	0.59	0.68	0.79	0.59
Adj. Flow (vph)	45	239	925	1001	494	388
RTOR Reduction (vph)	0	208	0	0	0	251
Lane Group Flow (vph)	45	31	925	1001	494	137
Heavy Vehicles (%)	0%	2%	1%	1%	2%	0%
Turn Type		custom	Prot			Perm
Protected Phases			5	2	6	
Permitted Phases	4	4				6
Actuated Green, G (s)	6.2	6.2	17.7	33.8	12.1	12.1
Effective Green, g (s)	6.2	6.2	17.7	33.8	12.1	12.1
Actuated g/C Ratio	0.13	0.13	0.37	0.70	0.25	0.25
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)	233	204	1304	2567	874	399
v/s Ratio Prot			c0.26	0.27	0.14	
v/s Ratio Perm	0.02	0.15				0.25
v/c Ratio	0.19	0.15	0.71	0.39	0.57	0.34
Uniform Delay, d1	18.7	18.6	13.0	2.9	15.7	14.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3	1.8	0.4	2.6	2.3
Delay (s)	19.1	18.9	14.7	3.3	18.3	17.0
Level of Service	B	B	B	A	B	B
Approach Delay (s)	18.9			8.8	17.7	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Table B-4: Basic Freeway Segments: *Highway Capacity Manual* Analysis - 2030 Volumes, With Existing Interchanges

Location	Inputs																Results			
	Volume (vph)	Peak-Hour			Heavy Vehs		RVs		Driver	Free Flow Speed					2030			
	2030	Factor	Lanes	Terrain	%	Auto Equiv	%	Auto Equiv	Pop. Factor	Base Speed (mph)	Lane Width (ft)	Right Lat. Clear (ft)	Intchg Density	Adj. Speed (mph)	Flow Rate (pcphpl)	Avg. pax-car speed (mph)	Density (pax-car/ lane/mi)	LOS
P.M. Peak Hour																		
K-10 Eastbound																		
1900 on to Church off	2900	0.90	3	4100' @ 0.00%, 3750' @ +1.79%, 2800' @ -0.72%, 3300' @ +0.70%, 1850' @ -0.28%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1101	67.0	16.4	B
Church on to 1400 off	2200	0.90	3	6950' @ -0.28%, 575' @ -2.43%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	65.5	835	65.5	12.7	B
1400 on to Evening Star off	2500	0.90	3	2055' @ -2.43%, 2270' @ +1.18%, 950' @ +2.96%, 1000' @ +0.50%, 1150' @ +1.60%, 2200' @ +0.50%, 538' @ +1.18%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	949	66.1	14.4	B
Evening Star on to Edgerton off	2500	0.90	3	662' @ +1.18%, 1400' @ -0.84%, 3400' @ -0.30%, 2354' @ -0.50%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	64.6	949	64.6	14.7	B
Edgerton on to Lexington off	2600	0.90	3	546' @ -0.50%, 2300' @ +1.21%, 2050' @ +3.00%, 3650' @ -3.00%, 1100' @ +2.31%, 710' @ -3.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	987	66.1	14.9	B
Lexington on to Kill Creek off	3100	0.90	3	2792' @ -3.00%, 3000' @ +3.00%, 2125' @ +1.10%	5.0%	1.5	0%	3.0	1.0	70	12	6	0.50	67.0	1177	67.0	17.6	B
Kill Creek on to Cedar Creek off	3300	0.90	3	4500' @ +1.10%, 5650' @ -2.82%, 4300' @ +0.17%, 6580' @ +2.89%	5.0%	2.5	0%	3.0	1.0	70	12	6	0.33	67.0	1314	67.0	19.6	C
Cedar Creek on to K-7 off	4200	0.90	4	420' @ +2.89%, 3590' @ -1.50%, 4037' @ +1.88%, 1685' @ +0.40%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	65.5	1196	65.5	18.3	C
K-7 on to Woodland off	4800	0.90	4	118' @ +0.40%, 1750' @ +0.57%, 800' @ -0.3%, 2150' @ +0.60%, 2550' @ -1.70%, 3115' @ -0.76%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1367	66.8	20.5	C
Woodland on to Ridgeview off	5100	0.90	5	2385' @ -3.55%, 2700' @ +3.06%, 225' @ -3.04%	5.0%	1.5	0%	1.3	1.0	70	12	6	0.83	63.8	1162	63.8	18.2	C
Ridgeview on to Renner off	6100	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	64.6	1389	64.6	21.5	C
Renner on to I-435 off	6400	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	69.1	1458	69.0	21.1	C
K-10 Westbound																		
I-435 on to Renner off	8100	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	69.1	1845	66.7	27.7	D
Renner on to Ridgeview off	8300	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	69.1	1891	66.0	28.6	D
Ridgeview on to Woodland off	8000	0.90	5	225' @ +3.04%, 2700' @ -3.06%, 2385' @ +3.55%	5.0%	2.0	0%	2.5	1.0	70	12	6	0.83	68.3	1867	65.8	28.4	D
Woodland on to K-7 off	6900	0.90	4	3115' @ +0.76%, 2550' @ +1.70%, 2150' @ -0.60%, 800' @ +0.30%, 1750' @ -0.57%, 118' @ -0.40%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1965	63.3	31.0	D
K-7 on to Cedar Creek off	5100	0.90	4	1685' @ -0.40%, 4037' @ -1.88%, 3590' @ +1.50%, 420' @ -2.89%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	65.5	1452	65.5	22.2	C
Cedar Creek on to Kill Creek off	4000	0.90	3	6580' @ -2.89%, 4300' @ -0.17%, 5650' @ +2.62%, 4500' @ -1.10%	5.0%	1.5	0%	1.3	1.0	70	12	6	0.33	67.0	1519	66.9	22.7	C
Kill Creek on to Lexington off	3200	0.90	3	2125' @ -1.10%, 3000' @ -3.00%, 2792' @ +3.00%	5.0%	1.5	0%	3.0	1.0	70	12	6	0.50	67.0	1215	67.0	18.1	C
Lexington on to Edgerton off	3400	0.90	3	742' @ -2.31%, 3650' @ +3.00%, 2050' @ -3.00%, 2300' @ -1.21%, 546' @ +0.50%	5.0%	1.5	0%	3.0	1.0	70	12	6	0.67	66.1	1291	66.1	19.5	C
Edgerton on to Evening Star off	2900	0.90	3	2354' @ +0.50%, 3400' @ +0.30%, 1400' @ +0.84%, 662' @ -1.18%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1101	66.1	16.7	B
Evening Star on to 1400 off	3700	0.90	3	538' @ -1.18%, 2200' @ -0.50%, 1150' @ -1.60%, 1000' @ -0.50%, 950' @ -2.96%, 2270' @ -1.18%, 2055' @ +2.43%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1405	66.1	21.3	C
1400 on to Church off	3500	0.90	3	575' @ +2.43%, 6950' @ +0.28%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1329	67.0	19.8	C
Church on to 1900 off	3500	0.90	3	1850' @ +0.28%, 3300' @ -0.70%, 2800' @ +0.72%, 3750' @ -1.79%, 4100' @ 0.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	65.5	1329	65.5	20.3	C

xxx - Actual grade entered into HCS

Table B-5: Ramp Junctions: *Highway Capacity Manual* Analysis - 2030 Volumes with Existing Interchanges

1/14/05

	Inputs																																		Results					Basic Ramp Capacity Check	
	Freeway Mainline Data										Ramp Data												Adjacent Ramp Data (6-lane freeways only)												2030						
Location	Lanes	Free-flow speed (mph)	Volume (vph) 2030	Peak-Hour Factor	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Side	Lanes	Free-flow speed (mph)	Volume (vph) 2030	Accel or decel length (ft)	Terrain*	Peak-Hour Factor	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Volume (vph) 2030	Peak-Hour Factor	Position	Type	Separation Dist (ft)	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Density (pc/mi/ln)	LOS	Speed (mph) Ramp Influ. Area	Speed (mph) Outer Lanes	Speed (mph) All Vehs.	Basic Capacity	Volume Exceeds Basic Capacity?
P.M. Peak Hour																																									
K-10 Eastbound																																									
1900 off	3	65.0	2800	0.90	7230' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	660	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.3	B	54.7	71.3	58.9	2000	no
1900 on	3	65.5	2600	0.90	3270' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	840	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.6	B	58.6	63.0	60.1	2000	no
Church off	3	65.5	2900	0.90	1130' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	1100	610	1110' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.5	C	52.8	71.9	56.3	2000	no
Church on	3	65.5	1800	0.90	6000' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	750	1000' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												13.7	B	58.7	64.3	60.4	2000	no
1400 off	3	65.5	2200	0.90	8230' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	100	800	1215' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												12.3	B	55.2	71.9	59.2	2000	no
1400 on	3	64.6	2100	0.90	1320' @ -2.43%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	970	690' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.0	B	58.3	63.0	59.8	2000	no
Evening Star off	3	64.6	2500	0.90	1670' @ +0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	816	425' @ -1.32%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.1	B	52.6	70.9	55.7	2000	no
Evening Star on	3	64.6	1500	0.90	1040' @ -0.84%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	1013	550' @ 2.87%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.6	B	58.2	64.0	59.4	2000	no
Edgerton off	3	64.6	2500	0.90	1200' @ -0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	858	325' @ -1.64%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.2	B	54.0	70.9	57.8	2000	no
Edgerton on	3	64.6	2100	0.90	1930' @ +1.21%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	927	425' @ 2.34%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.1	B	58.2	63.0	59.6	2000	no
Lexington off	3	64.6	2600	0.90	3580' @ -3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	651	180' @ -4.47%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.1	B	53.5	70.9	57.3	2000	no
Lexington on	3	65.5	2000	0.90	3655' @ -3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	1100	1370	860' @ 4.47%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.0	B	58.9	64.2	60.1	2000	no
Kill Creek off	3	65.5	3100	0.90	1145' @ +1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	655	390' @ 4.91%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.9	B	54.0	71.8	58.2	2000	no
Kill Creek on	3	65.5	2500	0.90	3660' @ +1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	860	75' @ 1.78%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.1	C	58.1	63.2	59.6	2000	no
Cedar Creek off	3	65.5	3300	0.90	5720' @ +2.89%	5.0%	2.5	0%	3.0	1.0	right	1	35	1000	680	1000' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.6	C	53.0	71.5	57.1	2000	no
Cedar Creek on	4	65.5	2300	0.90	3115' @ -1.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	1900	860	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.5	C	57.9	63.6	60.2	2000	no
Woodland off	4	63.8	4800	0.90	2300' @ -0.76%	5.0%	1.5	0%	1.2	1.0	right	2	35	800	600, 500	250' @ -5.74%	0.90	5.0%	1.5	0.0%	1.2	1.00												7.0	A	52.7	67.3	60.8	3800	no
Woodland on	5	63.8	4000	0.90	1540' @ -3.55%	5.0%	1.5	0%	1.2	1.0	right	1	35	1100	835	580' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.5	B	57.1	61.3	59.1	2000	no
Ridgeview off	5	63.8	5100	0.90	1900' @ +3.06%	5.0%	2.0	0%	2.5	1.0	right	2	35	600	710, 500	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												2.6	A	53.1	67.6	61.6	3800	no
Ridgeview on	5	64.6	4500	0.90	level	5.0%	1.5	0%	1.2	1.0	right	1	35	1600	840	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.6	C	57.1	61.1	59.1	2000	no
Renner off	5	64.6	6100	0.90	level	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	500	2100' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												28.5	D	52.1	69.8	58.6	2000	no
K-10 Westbound																																									
Renner on	5	69.1	6500	0.90	level	5.0%	1.5	0%	1.2	1.0	right	1	35	1800	500	1600' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.5	C	59.8	62.1	61.2	2000	no
Ridgeview off	5	69.1	8300	0.90	level	5.0%	1.5	0%	1.2	1.0	right	2	35	1100	550, 500	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.7	B	54.4	70.6	63.4	3800	no
Ridgeview on	5	68.3	7200	0.90	1850' @ -3.06%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	500	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.1	C	59.6	62.3	61.3	2000	no
Woodland off	5	68.3	8000	0.90	1309' @ +3.55%	5.0%	2.0	0%	2.5	1.0	right	2	35	1700	590, 910	690' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.5	B	52.5	70.8	61.2	3800	no
Woodland on	4	66.8	6300	0.90	2330' @ +0.76%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	1390	150' @ 3.98%	0.90	5.0%	1.5	0.0%	1.2	1.00												34.0**	F	49.4	63.1	53.9	2000	no
Cedar Creek off	4	67.0	5100	0.90	3040' @ +1.50%	5.0%	1.5	0%	1.2	1.0	right	2	35	2300	640, 500	1170' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.9	B	50.4	72.8	57.6	3800	no
Cedar Creek on	3	67.0	2800	0.90	5800' @ -2.89%	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	850	795' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												25.1	C	57.9	64.2	59.5	2000	no
Kill Creek off	3	67.0	4000	0.90	3675' @ -1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	660	275' @ -1.55%	0.90	5.0%	1.5	0.0%	1.2	1.00												26.1	C	53.2	72.2	57.6	2000	no
Kill Creek on	3	65.5	2800	0.90	1125' @ -1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	860	350' @ -4.77%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.4	B	58.4	62.7	59.8	2000	no
Lexington off	3	65.5	3200	0.90	2389' @ +3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	910	540' @ -2.58%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.4	B	53.8	71.7	57.9	2000	no
Lexington on	3	64.6	2500	0.90	3142' @ +3.00%	5.0%	1.5	0%	3.0	1.0	right	1	35	900	822	225' @ 1.28%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.2	C	57.3	62.3	58.7	2000	no
Edgerton off	3	64.6	3400	0.90	1780' @ -1.21%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	816	370' @ -4.29%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.6	C	53.1	70.4	57.1	2000	no
Edgerton on	3	64.6	2600	0.90	1500' @ +0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	1013	425' @ 4.75%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.6	B	58.2	62.2	59.6	2000	no
Evening Star off	3	64.6	2900	0.90	750' @ +0.84%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	858	425' @ -3.84%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.0	B	53.5	70.9	57.5	2000	no
Evening Star on	3	66.1	2300	0.90	1820' @ -0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	1400	880	420' @ 2.21%	0.90	5.0%	1.5	0.0%	1.2	1.00												24.0	C	57.6	64.1	59.1	2000	no
1400 off	3	66.1	3700	0.90	1200' @ +2.43%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	740	900' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.8	C	55.0	71.0	59.5	2000	no
1400 on	3	65.5	3400	0.90	6680' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	100	780	690' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.5	B	58.2	61.7	59.5	2000	no
Church off	3	65.5	3500	0.90	7770' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	600	860' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.8	C	53.8	71.1	58.0	2000	no
Church on	3	65.5	2800	0.90	1030' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	970	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.3	C	58.2	62.8	59.5	2000	no
1900 off	3	65.5	3500	0.90	3380' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	650	740' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.5	C	54.7	70.7	59.1	2000	no
1900 on	3	65.0	3200	0.90	7120' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	850	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.9	B	58.0	61.6	59.3	2000	no

* A ramp grade of 3% (or -3%) was estimated on ramps for which there was no ramp data available on the as-built plans.

** Local high densities, but no freeway queueing (HCM p 25-8)

HCM Unsignalized Intersection Capacity Analysis
2: K-10 & East Hills

2030 w/ existing interchanges
12/30/2004

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)	48	973	14	2	1160	5	12	0	6	31	0	197
Peak Hour Factor	0.63	0.90	0.58	0.50	0.89	0.63	0.43	0.25	0.50	0.55	0.25	0.52
Hourly flow rate (vph)	76	1081	24	4	1303	8	28	0	12	56	0	379
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							Raised			Raised		
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1311			1105			1893	2553	541	2016	2569	652
vC1, stage 1 conf vol							1233	1233		1311	1311	
vC2, stage 2 conf vol							660	1319		705	1258	
vCu, unblocked vol	1311			1105			1893	2553	541	2016	2569	652
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			99			0	100	98	61	100	8
cM capacity (veh/h)	523			627			3	118	486	145	145	411

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1	SB 2
Volume Total	76	541	541	24	4	652	652	8	40	56	379
Volume Left	76	0	0	0	4	0	0	0	28	56	0
Volume Right	0	0	0	24	0	0	0	8	12	0	379
cSH	523	1700	1700	1700	627	1700	1700	1700	4	145	411
Volume to Capacity	0.15	0.32	0.32	0.01	0.01	0.38	0.38	0.00	9.57	0.39	0.92
Queue Length (ft)	13	0	0	0	0	0	0	0	Err	41	252
Control Delay (s)	13.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	Err	44.7	59.1
Lane LOS	B				B				F	E	F
Approach Delay (s)	0.8				0.0				Err	57.2	
Approach LOS									F	F	

Intersection Summary			
Average Delay	143.0		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: K-10 & 1750 Rd

2030 w/ existing interchanges
12/30/2004

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)	17	1074	0	5	1365	63	0	2	3	39	2	21
Peak Hour Factor	0.85	0.95	0.25	0.41	0.89	0.84	0.25	0.50	0.38	0.88	0.50	0.66
Hourly flow rate (vph)	20	1131	0	12	1534	75	0	4	8	44	4	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												1
Median type								Raised			Raised	
Median storage veh)								1			1	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1609			1131			1964	2804	565	2173	2729	767
vC1, stage 1 conf vol							1171	1171		1558	1558	
vC2, stage 2 conf vol							793	1633		615	1171	
vCu, unblocked vol	1609			1131			1964	2804	565	2173	2729	767
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			100	95	98	50	96	91
cM capacity (veh/h)	402			614			119	87	468	89	99	345

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1
Volume Total	20	565	565	0	12	767	767	75	12	80
Volume Left	20	0	0	0	12	0	0	0	0	44
Volume Right	0	0	0	0	0	0	0	75	8	32
cSH	402	1700	1700	1700	614	1700	1700	1700	189	137
Volume to Capacity	0.05	0.33	0.33	0.00	0.02	0.45	0.45	0.04	0.06	0.58
Queue Length (ft)	4	0	0	0	2	0	0	0	5	74
Control Delay (s)	14.4	0.0	0.0	0.0	11.0	0.0	0.0	0.0	25.3	62.6
Lane LOS	B				B				D	F
Approach Delay (s)	0.3				0.1				25.3	62.6
Approach LOS									D	F

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
4: K10 WB ramps & 1900

2030 w/ existing interchanges
12/30/2004

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	0	0	150	0	150	100	150	0	0	150	100
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	167	0	167	111	167	0	0	167	111
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	778	611	222	611	667	167	278			167		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	778	611	222	611	667	167	278			167		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	100	56	100	81	91			100		
cM capacity (veh/h)	237	373	817	379	347	878	1285			1411		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	333	278	278
Volume Left	167	111	0
Volume Right	167	0	111
cSH	529	1285	1700
Volume to Capacity	0.63	0.09	0.16
Queue Length (ft)	108	7	0
Control Delay (s)	22.7	3.7	0.0
Lane LOS	C	A	
Approach Delay (s)	22.7	3.7	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	9.6		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: K10 EB ramps & 1900

2030 w/ existing interchanges
12/30/2004

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)	100	0	100	0	0	0	0	150	150	150	150	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	111	0	111	0	0	0	0	167	167	167	167	0
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	750	833	167	861	750	250	167			333		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	750	833	167	861	750	250	167			333		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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 %	62	100	87	100	100	100	100			86		
cM capacity (veh/h)	293	263	878	216	294	789	1411			1226		

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	222	333	333
Volume Left	111	0	167
Volume Right	111	167	0
cSH	440	1700	1226
Volume to Capacity	0.51	0.20	0.14
Queue Length (ft)	70	0	12
Control Delay (s)	21.3	0.0	4.8
Lane LOS	C		A
Approach Delay (s)	21.3	0.0	4.8
Approach LOS	C		

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
6: K10 WB ramps & Church

2030 w/ existing interchanges
12/30/2004

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		0.97	1.00			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		3433	1863			3539	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		3433	1863			3539	1583
Volume (vph)	0	0	0	500	0	200	500	500	0	0	300	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	556	0	222	556	556	0	0	333	222
RTOR Reduction (vph)	0	0	0	0	145	0	0	0	0	0	0	165
Lane Group Flow (vph)	0	0	0	556	77	0	556	556	0	0	333	57
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				20.7	20.7		11.9	31.3			15.4	15.4
Effective Green, g (s)				20.7	20.7		11.9	31.3			15.4	15.4
Actuated g/C Ratio				0.34	0.34		0.20	0.52			0.26	0.26
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)				611	546		681	972			908	406
v/s Ratio Prot				c0.31	0.14		c0.16	c0.30			0.09	0.14
v/s Ratio Perm												
v/c Ratio				0.91	0.14		0.82	0.57			0.37	0.14
Uniform Delay, d1				18.8	13.5		23.0	9.8			18.3	17.2
Progression Factor				1.00	1.00		0.33	0.42			1.00	1.00
Incremental Delay, d2				17.5	0.1		6.6	2.2			1.1	0.7
Delay (s)				36.2	13.6		14.2	6.3			19.4	17.9
Level of Service				D	B		B	A			B	B
Approach Delay (s)		0.0			29.8			10.2			18.8	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: K10 EB ramps & Church

2030 w/ existing interchanges
12/30/2004

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	4.0	
Lane Util. Factor	1.00	0.95	0.95					0.95	1.00	1.00	0.95	
Frt	1.00	0.85	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1504	1504					3539	1583	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.23	1.00	
Satd. Flow (perm)	1770	1504	1504					3539	1583	420	3539	
Volume (vph)	300	0	800	0	0	0	0	700	300	100	700	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	333	0	889	0	0	0	0	778	333	111	778	0
RTOR Reduction (vph)	0	83	83	0	0	0	0	0	198	0	0	0
Lane Group Flow (vph)	333	361	362	0	0	0	0	778	135	111	778	0
Turn Type	Prot		Perm						Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	18.7	18.7	18.7					24.4	24.4	33.3	33.3	
Effective Green, g (s)	18.7	18.7	18.7					24.4	24.4	33.3	33.3	
Actuated g/C Ratio	0.31	0.31	0.31					0.41	0.41	0.55	0.55	
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)	552	469	469					1439	644	343	1964	
v/s Ratio Prot	0.19	0.30						c0.22	0.21	0.03	c0.22	
v/s Ratio Perm			0.30							0.15		
v/c Ratio	0.60	0.77	0.77					0.54	0.21	0.32	0.40	
Uniform Delay, d1	17.5	18.7	18.7					13.5	11.5	7.4	7.6	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.69	0.51	
Incremental Delay, d2	1.9	7.4	7.7					1.5	0.7	0.5	0.4	
Delay (s)	19.4	26.1	26.4					15.0	12.3	5.7	4.3	
Level of Service	B	C	C					B	B	A	A	
Approach Delay (s)		24.4			0.0			14.2			4.5	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement Summary

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8: K-10 WB Ramps & E 1400 Rd

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
E 1400 Rd										
32	L	27	1770	0.077	9.3	LOS A	10	0.59	28.6	25
32	T	109	1770	0.077	9.3	LOS A	10	0.59	28.6	25
Approach		**137**	**1770**	**0.077**	**9.3**	**LOS A**	**10**	**0.59**	**28.6**	**25**
K-10 WB Off-Ramp										
72	L	109	1466	0.223	5.9	LOS A	33	0.39	30.0	56
72	T	190	1466	0.223	5.9	LOS A	33	0.39	30.0	56
72	R	27	1466	0.223	5.9	LOS A	33	0.39	30.0	56
Approach		**327**	**1466**	**0.223**	**5.9**	**LOS A**	**33**	**0.39**	**30.0**	**56**
Outer Road										
62	T	43	1085	0.066	7.6	LOS A	10	0.56	31.8	12
62	R	27	1085	0.066	7.6	LOS A	10	0.56	31.8	12
Approach		**72**	**1085**	**0.066**	**7.6**	**LOS A**	**10**	**0.56**	**31.8**	**12**
E 1400 Rd										
82	L	54	1623	0.291	4.8	LOS A	45	0.41	30.5	78
82	T	353	1623	0.291	4.8	LOS A	45	0.41	30.5	78
82	R	65	1623	0.291	4.8	LOS A	45	0.41	30.5	78
Approach		**472**	**1623**	**0.291**	**4.8**	**LOS A**	**45**	**0.41**	**30.5**	**78**
All Vehicles		**1008**	**5944**	**0.291**	**6.0**	**LOS A**	**45**	**0.44**	**30.2**	**170**

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Movement Summary

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9: K-10 EB Ramps & E 1400 Rd

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
E 1400 Rd										
72	L	27	1057	0.099	7.7	LOS A	15	0.57	29.1	18
72	T	33	1057	0.099	7.7	LOS A	15	0.57	29.1	18
72	R	43	1057	0.099	7.7	LOS A	15	0.57	29.1	18
Approach		**105**	**1057**	**0.099**	**7.7**	**LOS A**	**15**	**0.57**	**29.1**	**18**
E 1400 Rd										
42	L	326	1914	0.256	9.2	LOS A	35	0.55	28.7	90
42	T	163	1914	0.256	9.2	LOS A	35	0.55	28.7	90
Approach		**490**	**1914**	**0.256**	**9.2**	**LOS A**	**35**	**0.55**	**28.7**	**90**
K-10 EB Off-Ramp										
82	L	82	1038	0.107	12.1	LOS B	17	0.66	27.2	22
82	T	16	1038	0.107	12.1	LOS B	17	0.66	27.2	22
82	R	11	1038	0.107	12.1	LOS B	17	0.66	27.2	22
Approach		**111**	**1038**	**0.107**	**12.1**	**LOS B**	**17**	**0.66**	**27.2**	**22**
230 0th										
52	T	87	1067	0.108	5.0	LOS A	17	0.49	30.4	19
52	R	27	1067	0.108	5.0	LOS A	17	0.49	30.4	19
Approach		**115**	**1067**	**0.108**	**5.0**	**LOS A**	**17**	**0.49**	**30.4**	**19**
All Vehicles		**821**	**5076**	**0.256**	**8.8**	**LOS A**	**35**	**0.56**	**28.8**	**149**

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HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
10: K10 WB ramps & Evening Star — 12/30/2004

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
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor				0.97	1.00		0.97	1.00			1.00	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				3399	1567		3433	1863			1863	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				3399	1567		3433	1863			1863	1583
Volume (vph)	0	0	0	500	0	100	1200	300	0	0	200	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	556	0	111	1333	333	0	0	222	222
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	0	176
Lane Group Flow (vph)	0	0	0	556	23	0	1333	333	0	0	222	46
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				15.6	15.6		31.8	51.4			15.6	15.6
Effective Green, g (s)				15.6	15.6		31.8	51.4			15.6	15.6
Actuated g/C Ratio				0.21	0.21		0.42	0.69			0.21	0.21
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)				707	326		1456	1277			388	329
v/s Ratio Prot				c0.16	0.07		c0.39	0.18			0.12	c0.14
v/s Ratio Perm												
v/c Ratio				0.79	0.07		0.92	0.26			0.57	0.14
Uniform Delay, d1				28.1	23.9		20.3	4.5			26.7	24.2
Progression Factor				1.00	1.00		0.32	0.23			1.00	1.00
Incremental Delay, d2				5.8	0.1		6.2	0.4			6.0	0.9
Delay (s)				33.9	24.0		12.6	1.4			32.7	25.1
Level of Service				C	C		B	A			C	C
Approach Delay (s)		0.0			32.2			10.4			28.9	
Approach LOS		A			C			B			C	

Intersection Summary				
HCM Average Control Delay	18.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.82			
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
11: K10 EB ramps & Evening Star — 12/30/2004

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
Grade (%)		1%			0%			0%			0%	
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	0.95					0.95	0.88	1.00	0.95	
Frt	1.00	0.85	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1761	1497	1497					3539	2787	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1761	1497	1497					3539	2787	163	3539	
Volume (vph)	150	0	850	0	0	0	0	1350	850	150	550	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	0	944	0	0	0	0	1500	944	167	611	0
RTOR Reduction (vph)	0	253	253	0	0	0	0	0	418	0	0	0
Lane Group Flow (vph)	167	219	219	0	0	0	0	1500	526	167	611	0
Turn Type	Prot		Perm						Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	14.9	14.9	14.9					41.8	41.8	52.1	52.1	
Effective Green, g (s)	14.9	14.9	14.9					41.8	41.8	52.1	52.1	
Actuated g/C Ratio	0.20	0.20	0.20					0.56	0.56	0.69	0.69	
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)	350	297	297					1972	1553	248	2458	
v/s Ratio Prot	0.09	c0.32						c0.42	0.34	c0.06	0.17	
v/s Ratio Perm			0.32							0.41		
v/c Ratio	0.48	0.74	0.74					0.76	0.34	0.67	0.25	
Uniform Delay, d1	26.6	28.2	28.2					12.8	9.1	12.3	4.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.83	0.00	
Incremental Delay, d2	1.0	9.2	9.2					2.8	0.6	6.2	0.2	
Delay (s)	27.6	37.4	37.4					15.6	9.7	16.5	0.2	
Level of Service	C	D	D					B	A	B	A	
Approach Delay (s)		35.9			0.0			13.3			3.7	
Approach LOS		D			A			B			A	

Intersection Summary				
HCM Average Control Delay	17.4	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.95			
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	73.2%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
12: K10 WB ramps & Edgerton — 12/30/2004

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
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor				0.97	1.00		1.00	1.00			1.00	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				3399	1567		1770	1863			1863	1583
Flt Permitted				0.95	1.00		0.49	1.00			1.00	1.00
Satd. Flow (perm)				3399	1567		906	1863			1863	1583
Volume (vph)	0	0	0	600	0	200	200	300	0	0	200	100
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	667	0	222	222	333	0	0	222	111
RTOR Reduction (vph)	0	0	0	0	161	0	0	0	0	0	0	72
Lane Group Flow (vph)	0	0	0	667	61	0	222	333	0	0	222	39
Turn Type				Prot			pm+pt					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases							2					
Actuated Green, G (s)				16.5	16.5		35.5	35.5			21.3	21.3
Effective Green, g (s)				16.5	16.5		35.5	35.5			21.3	21.3
Actuated g/C Ratio				0.28	0.28		0.59	0.59			0.36	0.36
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)				935	431		683	1102			661	562
v/s Ratio Prot				c0.20	0.14		c0.06	0.18			0.12	0.07
v/s Ratio Perm							c0.14					
v/c Ratio				0.71	0.14		0.33	0.30			0.34	0.07
Uniform Delay, d1				19.6	16.4		6.0	6.1			14.2	12.8
Progression Factor				1.00	1.00		0.24	0.29			1.00	1.00
Incremental Delay, d2				2.6	0.2		0.3	0.7			1.4	0.2
Delay (s)				22.2	16.6		1.7	2.5			15.5	13.0
Level of Service				C	B		A	A			B	B
Approach Delay (s)		0.0			20.8			2.2			14.7	
Approach LOS		A			C			A			B	

Intersection Summary				
HCM Average Control Delay	13.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.44			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	58.6%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
13: K10 EB ramps & Edgerton — 12/30/2004

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						0.95	1.00	1.00	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	1770	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.42	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	787	3539	
Volume (vph)	100	0	300	0	0	0	0	400	350	150	650	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	111	0	333	0	0	0	0	444	389	167	722	0
RTOR Reduction (vph)	0	150	0	0	0	0	0	0	206	0	0	0
Lane Group Flow (vph)	111	183	0	0	0	0	0	444	183	167	722	0
Turn Type	Prot								Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases										6		
Actuated Green, G (s)	11.5	11.5						28.3	28.3	40.5	40.5	
Effective Green, g (s)	11.5	11.5						28.3	28.3	40.5	40.5	
Actuated g/C Ratio	0.19	0.19						0.47	0.47	0.68	0.68	
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)	339	303						1669	747	666	2389	
v/s Ratio Prot	0.06	c0.21						0.13	c0.25	0.03	c0.20	
v/s Ratio Perm										0.14		
v/c Ratio	0.33	0.61						0.27	0.25	0.25	0.30	
Uniform Delay, d1	20.9	22.2						9.6	9.5	3.7	4.0	
Progression Factor	1.00	1.00						1.00	1.00	1.15	0.06	
Incremental Delay, d2	0.6	3.4						0.4	0.8	0.2	0.3	
Delay (s)	21.5	25.6						10.0	10.3	4.5	0.5	
Level of Service	C	C						A	B	A	A	
Approach Delay (s)		24.6			0.0			10.1			1.2	
Approach LOS		C			A			B			A	

Intersection Summary				
HCM Average Control Delay	9.4	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	58.6%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
14: K10 WB ramps & Lexington — 12/30/2004

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	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	2787	1770	1723		3433	3443		1770	3539	1583
Flt Permitted	0.39	1.00	1.00	0.45	1.00		0.95	1.00		0.24	1.00	1.00
Satd. Flow (perm)	730	1863	2787	834	1723		3433	3443		440	3539	1583
Volume (vph)	100	100	500	200	100	100	650	450	100	100	600	150
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	111	111	556	222	111	111	722	500	111	111	667	167
RTOR Reduction (vph)	0	0	136	0	35	0	0	16	0	0	0	111
Lane Group Flow (vph)	111	111	420	222	187	0	722	595	0	111	667	56
Turn Type	pm+pt		pt+ov	pm+pt			Prot			pm+pt		Prot
Protected Phases	7	4	4 5	3	8		5	2		1	6	6
Permitted Phases	4			8						6		
Actuated Green, G (s)	22.6	12.9	40.7	30.0	16.6		27.8	53.4		34.9	34.9	34.9
Effective Green, g (s)	22.6	12.9	40.7	30.0	16.6		27.8	53.4		34.9	34.9	34.9
Actuated g/C Ratio	0.22	0.12	0.39	0.29	0.16		0.26	0.51		0.33	0.33	0.33
Clearance Time (s)	4.0	4.0		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	3.0	3.0
Lane Grp Cap (vph)	253	229	1080	358	272		909	1751		264	1176	526
v/s Ratio Prot	0.04	0.06	0.20	c0.08	c0.13		c0.21	0.18		0.04	c0.19	0.11
v/s Ratio Perm	0.05			0.10						0.10		
v/c Ratio	0.44	0.48	0.39	0.62	0.69		0.79	0.34		0.42	0.57	0.11
Uniform Delay, d1	34.6	43.0	23.2	30.8	41.7		35.9	15.3		25.7	28.8	24.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.73	0.79		1.00	1.00	1.00
Incremental Delay, d2	1.2	1.6	0.2	3.3	7.0		4.3	0.5		1.1	2.0	0.4
Delay (s)	35.8	44.6	23.4	34.1	48.7		30.7	12.6		26.7	30.8	24.7
Level of Service	D	D	C	C	D		C	B		C	C	C
Approach Delay (s)		28.2			41.4			22.4			29.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
15: K10 EB ramps & Lexington — 12/30/2004

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
Grade (%)		-2%			0%			0%			0%	
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	0.88		1.00		0.97	0.95		1.00	0.95	1.00
Frt		1.00	0.85		0.93		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1797	2815		1716		3433	3534		1770	3539	1583
Flt Permitted		0.96	1.00		0.99		0.95	1.00		0.24	1.00	1.00
Satd. Flow (perm)		1797	2815		1716		3433	3534		447	3539	1583
Volume (vph)	150	10	450	10	10	20	900	1050	10	20	1000	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	11	500	11	11	22	1000	1167	11	22	1111	222
RTOR Reduction (vph)	0	0	170	0	21	0	0	0	0	0	0	147
Lane Group Flow (vph)	0	178	330	0	23	0	1000	1178	0	22	1111	75
Turn Type	Split		pt+ov	Split			Prot			pm+pt		Prot
Protected Phases	4	4	4 5	8	8		5	2		1	6	6
Permitted Phases										6		
Actuated Green, G (s)		14.2	49.1		4.6		34.9	68.6		36.9	35.3	35.3
Effective Green, g (s)		14.2	49.1		4.6		34.9	68.6		36.9	35.3	35.3
Actuated g/C Ratio		0.14	0.47		0.04		0.33	0.65		0.35	0.34	0.34
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)		243	1316		75		1141	2309		177	1190	532
v/s Ratio Prot		c0.10	0.18		c0.03		c0.29	0.33		0.00	c0.31	0.14
v/s Ratio Perm										0.04		
v/c Ratio		0.73	0.25		0.31		0.88	0.51		0.12	0.93	0.14
Uniform Delay, d1		43.6	16.9		48.7		33.0	9.5		23.2	33.7	24.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		0.71	0.79	0.88
Incremental Delay, d2		10.8	0.1		2.3		7.8	0.8		0.3	13.1	0.5
Delay (s)		54.4	17.0		51.0		40.8	10.3		16.8	39.7	21.8
Level of Service		D	B		D		D	B		B	D	C
Approach Delay (s)		26.8			51.0			24.3			36.4	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM Average Control Delay	28.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
16: K10 WB ramps & Kill Creek — 12/30/2004

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				0.97	1.00		1.00	0.95			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433	1583		1770	3539			3539	1583
Flt Permitted				0.95	1.00		0.26	1.00			1.00	1.00
Satd. Flow (perm)				3433	1583		484	3539			3539	1583
Volume (vph)	0	0	0	900	0	300	300	500	0	0	500	100
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1000	0	333	333	556	0	0	556	111
RTOR Reduction (vph)	0	0	0	0	175	0	0	0	0	0	0	81
Lane Group Flow (vph)	0	0	0	1000	158	0	333	556	0	0	556	30
Turn Type				Prot			pm+pt					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases							2					
Actuated Green, G (s)				21.0	21.0		31.0	31.0			16.4	16.4
Effective Green, g (s)				21.0	21.0		31.0	31.0			16.4	16.4
Actuated g/C Ratio				0.35	0.35		0.52	0.52			0.27	0.27
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)				1202	554		477	1828			967	433
v/s Ratio Prot				c0.29	0.21		c0.12	0.16			0.16	0.07
v/s Ratio Perm							c0.24					
v/c Ratio				0.83	0.29		0.70	0.30			0.57	0.07
Uniform Delay, d1				17.9	14.1		9.6	8.3			18.8	16.2
Progression Factor				1.00	1.00		0.41	0.24			1.00	1.00
Incremental Delay, d2				5.1	0.3		3.3	0.4			2.5	0.3
Delay (s)				22.9	14.4		7.3	2.4			21.3	16.5
Level of Service				C	B		A	A			C	B
Approach Delay (s)		0.0			20.8			4.2			20.5	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
17: K10 EB ramps & Kill Creek — 12/30/2004

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						0.95	0.88	1.00	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	2787	1770	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.19	1.00	
Satd. Flow (perm)	1770	1583						3539	2787	361	3539	
Volume (vph)	150	0	450	0	0	0	0	650	600	200	1200	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	0	500	0	0	0	0	722	667	222	1333	0
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	459	0	0	0
Lane Group Flow (vph)	167	485	0	0	0	0	0	722	208	222	1333	0
Turn Type	Prot								Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases										6		
Actuated Green, G (s)	21.2	21.2						18.7	18.7	30.8	30.8	
Effective Green, g (s)	21.2	21.2						18.7	18.7	30.8	30.8	
Actuated g/C Ratio	0.35	0.35						0.31	0.31	0.51	0.51	
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)	625	559						1103	869	376	1817	
v/s Ratio Prot	0.09	c0.32						0.20	0.24	0.08	c0.38	
v/s Ratio Perm										0.22		
v/c Ratio	0.27	0.87						0.65	0.24	0.59	0.73	
Uniform Delay, d1	13.9	18.1						17.9	15.4	9.6	11.4	
Progression Factor	1.00	1.00						1.00	1.00	1.46	0.23	
Incremental Delay, d2	0.2	13.4						3.0	0.7	2.1	1.8	
Delay (s)	14.1	31.5						20.9	16.0	16.1	4.4	
Level of Service	B	C						C	B	B	A	
Approach Delay (s)		27.1			0.0			18.5			6.1	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
18: K10 WB ramps & Cedar Creek — 12/30/2004

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				0.97		1.00	0.97	0.91			0.86	0.88
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433		1583	3433	5085			6408	2787
Flt Permitted				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				3433		1583	3433	5085			6408	2787
Volume (vph)	0	0	0	1000	0	1300	500	1250	0	0	1550	700
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1111	0	1444	556	1389	0	0	1722	778
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	539
Lane Group Flow (vph)	0	0	0	1111	0	1444	556	1389	0	0	1722	239
Turn Type				Prot		Free	Prot					Prot
Protected Phases				3			5	2			6	6
Permitted Phases						Free						
Actuated Green, G (s)				25.8		75.0	14.2	41.2			23.0	23.0
Effective Green, g (s)				25.8		75.0	14.2	41.2			23.0	23.0
Actuated g/C Ratio				0.34		1.00	0.19	0.55			0.31	0.31
Clearance Time (s)				4.0			4.0	4.0			4.0	4.0
Vehicle Extension (s)				3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				1181		1583	650	2793			1965	855
v/s Ratio Prot				0.32			0.16	0.27			0.27	0.28
v/s Ratio Perm						0.91						
v/c Ratio				0.94		0.91	0.86	0.50			0.88	0.28
Uniform Delay, d1				23.9		0.0	29.4	10.5			24.7	19.7
Progression Factor				1.00		1.00	0.12	0.16			1.00	1.00
Incremental Delay, d2				14.3		9.5	4.2	0.3			5.9	0.8
Delay (s)				38.1		9.5	7.7	1.9			30.5	20.5
Level of Service				D		A	A	A			C	C
Approach Delay (s)		0.0			22.0			3.6			27.4	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
19: K10 EB ramps & Cedar Creek — 12/30/2004

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	4.0	
Lane Util. Factor	0.97	0.95	0.95					0.91	0.88	0.97	0.95	
Frt	1.00	0.85	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	1504	1504					5085	2787	3433	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	1504	1504					5085	2787	3433	3539	
Volume (vph)	550	0	450	0	0	0	0	1200	850	1050	1500	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	611	0	500	0	0	0	0	1333	944	1167	1667	0
RTOR Reduction (vph)	0	32	32	0	0	0	0	0	535	0	0	0
Lane Group Flow (vph)	611	218	218	0	0	0	0	1333	409	1167	1667	0
Turn Type	Prot		Prot						Perm	Prot		
Protected Phases	7	4	4					2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	15.6	15.6	15.6					21.0	21.0	26.4	51.4	
Effective Green, g (s)	15.6	15.6	15.6					21.0	21.0	26.4	51.4	
Actuated g/C Ratio	0.21	0.21	0.21					0.28	0.28	0.35	0.69	
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)	714	313	313					1424	780	1208	2425	
v/s Ratio Prot	c0.18	0.17	0.17					0.26		c0.34	0.47	
v/s Ratio Perm									0.34			
v/c Ratio	0.86	0.70	0.70					0.94	0.52	0.97	0.69	
Uniform Delay, d1	28.6	27.5	27.5					26.3	22.8	23.9	7.0	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.15	0.11	
Incremental Delay, d2	9.9	6.6	6.6					12.8	2.5	10.8	0.6	
Delay (s)	38.5	34.1	34.1					39.2	25.3	14.3	1.4	
Level of Service	D	C	C					D	C	B	A	
Approach Delay (s)		36.5			0.0			33.4			6.7	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
20: K10 WB ramps & Woodland — 12/30/2004

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	4.0
Lane Util. Factor				0.97	0.95	0.95	0.97	0.95			0.95	1.00
Frt				1.00	0.85	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433	1504	1504	3433	3539			3539	1583
Flt Permitted				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				3433	1504	1504	3433	3539			3539	1583
Volume (vph)	0	0	0	950	0	750	350	900	0	0	900	250
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	1056	0	833	389	1000	0	0	1000	278
RTOR Reduction (vph)	0	0	0	0	59	59	0	0	0	0	0	183
Lane Group Flow (vph)	0	0	0	1056	357	358	389	1000	0	0	1000	95
Turn Type				Prot		Perm	Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases						8						
Actuated Green, G (s)				26.1	26.1	26.1	11.2	40.9			25.7	25.7
Effective Green, g (s)				26.1	26.1	26.1	11.2	40.9			25.7	25.7
Actuated g/C Ratio				0.35	0.35	0.35	0.15	0.55			0.34	0.34
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)				1195	523	523	513	1930			1213	542
v/s Ratio Prot				c0.31	0.28		c0.11	0.28			c0.28	0.18
v/s Ratio Perm						0.28						
v/c Ratio				0.88	0.68	0.69	0.76	0.52			0.82	0.18
Uniform Delay, d1				23.0	20.9	20.9	30.6	10.8			22.6	17.2
Progression Factor				1.00	1.00	1.00	0.33	0.38			1.00	1.00
Incremental Delay, d2				8.0	3.7	3.7	3.2	0.6			6.4	0.7
Delay (s)				31.0	24.6	24.6	13.3	4.7			29.0	17.9
Level of Service				C	C	C	B	A			C	B
Approach Delay (s)		0.0			28.2			7.1			26.6	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
21: K10 EB ramps & Woodland — 12/30/2004

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						0.95	0.88	0.97	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	2787	3433	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1583						3539	2787	3433	3539	
Volume (vph)	350	0	450	0	0	0	0	900	600	500	1350	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	389	0	500	0	0	0	0	1000	667	556	1500	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	446	0	0	0
Lane Group Flow (vph)	389	480	0	0	0	0	0	1000	221	556	1500	0
Turn Type	Prot								Perm	Prot		
Protected Phases	7	4						2		1	6	
Permitted Phases									2			
Actuated Green, G (s)	24.2	24.2						24.9	24.9	13.9	42.8	
Effective Green, g (s)	24.2	24.2						24.9	24.9	13.9	42.8	
Actuated g/C Ratio	0.32	0.32						0.33	0.33	0.19	0.57	
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)	571	511						1175	925	636	2020	
v/s Ratio Prot	0.22	c0.32						c0.28		c0.16	0.42	
v/s Ratio Perm									0.24			
v/c Ratio	0.68	0.94						0.85	0.24	0.87	0.74	
Uniform Delay, d1	22.1	24.7						23.3	18.2	29.7	12.0	
Progression Factor	1.00	1.00						1.00	1.00	0.31	0.22	
Incremental Delay, d2	3.3	25.6						7.8	0.6	7.5	1.3	
Delay (s)	25.4	50.3						31.2	18.8	16.8	3.9	
Level of Service	C	D						C	B	B	A	
Approach Delay (s)		39.4			0.0			26.2			7.4	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
22: K-10 WB Ramps & Ridgeview — 12/30/2004

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	4.0
Lane Util. Factor				0.97	0.95	0.95	0.97	0.95			0.91	1.00
Frt				1.00	0.85	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				3433	1504	1504	3433	3539			5085	1583
Flt Permitted				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				3433	1504	1504	3433	3539			5085	1583
Volume (vph)	0	0	0	600	0	500	450	850	0	0	1300	350
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	667	0	556	500	944	0	0	1444	389
RTOR Reduction (vph)	0	0	0	0	113	113	0	0	0	0	0	235
Lane Group Flow (vph)	0	0	0	667	165	165	500	944	0	0	1444	154
Turn Type				Prot		Perm	Prot					Perm
Protected Phases				3	8		5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				18.3	18.3	18.3	15.1	48.7			29.6	29.6
Effective Green, g (s)				18.3	18.3	18.3	15.1	48.7			29.6	29.6
Actuated g/C Ratio				0.24	0.24	0.24	0.20	0.65			0.39	0.39
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)				838	367	367	691	2298			2007	625
v/s Ratio Prot				c0.19	0.18		c0.15	0.27			c0.28	
v/s Ratio Perm						0.18						0.25
v/c Ratio				0.80	0.45	0.45	0.72	0.41			0.72	0.25
Uniform Delay, d1				26.6	24.1	24.1	28.0	6.3			19.2	15.2
Progression Factor				1.00	1.00	1.00	0.36	0.31			1.00	1.00
Incremental Delay, d2				5.3	0.9	0.9	1.7	0.3			2.3	0.9
Delay (s)				31.9	24.9	24.9	11.7	2.2			21.5	16.2
Level of Service				C	C	C	B	A			C	B
Approach Delay (s)		0.0			28.7			5.5			20.3	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
23: K10 EB ramps & Ridgeview — 12/30/2004

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						0.95	0.88	0.97	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	2787	3433	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1583						3539	2787	3433	3539	
Volume (vph)	250	0	350	0	0	0	0	1050	900	700	1200	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	278	0	389	0	0	0	0	1167	1000	778	1333	0
RTOR Reduction (vph)	0	59	0	0	0	0	0	0	592	0	0	0
Lane Group Flow (vph)	278	330	0	0	0	0	0	1167	408	778	1333	0
Turn Type	Prot								Prot	Prot		
Protected Phases	7	4						2	2	1	6	
Permitted Phases												
Actuated Green, G (s)	16.8	16.8						28.0	28.0	18.2	50.2	
Effective Green, g (s)	16.8	16.8						28.0	28.0	18.2	50.2	
Actuated g/C Ratio	0.22	0.22						0.37	0.37	0.24	0.67	
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)	396	355						1321	1040	833	2369	
v/s Ratio Prot	0.16	c0.25						0.33	c0.36	c0.23	0.38	
v/s Ratio Perm												
v/c Ratio	0.70	0.93						0.88	0.39	0.93	0.56	
Uniform Delay, d1	26.8	28.5						22.0	17.3	27.8	6.6	
Progression Factor	1.00	1.00						1.00	1.00	0.30	0.32	
Incremental Delay, d2	5.6	30.0						8.8	1.1	12.9	0.7	
Delay (s)	32.3	58.5						30.8	18.4	21.2	2.8	
Level of Service	C	E						C	B	C	A	
Approach Delay (s)		47.6			0.0			25.1			9.5	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
24: K10 WB ramps & Renner — 12/30/2004

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	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	0.88	0.97	1.00		0.97	0.91	1.00	1.00	0.91	0.88
Frt	1.00	1.00	0.85	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	2787	3433	1723		3433	5085	1583	1770	5085	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	3433	1863	2787	3433	1723		3433	5085	1583	573	5085	2787
Volume (vph)	700	25	900	250	50	50	1000	800	25	25	700	800
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	778	28	1000	278	56	56	1111	889	28	28	778	889
RTOR Reduction (vph)	0	0	27	0	36	0	0	0	14	0	0	245
Lane Group Flow (vph)	778	28	973	278	76	0	1111	889	14	28	778	644
Turn Type	Prot		pt+ov	Prot			Prot		Prot	pm+pt		pt+ov
Protected Phases	7	4	4 5	3	8		5	2	2	1	6	6 7
Permitted Phases										6		
Actuated Green, G (s)	29.2	20.7	53.7	18.3	9.8		33.0	47.6	47.6	19.4	17.0	46.2
Effective Green, g (s)	29.2	20.7	53.7	18.3	9.8		33.0	47.6	47.6	19.4	17.0	46.2
Actuated g/C Ratio	0.28	0.20	0.51	0.17	0.09		0.31	0.45	0.45	0.18	0.16	0.44
Clearance Time (s)	4.0	4.0		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	3.0	3.0	
Lane Grp Cap (vph)	955	367	1425	598	161		1079	2305	718	133	823	1226
v/s Ratio Prot	c0.23	0.02	c0.36	0.08	0.07		c0.32	0.17	0.02	0.00	c0.15	0.32
v/s Ratio Perm										0.03		
v/c Ratio	0.81	0.08	0.68	0.46	0.47		1.03	0.39	0.02	0.21	0.95	0.53
Uniform Delay, d1	35.4	34.4	19.3	39.0	45.1		36.0	19.0	15.8	35.5	43.5	21.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.82	0.42	0.43	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.1	1.4	0.6	2.2		33.8	0.4	0.0	0.8	20.6	0.4
Delay (s)	40.8	34.4	20.6	39.5	47.3		63.4	8.3	6.9	36.2	64.1	21.8
Level of Service	D	C	C	D	D		E	A	A	D	E	C
Approach Delay (s)		29.5			41.8			38.5			41.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ existing interchanges
25: K10 EB Ramps & Renner — 12/30/2004

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	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95				0.97	0.91	1.00	1.00	0.91	0.88
Frt	1.00	0.85	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1504	1504				3433	5085	1583	1770	5085	2787
Flt Permitted	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1504	1504				3433	5085	1583	1770	5085	2787
Volume (vph)	550	0	650	0	0	0	800	1250	280	120	900	700
Peak-hour factor, PHF	0.90	0.92	0.90	0.92	0.92	0.92	0.90	0.90	0.92	0.92	0.90	0.90
Adj. Flow (vph)	611	0	722	0	0	0	889	1389	304	130	1000	778
RTOR Reduction (vph)	0	268	3	0	0	0	0	0	0	0	0	25
Lane Group Flow (vph)	611	76	375	0	0	0	889	1389	304	130	1000	753
Turn Type	Prot		pt+ov				Prot		Free	Prot		pt+ov
Protected Phases	7	4	4 5				5	2		1	6	6 7
Permitted Phases									Free			
Actuated Green, G (s)	23.1	23.1	60.2				33.1	57.4	105.0	12.5	36.8	63.9
Effective Green, g (s)	23.1	23.1	60.2				33.1	57.4	105.0	12.5	36.8	63.9
Actuated g/C Ratio	0.22	0.22	0.57				0.32	0.55	1.00	0.12	0.35	0.61
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)	755	331	862				1082	2780	1583	211	1782	1696
v/s Ratio Prot	0.18	c0.23	0.25				c0.26	0.27		0.07	c0.20	0.28
v/s Ratio Perm									0.19			
v/c Ratio	0.81	0.23	0.44				0.82	0.50	0.19	0.62	0.56	0.44
Uniform Delay, d1	38.9	33.6	12.7				33.2	14.8	0.0	44.0	27.6	11.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	0.96	0.79	0.80
Incremental Delay, d2	6.4	0.4	0.4				5.1	0.6	0.3	3.7	0.9	0.1
Delay (s)	45.3	34.0	13.1				38.4	15.5	0.3	45.8	22.8	8.9
Level of Service	D	C	B				D	B	A	D	C	A
Approach Delay (s)		33.2			0.0			21.6			18.7	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Table B-6: Basic Freeway Segments: *Highway Capacity Manual* Analysis - 2030 Volumes, With New Interchanges

Location	Inputs															Results			
	Volume (vph)	Peak-Hour			Heavy Vehs		RVs		Driver	Free Flow Speed					2030			
	2030	Factor	Lanes	Terrain	%	Auto Equiv	%	Auto Equiv	Pop. Factor	Base Speed (mph)*	Lane Width (ft)	Right Lat. Clear (ft)	Intchg Density	Adj. Speed (mph)	Flow Rate (pcphpl)	Avg. pax-car speed (mph)	Density (pax-car/lane/mi)	LOS
P.M. Peak Hour																		
K-10 Eastbound																		
Franklin on to K10 extension off	1050	0.90	3		5.0%	1.5	0%	1.2	1.0	70	12	6	1.00*	64.5	399	64.5	6.2	A
K10 extension on to 1900 off	2700	0.90	3	7950' @ 0.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.33	67.0	1025	67.0	15.3	B
1900 on to Winchester off	2800	0.90	3	4100' @ 0.00%, 3750' @ +1.79%, 2670' @ -0.72%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1063	67.0	15.9	B
Winchester on to Church off	2600	0.90	3	130' @ -0.72%, 3300' @ +0.70%, 1850' @ -0.28%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	67.0	987	67.0	14.7	B
Church on to 1400 off	2200	0.90	3	6950' @ -0.28%, 575' @ -2.43%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	64.6	835	64.6	12.9	B
1400 on to Evening Star off	2500	0.90	3	2055' @ -2.43%, 2270' @ +1.18%, 950' @ +2.96%, 1000' @ +0.50%, 1150' @ +1.60%, 2200' @ +0.50%, 538' @ +1.18%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	949	66.1	14.4	B
Evening Star on to Edgerton off	2500	0.90	3	662' @ +1.18%, 1400' @ -0.84%, 3400' @ -0.30%, 2354' @ -0.50%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	64.6	949	64.6	14.7	B
Edgerton on to Lexington off	2600	0.90	3	546' @ -0.50%, 2300' @ +1.21%, 2050' @ +3.00%, 3650' @ -3.00%, 1100' @ +2.31%, 710' @ -3.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	987	66.1	14.9	B
Lexington on to Kill Creek off	3100	0.90	3	2792' @ -3.00%, 3000' @ +3.00%, 2125' @ +1.10%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1177	67.0	17.6	B
Kill Creek on to Prairie Star off	3300	0.90	3	4500' @ +1.10%, 5650' @ -2.82%, 2326' @ +0.17%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1253	66.1	19.0	C
Prairie Star on to Cedar Creek off	3400	0.90	3	1974' @ +0.17%, 6580' @ +2.89%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1354	66.1	20.5	C
Cedar Creek on to Clare off	3800	0.90	4	420' @ +2.89%, 3590' @ -1.50%, 442' @ +1.88%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1082	66.8	16.2	B
Clare on to K-7 off	4400	0.90	4	3595' @ +1.88%, 1685' @ +0.40%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1253	66.8	18.8	C
K-7 on to Lone Elm off	4900	0.90	4	118' @ +0.40%, 1750' @ +0.57%, 800' @ -0.3%, 2150' @ +0.60%, 462' @ -1.70%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1395	66.8	20.9	C
Lone Elm on to Woodland off	5000	0.90	4	2088' @ -1.70%, 3115' @ -0.76%	5.0%	1.5	0%	1.2	1.0	70	12	6	1.00	66.0	1424	66.0	21.6	C
Woodland on to Ridgeview off	5100	0.90	5	2385' @ -3.55%, 2700' @ +3.06%, 225' @ -3.04%	5.0%	1.5	0%	1.3	1.0	70	12	6	1.00	63.0	1162	63.0	18.4	C
Ridgeview on to Renner off	6100	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	63.8	1389	63.8	21.8	C
Renner on to I-435 off	6400	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	69.1	1458	69.0	21.1	C
K-10 Westbound																		
I-435 on to Renner off	8100	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	69.1	1845	66.7	27.7	D
Renner on to Ridgeview off	8300	0.90	5		5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	68.3	1891	65.5	28.9	D
Ridgeview on to Woodland off	8000	0.90	5	225' @ +3.04%, 2700' @ -3.06%, 2385' @ +3.55%	5.0%	2.0	0%	2.5	1.0	70	12	6	1.00	67.5	1867	65.2	28.6	D
Woodland on to Lone Elm off	7300	0.90	4	3115' @ +0.76%, 2088' @ +1.70%	5.0%	1.5	0%	1.2	1.0	70	12	6	1.00	66.0	2078	60.6	34.3	D
Lone Elm on to K-7 off	6800	0.90	4	462' @ +1.70%, 2150' @ -0.60%, 800' @ +0.30%, 1750' @ -0.57%, 118' @ -0.40%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1936	63.7	30.4	D
K-7 on to Clare off	5300	0.90	4	1685' @ -0.40%, 3595' @ -1.88%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1509	66.8	22.6	C
Clare on to Cedar Creek off	4800	0.90	4	442' @ -1.88%, 3590' @ +1.50%, 420' @ -2.89%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.83	66.8	1367	66.8	20.5	C
Cedar Creek on to Prairie Star off	4500	0.90	3	6580' @ -2.89%, 1974' @ -0.17%	5.0%	1.5	0%	1.3	1.0	70	12	6	0.67	66.1	1708	65.5	26.1	D
Prairie Star on to Kill Creek off	4000	0.90	3	2326' @ -0.17%, 5650' @ +2.62%, 4500' @ -1.10%	5.0%	1.5	0%	1.3	1.0	70	12	6	0.67	66.1	1519	66.1	23.0	C
Kill Creek on to Lexington off	3200	0.90	3	2125' @ -1.10%, 3000' @ -3.00%, 2792' @ +3.00%	5.0%	1.5	0%	3.0	1.0	70	12	6	0.50	67.0	1215	67.0	18.1	C
Lexington on to Edgerton off	3400	0.90	3	742' @ -2.31%, 3650' @ +3.00%, 2050' @ -3.00%, 2300' @ -1.21%, 546' @ +0.50%	5.0%	1.5	0%	3.0	1.0	70	12	6	0.67	66.1	1291	66.1	19.5	C
Edgerton on to Evening Star off	2900	0.90	3	2354' @ +0.50%, 3400' @ +0.30%, 1400' @ +0.84%, 662' @ -1.18%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1101	66.1	16.7	B
Evening Star on to 1400 off	3700	0.90	3	538' @ -1.18%, 2200' @ -0.50%, 1150' @ -1.60%, 1000' @ -0.50%, 950' @ -2.96%, 2270' @ -1.18%, 2055' @ +2.43%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1405	66.1	21.3	C
1400 on to Church off	3500	0.90	3	575' @ +2.43%, 6950' @ +0.28%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1329	67.0	19.8	C
Church on to Winchester off	3500	0.90	3	1850' @ +0.28%, 3300' @ -0.70%, 2670' @ +0.72%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.67	66.1	1329	66.1	20.1	C
Winchester on to 1900 off	3500	0.90	3	130' @ +0.72%, 3750' @ -1.79%, 4100' @ 0.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.50	67.0	1329	67.0	19.8	C
1900 on to K10 extension off	3400	0.90	3	7950' @ 0.00%	5.0%	1.5	0%	1.2	1.0	70	12	6	0.33	67.0	1291	67.0	19.3	C
K10 extension on to Franklin off	1400	0.90	3		5.0%	1.5	0%	1.2	1.0	70	12	6	1.00*	64.5	531	64.5	8.2	A

* Density adjusted to reflect transition zone.

xxx - Actual grade entered into HCS

Table B-7: Ramp Junctions: *Highway Capacity Manual* Analysis - 2030 Volumes, with New Interchanges

1/14/05

Location	Inputs																																		Results					Basic Ramp Capacity Check	
	Freeway Mainline Data										Ramp Data											Adjacent Ramp Data (6-lane freeways only)										2030						
	Lanes	Free-flow speed (mph)	Volume (vph) 2030	Peak-Hour Factor	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Side	Lanes	Free-flow speed (mph)	Volume (vph) 2030	Accel or decel length (ft)***	Terrain*	Peak-Hour Factor	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Volume (vph) 2030	Peak-Hour Factor	Position	Separation Type	Dist (ft)	Terrain	Heavy Vehs %	Heavy Vehs Auto Equiv	RVs %	RVs Auto Equiv	Driver Pop Adj.	Density (pc/mi/ln)	LOS	Speed (mph) Ramp Influ. Area	Outer Lanes	All Vehs.	Basic Capacity	Volume Exceeds Basic Capacity?
P.M. Peak Hour																																									
K-10 Eastbound																																									
Franklin off	3	65.0	800	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	660	1060' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												4.8	A	54.4	71.3	56.8	2000	no
Franklin on	3	64.5	500	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	550	750	1060' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												8.0	A	58.2	64.5	59.3	2000	no
1900 off	3	67.0	2700	0.90	7230' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	660	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.7	B	55.8	73.5	60.2	2000	no
1900 on	3	65.5	2500	0.90	3270' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	840	800' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.1	B	58.6	63.2	60.2	2000	no
Winchester off	3	65.5	2800	0.90	1825' @ -0.72%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	660	845' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.5	B	54.7	71.9	58.9	2000	no
Winchester on	3	64.6	2500	0.90	2638' @ +0.70%	5.0%	1.5	0%	1.2	1.0	right	1	35	100	750	800' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.9	B	58.0	62.3	59.6	2000	no
Church off	3	64.6	2600	0.90	1130' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	610	1110' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.7	B	53.3	70.9	56.9	2000	no
Church on	3	64.6	1900	0.90	6000' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	750	1005' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												13.4	B	58.1	63.3	59.8	2000	no
1400 off	3	65.5	2200	0.90	8230' @ -0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	100	800	1215' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												12.3	B	55.2	71.9	59.2	2000	no
1400 on	3	64.6	2100	0.90	1320' @ -2.43%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	970	690' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.0	B	58.3	63.0	59.8	2000	no
Evening Star off	3	64.6	2500	0.90	1670' @ +0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	816	425' @ -1.32%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.1	B	52.6	70.9	55.7	2000	no
Evening Star on	3	64.6	1500	0.90	1040' @ -0.84%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	1013	550' @ 2.87%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.6	B	58.2	64.0	59.4	2000	no
Edgerton off	3	64.6	2500	0.90	1200' @ -0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	858	325' @ -1.64%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.2	B	54.0	70.9	57.8	2000	no
Edgerton on	3	64.6	2100	0.90	1930' @ +1.21%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	927	425' @ 2.34%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.1	B	58.2	63.0	59.6	2000	no
Lexington off	3	64.6	2600	0.90	3580' @ -3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	651	180' @ -4.47%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.1	B	53.5	70.9	57.3	2000	no
Lexington on	3	65.5	1900	0.90	3655' @ -3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	1370	845' @ 4.47%	0.90	5.0%	1.5	0.0%	2.5	1.00												17.3	B	58.8	64.3	60.0	2000	no
Kill Creek off	3	65.5	3100	0.90	1145' @ +1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	655	390' @ 4.91%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.9	B	54.0	71.8	58.2	2000	no
Kill Creek on	3	65.5	2500	0.90	3660' @ +1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	860	75' @ 1.78%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.1	C	58.1	63.2	59.6	2000	no
Prairie Star off	3	66.1	3300	0.90	1640' @ +0.17%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	660	690' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.0	C	54.3	72.0	58.6	2000	no
Prairie Star on	3	64.6	2700	0.90	1235' @ +0.17%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	750	740' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.0	C	57.3	62.0	58.7	2000	no
Cedar Creek off	3	64.6	3400	0.90	5720' @ +2.89%	5.0%	2.5	0%	3.0	1.0	right	1	35	400	680	1005' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.8	C	54.0	69.7	58.2	2000	no
Cedar Creek on	4	66.8	3000	0.90	3115' @ -1.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	860	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.8	B	59.5	64.8	62.0	2000	no
Clare off	4	66.8	3800	0.90	2976' @ -1.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	660	1060' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												16.2	B	55.4	72.8	63.3	2000	no
Clare on	4	66.8	3500	0.90	1747' @ +1.88%	5.0%	1.5	0%	1.2	1.0	right	1	35	900	750	1850' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.5	B	59.1	63.8	61.5	2000	no
Lone Elm off	4	66.8	4900	0.90	553' @ +0.60%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	660	2060' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.0	C	54.9	71.7	62.3	2000	no
Lone Elm on	4	66.0	4400	0.90	926' @ -1.70%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	750	1165' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.3	C	58.4	62.1	60.4	2000	no
Woodland off	4	66.0	5000	0.90	2300' @ -0.76%	5.0%	1.5	0%	1.2	1.0	right	2	35	700	600	265' @ -5.74%	0.90	5.0%	1.5	0.0%	1.2	1.00												6.8	A	54.0	69.2	62.8	3800	no
Woodland on	5	63.0	4300	0.90	1540' @ -3.55%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	835	585' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.9	B	56.6	60.5	58.5	2000	no
Ridgeview off	5	63.8	5100	0.90	1900' @ +3.06%	5.0%	1.5	0%	1.2	1.0	right	2	35	600	710, 500	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												2.6	A	53.1	67.6	61.6	3800	no
Ridgeview on	5	64.6	4500	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	1600	840	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.6	C	57.1	61.1	59.1	2000	no
Renner off	5	64.6	6100	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	500	2100' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												28.5	D	52.1	69.8	58.6	2000	no
K-10 Westbound																																									
Renner on	5	69.1	6500	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	1800	500	1600' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.5	C	59.8	62.1	61.2	2000	no
Ridgeview off	5	69.1	8300	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	2	35	1100	550, 500	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.7	B	54.4	70.6	63.4	3800	no
Ridgeview on	5	68.3	7200	0.90	1850' @ -3.06%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	500	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.1	C	59.6	62.3	61.3	2000	no
Woodland off	5	68.3	8000	0.90	1309' @ +3.55%	5.0%	1.5	0%	1.2	1.0	right	2	35	1700	590, 910	690' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												14.5	B	52.5	70.8	61.2	3800	no
Woodland on	4	66.0	6800	0.90	2330' @ +0.76%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	1390	150' @ 3.98%	0.90	5.0%	1.5	0.0%	1.2	1.00												36.5**	F	44.7	62.1	50.1	2000	no
Lone Elm off	4	66.0	7300	0.90	1138' @ +1.70%	5.0%	1.5	0%	1.2	1.0	right	1	35	900	660	950' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												34.5	D	53.5	68.3	59.9	2000	no
Lone Elm on	4	66.8	6400	0.90	606' @ -0.60%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	750	2010' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												26.8	C	57.3	60.7	59.2	2000	no
Clare off	4	66.8	5300	0.90	1800' @ -1.88%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	660	1800' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												26.5	C	53.6	71.8	60.7	2000	no
Clare on	4	66.8	4300	0.90	2976' @ +1.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	750	1060' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.7	B	59.0	63.2	61.2	2000	no
Cedar Creek off	4	66.8	4800	0.90	3040' @ +1.50%	5.0%	1.5	0%	1.2	1.0	right	2	35	900	640	1165' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												7.0	A	53.9	70.8	62.9	3800	no
Cedar Creek on	3	66.1	3900	0.90	5800' @ -2.89%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	850	800' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												26.0	C	57.1	61.5	58.6	2000	no
Prairie Star off	3	66.1	4500	0.90	1129' @ -0.17%	5.0%	1.5	0%	1.2	1.0	right	1	35	1000	660	845' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												28.0	C	53.3	69.9	57.8	2000	no
Prairie Star on	3	66.1	3500	0.90	1587' @ -0.17%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	750	740' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												23.6	C	57.8	62.1	59.3	2000	no
Kill Creek off	3	67.0	4000	0.90	3675' @ -1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	1200	660	275' @ -1.55%	0.90	5.0%	1.5	0.0%	1.2	1.00												26.1	C	53.2	72.2	57.6	2000	no
Kill Creek on	3	65.5	2800	0.90	1125' @ -1.10%	5.0%	1.5	0%	1.2	1.0	right	1	35	400	860	350' @ -4.77%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.4	B	58.4	62.7	59.8	2000	no
Lexington off	3	65.5	3200	0.90	2389' @ +3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	910	540' @ -2.58%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.4	B	53.8	71.7	57.9	2000	no
Lexington on	3	64.6	2500	0.90	3142' @ +3.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	900	822	225' @ 1.28%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.2	C	57.3	62.3	58.7	2000	no
Edgerton off	3	64.6	3400	0.90	1780' @ -1.21%	5.0%	1.5	0%	1.2	1.0	right	1	35	800	816	370' @ -4.29%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.6	C	53.1	70.4	57.1	2000	no
Edgerton on	3	64.6	2600	0.90	1500' @ +0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	1013	425' @ 4.75%	0.90	5.0%	1.5	0.0%	1.2	1.00												15.6	B	58.2	62.2	59.6	2000	no
Evening Star off	3	64.6	2900	0.90	750' @ +0.84%	5.0%	1.5	0%	1.2	1.0	right	1	35	600	858	425' @ -3.84%	0.90	5.0%	1.5	0.0%	1.2	1.00												17.0	B	53.5	70.9	57.5	2000	no
Evening Star on	3	66.1	2300	0.90	1820' @ -0.50%	5.0%	1.5	0%	1.2	1.0	right	1	35	1400	880	420' @ 2.21%	0.90	5.0%	1.5	0.0%	1.2	1.00												24.0	C	57.6	64.1	59.1	2000	no
1400 off	3	66.1	3700	0.90	1200' @ +2.43%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	740	900' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.8	C	55.0	71.0	59.5	2000	no
1400 on	3	65.5	3400	0.90	6680' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	100	780	690' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.5	B	58.2	61.7	59.5	2000	no
Church off	3	65.5	3500	0.90	7770' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	700	600	860' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												22.8	C	53.8	71.1	58.0	2000	no
Church on	3	66.1	3000	0.90	1030' @ +0.28%	5.0%	1.5	0%	1.2	1.0	right	1	35	500	970	800' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												19.7	C	58.7	63.0	60.1	2000	no
Winchester off	3	66.1	3500	0.90	1772' @ +0.72%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	660	900' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.3	C	55.3	71.3	59.7	2000	no
Winchester on	3	67.0	3300	0.90	3008' @ -1.79%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	750	800' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												20.0	B	59.1	63.4	60.7	2000	no
1900 off	3	65.5	3500	0.90	3380' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	300	650	740' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												21.5	C	54.7	70.7	59.1	2000	no
1900 on	3	65.5	3200	0.90	7120' @ 0.00%	5.0%	1.5	0%	1.2	1.0	right	1	35	200	850	795' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												18.9	B	58.0	61.6	59.3	2000	no
Franklin off	3	64.5	1400	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	550	660	1005' @ 3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												9.4	A	53.6	70.8	56.2	2000	no
Franklin on	3	65.0	850	0.90	0%	5.0%	1.5	0%	1.2	1.0	right	1	35	350	750	1110' @ -3.00%	0.90	5.0%	1.5	0.0%	1.2	1.00												8.2	A	58.6	65.0	60.3	2000	no

* A ramp grade of 3% (or -3%) was estimated on ramps for which there was no ramp data available on the as-built plans.
** Local high densities, but no freeway queueing (HCM p 25-8)
*** For new ramps, a default of 750 was used for accel lanes and 660 for decel lanes. (KDOT Standard Drawing RD-575

HCM Signalized Intersection Capacity Analysis
146: K-10 WB ramps & Franklin

2030 w/ new interchanges
12/30/2004

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			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		1770	3539			3539	1583
Flt Permitted				0.95	1.00		0.23	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		432	3539			3539	1583
Volume (vph)	0	0	0	200	0	350	50	350	0	0	1000	300
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)	0	0	0	217	0	380	54	380	0	0	1087	326
RTOR Reduction (vph)	0	0	0	0	309	0	0	0	0	0	0	96
Lane Group Flow (vph)	0	0	0	217	71	0	54	380	0	0	1087	230
Turn Type				Perm			Perm					Perm
Protected Phases					8			2			6	
Permitted Phases				8			2					6
Actuated Green, G (s)				14.0	14.0		53.0	53.0			53.0	53.0
Effective Green, g (s)				14.0	14.0		53.0	53.0			53.0	53.0
Actuated g/C Ratio				0.19	0.19		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)				330	295		305	2501			2501	1119
v/s Ratio Prot					c0.24			0.11			c0.31	
v/s Ratio Perm				0.12			0.13					0.21
v/c Ratio				0.66	0.24		0.18	0.15			0.43	0.21
Uniform Delay, d1				28.3	26.0		3.7	3.6			4.7	3.8
Progression Factor				1.00	1.00		1.10	0.61			1.00	1.00
Incremental Delay, d2				4.7	0.4		1.3	0.1			0.6	0.4
Delay (s)				33.0	26.4		5.3	2.3			5.2	4.2
Level of Service				C	C		A	A			A	A
Approach Delay (s)		0.0			28.8			2.7			5.0	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
149: K10 EB ramps & Franklin

2030 w/ new interchanges
12/30/2004

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						0.95	1.00	1.00	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	1770	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.50	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	930	3539	
Volume (vph)	200	0	100	0	0	0	0	400	100	450	550	0
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)	217	0	109	0	0	0	0	435	109	489	598	0
RTOR Reduction (vph)	0	90	0	0	0	0	0	0	31	0	0	0
Lane Group Flow (vph)	217	19	0	0	0	0	0	435	78	489	598	0
Turn Type	Perm								Perm	Perm		
Protected Phases		4						2			6	
Permitted Phases	4								2	6		
Actuated Green, G (s)	13.3	13.3						53.7	53.7	53.7	53.7	
Effective Green, g (s)	13.3	13.3						53.7	53.7	53.7	53.7	
Actuated g/C Ratio	0.18	0.18						0.72	0.72	0.72	0.72	
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)	314	281						2534	1133	666	2534	
v/s Ratio Prot		0.07						0.12			0.17	
v/s Ratio Perm	0.12								0.07	c0.53		
v/c Ratio	0.69	0.07						0.17	0.07	0.73	0.24	
Uniform Delay, d1	28.9	25.7						3.4	3.2	6.4	3.6	
Progression Factor	1.00	1.00						1.00	1.00	0.54	1.02	
Incremental Delay, d2	6.4	0.1						0.1	0.1	6.5	0.2	
Delay (s)	35.3	25.8						3.6	3.3	9.9	3.9	
Level of Service	D	C						A	A	A	A	
Approach Delay (s)		32.2			0.0			3.5			6.6	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
26: K10 WB ramps & Winchester

2030 w/ new interchanges
12/30/2004

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	0	0	100	0	100	100	250	0	0	150	100
Peak Hour Factor	0.90	0.92	0.90	0.92	0.92	0.92	0.90	0.90	0.92	0.92	0.90	0.90
Hourly flow rate (vph)	0	0	0	109	0	109	111	278	0	0	167	111
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	831	722	222	722	778	278	278			278		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	831	722	222	722	778	278	278			278		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	100	66	100	86	91			100		
cM capacity (veh/h)	231	322	817	319	299	761	1285			1285		

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	109	109	111	278	278
Volume Left	109	0	111	0	0
Volume Right	0	109	0	0	111
cSH	319	761	1285	1700	1700
Volume to Capacity	0.34	0.14	0.09	0.16	0.16
Queue Length (ft)	37	12	7	0	0
Control Delay (s)	22.0	10.5	8.1	0.0	0.0
Lane LOS	C	B	A		
Approach Delay (s)	16.2		2.3		0.0
Approach LOS	C				

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
27: K10 EB ramps & Winchester

2030 w/ new interchanges
12/30/2004

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)	150	0	150	0	0	0	0	200	50	50	200	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	167	0	167	0	0	0	0	222	56	56	222	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	583	611	222	667	583	250	222			278		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	583	611	222	667	583	250	222			278		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	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	100	80	100	100	100	100			96		
cM capacity (veh/h)	410	391	817	287	406	789	1347			1285		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	333	278	56	222
Volume Left	167	0	56	0
Volume Right	167	56	0	0
cSH	819	1700	1285	1700
Volume to Capacity	0.41	0.16	0.04	0.13
Queue Length (ft)	50	0	3	0
Control Delay (s)	15.1	0.0	7.9	0.0
Lane LOS	C		A	
Approach Delay (s)	15.1	0.0	1.6	
Approach LOS	C			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
6: K10 WB ramps & Church

2030 w/ new interchanges
12/30/2004

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		0.97	1.00			1.00	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		3433	1863			1863	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		3433	1863			1863	1583
Volume (vph)	0	0	0	350	0	150	350	500	0	0	250	150
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	389	0	167	389	556	0	0	278	167
RTOR Reduction (vph)	0	0	0	0	120	0	0	0	0	0	0	110
Lane Group Flow (vph)	0	0	0	389	47	0	389	556	0	0	278	57
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				16.9	16.9		10.8	35.1			20.3	20.3
Effective Green, g (s)				16.9	16.9		10.8	35.1			20.3	20.3
Actuated g/C Ratio				0.28	0.28		0.18	0.59			0.34	0.34
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)				499	446		618	1090			630	536
v/s Ratio Prot				c0.22	0.11		c0.11	c0.30			0.15	0.11
v/s Ratio Perm												
v/c Ratio				0.78	0.11		0.63	0.51			0.44	0.11
Uniform Delay, d1				19.8	16.0		22.7	7.4			15.4	13.6
Progression Factor				1.00	1.00		0.30	0.51			1.00	1.00
Incremental Delay, d2				7.6	0.1		1.8	1.6			2.2	0.4
Delay (s)				27.4	16.1		8.5	5.3			17.7	14.0
Level of Service				C	B		A	A			B	B
Approach Delay (s)		0.0			24.0			6.7			16.3	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: K10 EB ramps & Church

2030 w/ new interchanges
12/30/2004

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						0.95	1.00	1.00	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	1770	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.25	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	462	3539	
Volume (vph)	200	0	500	0	0	0	0	650	200	100	500	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	222	0	556	0	0	0	0	722	222	111	556	0
RTOR Reduction (vph)	0	150	0	0	0	0	0	0	133	0	0	0
Lane Group Flow (vph)	222	406	0	0	0	0	0	722	89	111	556	0
Turn Type	Prot								Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases										6		
Actuated Green, G (s)	18.5	18.5						24.1	24.1	33.5	33.5	
Effective Green, g (s)	18.5	18.5						24.1	24.1	33.5	33.5	
Actuated g/C Ratio	0.31	0.31						0.40	0.40	0.56	0.56	
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)	546	488						1421	636	376	1976	
v/s Ratio Prot	0.13	c0.35						c0.20	0.14	0.03	c0.16	
v/s Ratio Perm										0.14		
v/c Ratio	0.41	0.83						0.51	0.14	0.30	0.28	
Uniform Delay, d1	16.4	19.3						13.5	11.4	7.2	6.9	
Progression Factor	1.00	1.00						1.00	1.00	0.61	0.38	
Incremental Delay, d2	0.5	11.5						1.3	0.5	0.4	0.3	
Delay (s)	16.9	30.8						14.8	11.8	4.8	3.0	
Level of Service	B	C						B	B	A	A	
Approach Delay (s)		26.9			0.0			14.1			3.3	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: K10 WB ramps & Evening Star

2030 w/ new interchanges
12/30/2004

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
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)				4.0	4.0		4.0	4.0			4.0	4.0
Lane Util. Factor				0.97	1.00		0.97	1.00			1.00	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				3399	1567		3433	1863			1863	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				3399	1567		3433	1863			1863	1583
Volume (vph)	0	0	0	500	0	100	1200	300	0	0	200	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	556	0	111	1333	333	0	0	222	222
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	0	176
Lane Group Flow (vph)	0	0	0	556	23	0	1333	333	0	0	222	46
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				15.6	15.6		31.8	51.4			15.6	15.6
Effective Green, g (s)				15.6	15.6		31.8	51.4			15.6	15.6
Actuated g/C Ratio				0.21	0.21		0.42	0.69			0.21	0.21
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)				707	326		1456	1277			388	329
v/s Ratio Prot				c0.16	0.07		c0.39	0.18			0.12	c0.14
v/s Ratio Perm												
v/c Ratio				0.79	0.07		0.92	0.26			0.57	0.14
Uniform Delay, d1				28.1	23.9		20.3	4.5			26.7	24.2
Progression Factor				1.00	1.00		0.32	0.23			1.00	1.00
Incremental Delay, d2				5.8	0.1		6.2	0.4			6.0	0.9
Delay (s)				33.9	24.0		12.6	1.4			32.7	25.1
Level of Service				C	C		B	A			C	C
Approach Delay (s)		0.0			32.2			10.4			28.9	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
11: K10 EB ramps & Evening Star

2030 w/ new interchanges
12/30/2004

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
Grade (%)		1%			0%			0%			0%	
Total Lost time (s)	4.0	4.0	4.0					4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	0.95					0.95	0.88	1.00	0.95	
Frt	1.00	0.85	0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1761	1497	1497					3539	2787	1770	3539	
Flt Permitted	0.95	1.00	1.00					1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1761	1497	1497					3539	2787	163	3539	
Volume (vph)	150	0	850	0	0	0	0	1350	850	150	550	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	0	944	0	0	0	0	1500	944	167	611	0
RTOR Reduction (vph)	0	253	253	0	0	0	0	0	418	0	0	0
Lane Group Flow (vph)	167	219	219	0	0	0	0	1500	526	167	611	0
Turn Type	Prot		Perm						Prot	pm+pt		
Protected Phases	7	4						2	2	1	6	
Permitted Phases			4							6		
Actuated Green, G (s)	14.9	14.9	14.9					41.8	41.8	52.1	52.1	
Effective Green, g (s)	14.9	14.9	14.9					41.8	41.8	52.1	52.1	
Actuated g/C Ratio	0.20	0.20	0.20					0.56	0.56	0.69	0.69	
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)	350	297	297					1972	1553	248	2458	
v/s Ratio Prot	0.09	c0.32						c0.42	0.34	c0.06	0.17	
v/s Ratio Perm			0.32							0.41		
v/c Ratio	0.48	0.74	0.74					0.76	0.34	0.67	0.25	
Uniform Delay, d1	26.6	28.2	28.2					12.8	9.1	12.3	4.2	
Progression Factor	1.00	1.00	1.00					1.00	1.00	0.83	0.00	
Incremental Delay, d2	1.0	9.2	9.2					2.8	0.6	6.2	0.2	
Delay (s)	27.6	37.4	37.4					15.6	9.7	16.5	0.2	
Level of Service	C	D	D					B	A	B	A	
Approach Delay (s)		35.9			0.0			13.3			3.7	
Approach LOS		D			A			B			A	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement Summary

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28: K-10 WB Ramps & Prairie Star Pkwy

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
Prairie Star Pkwy										
32	L	333	1141	0.293	10.5	LOS B	42	0.62	28.2	64
31	T	667	2276	0.293	2.0	LOS A	42	0.21	32.9	99
Approach		**1000**	**3417**	**0.293**	**4.8**	**LOS A**	**42**	**0.35**	**31.1**	**164**
K10 WB off-ramp										
22	L	611	991	0.617	16.8	LOS B	141	1.02	25.4	129
21	T	57	369	0.154	9.4	LOS A	18	0.69	28.5	10
23	R	444	1270	0.350	4.5	LOS A	52	0.46	30.5	73
Approach		**1113**	**2630**	**0.617**	**11.5**	**LOS B**	**141**	**0.78**	**27.3**	**212**
Prairie Star Pkwy										
41	T	472	984	0.480	8.8	LOS A	88	0.84	28.9	83
43	R	228	475	0.480	9.5	LOS A	88	0.86	28.5	40
Approach		**700**	**1459**	**0.480**	**9.0**	**LOS A**	**88**	**0.85**	**28.7**	**123**
Cedar Creek Road										
82	L	28	371	0.364	19.8	LOS B	57	0.96	23.8	28
82	T	83	371	0.364	19.8	LOS B	57	0.96	23.8	28
82	R	22	371	0.364	19.8	LOS B	57	0.96	23.8	28
Approach		**135**	**371**	**0.364**	**19.8**	**LOS B**	**57**	**0.96**	**23.8**	**28**
All Vehicles		**2948**	**7877**	**0.617**	**9.0**	**LOS A**	**141**	**0.66**	**28.6**	**527**

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Movement Summary

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29: K-10 EB Ramps & Prairie Star Pkwy

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
Cedar Creek Road										
32	L	28	45	0.622	21.0	LOS C	166	1.03	24.0	6
31	T	611	990	0.617	11.3	LOS B	175	0.92	27.5	112
33	R	417	674	0.617	11.0	LOS B	175	0.90	27.6	76
Approach		**1055**	**1709**	**0.617**	**11.5**	**LOS B**	**175**	**0.92**	**27.4**	**194**
Prairie Star Pkwy										
42	L	333	980	0.341	10.5	LOS B	51	0.62	28.2	64
41	T	833	2448	0.341	1.4	LOS A	52	0.16	33.3	122
Approach		**1168**	**3428**	**0.341**	**4.0**	**LOS A**	**52**	**0.29**	**31.6**	**187**
K10 EB off-ramp										
12	L	326	932	0.351	14.9	LOS B	54	0.88	26.3	67
11	T	1	6	0.333	5.2	LOS A	54	0.57	30.3	0
13	R	326	757	0.432	9.2	LOS A	72	0.84	28.6	58
Approach		**656**	**1694**	**0.432**	**12.0**	**LOS B**	**72**	**0.86**	**27.4**	**125**
95th St										
52	L	1	490	0.229	14.6	LOS B	30	0.88	28.3	20
52	T	82	490	0.229	14.6	LOS B	30	0.88	28.3	20
52	R	27	490	0.229	14.6	LOS B	30	0.88	28.3	20
Approach		**112**	**490**	**0.228**	**14.6**	**LOS B**	**30**	**0.88**	**28.3**	**20**
All Vehicles		**2991**	**7322**	**0.622**	**8.8**	**LOS A**	**175**	**0.66**	**28.9**	**526**

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HCM Signalized Intersection Capacity Analysis 2030 w/ new interchanges
18: K10 WB ramps & Mize 12/30/2004

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			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		1770	3539			3539	1583
Flt Permitted				0.95	1.00		0.28	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		522	3539			3539	1583
Volume (vph)	0	0	0	350	0	550	250	600	0	0	500	350
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	389	0	611	278	667	0	0	556	389
RTOR Reduction (vph)	0	0	0	0	107	0	0	0	0	0	0	272
Lane Group Flow (vph)	0	0	0	389	504	0	278	667	0	0	556	117
Turn Type				Prot			pm+pt					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases							2					
Actuated Green, G (s)				21.6	21.6		30.4	30.4			18.1	18.1
Effective Green, g (s)				21.6	21.6		30.4	30.4			18.1	18.1
Actuated g/C Ratio				0.36	0.36		0.51	0.51			0.30	0.30
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)				637	570		437	1793			1068	478
v/s Ratio Prot				0.22	c0.39		c0.09	0.19			0.16	c0.25
v/s Ratio Perm							0.23					
v/c Ratio				0.61	0.88		0.64	0.37			0.52	0.25
Uniform Delay, d1				15.8	18.0		9.5	9.0			17.4	15.8
Progression Factor				1.00	1.00		0.79	0.34			1.00	1.00
Incremental Delay, d2				1.7	15.1		2.6	0.5			1.8	1.2
Delay (s)				17.5	33.2		10.1	3.6			19.2	17.0
Level of Service				B	C		B	A			B	B
Approach Delay (s)		0.0			27.1			5.5			18.3	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis 2030 w/ new interchanges
19: K10 EB ramps & Cedar Creek 12/30/2004

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						0.95	1.00	0.97	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	3433	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	3433	3539	
Volume (vph)	250	0	150	0	0	0	0	600	350	450	400	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	278	0	167	0	0	0	0	667	389	500	444	0
RTOR Reduction (vph)	0	129	0	0	0	0	0	0	249	0	0	0
Lane Group Flow (vph)	278	38	0	0	0	0	0	667	140	500	444	0
Turn Type	Prot								Prot	Prot		
Protected Phases	7	4						2	2	1	6	
Permitted Phases												
Actuated Green, G (s)	13.6	13.6						21.6	21.6	12.8	38.4	
Effective Green, g (s)	13.6	13.6						21.6	21.6	12.8	38.4	
Actuated g/C Ratio	0.23	0.23						0.36	0.36	0.21	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)	401	359						1274	570	732	2265	
v/s Ratio Prot	c0.16	0.11						0.19	c0.25	c0.15	0.13	
v/s Ratio Perm												
v/c Ratio	0.69	0.11						0.52	0.25	0.68	0.20	
Uniform Delay, d1	21.3	18.4						15.1	13.5	21.7	4.4	
Progression Factor	1.00	1.00						1.00	1.00	0.22	0.24	
Incremental Delay, d2	5.1	0.1						1.5	1.0	2.4	0.2	
Delay (s)	26.4	18.5						16.7	14.5	7.1	1.2	
Level of Service	C	B						B	B	A	A	
Approach Delay (s)		23.4			0.0			15.9			4.3	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ new interchanges
30: K10 WB ramps & Clare — 12/30/2004

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		0.97	0.95			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		3433	3539			3539	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		3433	3539			3539	1583
Volume (vph)	0	0	0	450	0	550	200	550	0	0	800	300
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	500	0	611	222	611	0	0	889	333
RTOR Reduction (vph)	0	0	0	0	138	0	0	0	0	0	0	213
Lane Group Flow (vph)	0	0	0	500	473	0	222	611	0	0	889	120
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				20.4	20.4		6.0	31.6			21.6	21.6
Effective Green, g (s)				20.4	20.4		6.0	31.6			21.6	21.6
Actuated g/C Ratio				0.34	0.34		0.10	0.53			0.36	0.36
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)				602	538		343	1864			1274	570
v/s Ratio Prot				0.28	c0.39		c0.06	0.17			c0.25	0.21
v/s Ratio Perm												
v/c Ratio				0.83	0.88		0.65	0.33			0.70	0.21
Uniform Delay, d1				18.2	18.6		26.0	8.1			16.4	13.3
Progression Factor				1.00	1.00		0.68	0.44			1.00	1.00
Incremental Delay, d2				9.5	15.1		3.8	0.4			3.2	0.8
Delay (s)				27.7	33.7		21.4	4.0			19.6	14.1
Level of Service				C	C		C	A			B	B
Approach Delay (s)		0.0			31.0			8.7			18.1	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ new interchanges
31: K10 EB ramps & Clare — 12/30/2004

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						0.95	1.00	0.97	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	3433	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	3433	3539	
Volume (vph)	150	0	150	0	0	0	0	600	400	500	750	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	0	167	0	0	0	0	667	444	556	833	0
RTOR Reduction (vph)	0	141	0	0	0	0	0	0	261	0	0	0
Lane Group Flow (vph)	167	26	0	0	0	0	0	667	183	556	833	0
Turn Type	Prot								Prot	Prot		
Protected Phases	7	4						2	2	1	6	
Permitted Phases												
Actuated Green, G (s)	9.3	9.3						24.7	24.7	14.0	42.7	
Effective Green, g (s)	9.3	9.3						24.7	24.7	14.0	42.7	
Actuated g/C Ratio	0.16	0.16						0.41	0.41	0.23	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)	274	245						1457	652	801	2519	
v/s Ratio Prot	0.09	c0.11						0.19	c0.28	c0.16	0.24	
v/s Ratio Perm												
v/c Ratio	0.61	0.11						0.46	0.28	0.69	0.33	
Uniform Delay, d1	23.7	21.8						12.8	11.7	21.0	3.3	
Progression Factor	1.00	1.00						1.00	1.00	0.19	0.29	
Incremental Delay, d2	3.8	0.2						1.0	1.1	1.9	0.2	
Delay (s)	27.5	22.0						13.8	12.8	5.9	1.2	
Level of Service	C	C						B	B	A	A	
Approach Delay (s)		24.7			0.0			13.4			3.1	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ new interchanges
53: Lone Elm & — 12/30/2004

Movement	NBL	NBT	SBL	SBT	NEL	SWL
Lane Configurations						
Ideal Flow (vphpl)	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	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	3539	3433	3539	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	3539	3433	3539	3433	3433
Volume (vph)	200	250	350	350	300	400
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	222	278	389	389	333	444
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	222	278	389	389	333	444
Turn Type	Prot		Prot		Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	6.7	10.4	9.7	13.4	10.8	10.8
Effective Green, g (s)	8.7	12.4	11.7	15.4	12.8	12.8
Actuated g/C Ratio	0.18	0.25	0.24	0.31	0.26	0.26
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	611	897	821	1115	899	899
v/s Ratio Prot	0.06	c0.08	c0.11	0.11	0.10	c0.13
v/s Ratio Perm						
v/c Ratio	0.36	0.31	0.47	0.35	0.37	0.49
Uniform Delay, d1	17.7	14.8	16.0	12.9	14.8	15.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2	0.4	0.2	0.3	0.4
Delay (s)	18.0	15.0	16.4	13.1	15.0	15.7
Level of Service	B	B	B	B	B	B
Approach Delay (s)		16.3		14.7		
Approach LOS		B		B		

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ new interchanges
20: K10 WB ramps & Woodland — 12/30/2004

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		0.97	0.95			0.95	1.00
Frt				1.00	0.85		1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	1583		3433	3539			3539	1583
Flt Permitted				0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770	1583		3433	3539			3539	1583
Volume (vph)	0	0	0	650	0	550	300	650	0	0	800	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	722	0	611	333	722	0	0	889	222
RTOR Reduction (vph)	0	0	0	0	76	0	0	0	0	0	0	155
Lane Group Flow (vph)	0	0	0	722	535	0	333	722	0	0	889	67
Turn Type				Prot			Prot					Prot
Protected Phases				3	8		5	2			6	6
Permitted Phases												
Actuated Green, G (s)				32.0	32.0		8.5	35.0			22.5	22.5
Effective Green, g (s)				32.0	32.0		8.5	35.0			22.5	22.5
Actuated g/C Ratio				0.43	0.43		0.11	0.47			0.30	0.30
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)				755	675		389	1652			1062	475
v/s Ratio Prot				c0.41	0.39		c0.10	0.20			c0.25	0.14
v/s Ratio Perm												
v/c Ratio				0.96	0.79		0.86	0.44			0.84	0.14
Uniform Delay, d1				20.8	18.6		32.6	13.4			24.5	19.2
Progression Factor				1.00	1.00		0.37	0.52			1.00	1.00
Incremental Delay, d2				22.4	6.3		14.4	0.7			7.9	0.6
Delay (s)				43.2	25.0		26.3	7.7			32.4	19.8
Level of Service				D	C		C	A			C	B
Approach Delay (s)		0.0			34.9			13.6			29.9	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — 2030 w/ new interchanges

21: K10 EB ramps & Woodland — 12/30/2004

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						0.95	1.00	0.97	0.95	
Frt	1.00	0.85						1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583						3539	1583	3433	3539	
Flt Permitted	0.95	1.00						1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	1583						3539	1583	3433	3539	
Volume (vph)	300	0	400	0	0	0	0	650	450	350	1100	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	333	0	444	0	0	0	0	722	500	389	1222	0
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	317	0	0	0
Lane Group Flow (vph)	333	412	0	0	0	0	0	722	183	389	1222	0
Turn Type	Prot								Prot	Prot		
Protected Phases	7	4						2	2	1	6	
Permitted Phases												
Actuated Green, G (s)	22.8	22.8						27.4	27.4	12.8	44.2	
Effective Green, g (s)	22.8	22.8						27.4	27.4	12.8	44.2	
Actuated g/C Ratio	0.30	0.30						0.37	0.37	0.17	0.59	
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)	538	481						1293	578	586	2086	
v/s Ratio Prot	0.19	c0.28						0.20	c0.32	c0.11	0.35	
v/s Ratio Perm												
v/c Ratio	0.62	0.86						0.56	0.32	0.66	0.59	
Uniform Delay, d1	22.4	24.6						19.0	17.1	29.1	9.7	
Progression Factor	1.00	1.00						1.00	1.00	0.30	0.49	
Incremental Delay, d2	2.1	14.0						1.7	1.4	1.5	0.5	
Delay (s)	24.5	38.5						20.7	18.5	10.2	5.3	
Level of Service	C	D						C	B	B	A	
Approach Delay (s)		32.5			0.0			19.8			6.5	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			