

APPENDIX C: BOULEVARD INPUTS

Appendix C1: Urban Streets – Arterials and Collectors/Locals (also used for On-Ramps and Off Ramps, not normally associated in systems planning)

The equation below is an approximation of the “ultimate capacity” (LOS E) of an urban street (arterial). However, HCM does not provide a single equation which estimates the capacity of urban streets at other Levels of Service (e.g. at LOS D). Instead, the detailed procedures and equations described in HCM Chapters 15 and 16 must be used in order to manually calculate urban street capacity. The equation for estimating “ultimate capacity” (LOS E) of urban streets is provided below because it shows the factors which influence capacity of these facilities. Following the equation and table of adjustment factors, the HCM 2000 Urban Street Worksheet is provided because it lists additional factors which influence capacity, such as Arrival Type and Urban Street Class. See **Exhibit 3**.

NOTE: Two-way daily capacity = One-way hourly capacity/K /D.

The following equation is used to estimate the hourly one-way ultimate capacity (LOS E) of arterials and collectors.

$$c = s_o * N * f_W * f_{HV} * f_g * f_p * f_{bb} * f_a * f_{LU} * f_{LT} * f_{RT} * f_{Lpb} * f_{Rpb} * PHF * g/C$$

Where

- c = Capacity (veh/hr), by direction.
- s_o = Base saturation flow rate – the maximum steady traffic flow rate for a signalized intersection approach in pc/hr/ln under ideal conditions, assuming all green time is available & no lost time is experienced. *HCM 2000, p. 10-24, Exhibit 10-12.*
 1,900 pc/hr/ln assumed for arterials
 1,805 pc/hr/ln assumed for collectors/locals
- N = Number of useable through lanes **at the intersection approach** per direction (excludes exclusive turn lanes, or lanes assumed unusable due to parking, transit operations, etc.)
- PHF = Peak-hour factor. Default = 0.92, *HCM 2000, p. 10-8*
- g/C = Effective green ratio, or the proportion of effective green time available to a given approach. Larger ratios are associated with higher volume/priority facilities.

See **Exhibit 2** for other adjustment factors for urban streets

For NCDOT – TPB Level of Service D for Systems Level Planning, the NCLOS 2.1 program was used in developing the boulevard, major thoroughfares, and minor thoroughfares capacity tables.

Appendix C1: Urban Streets – Arterials and Collectors/Locals

(also used for On-Ramps and Off Ramps, not normally associated in systems planning)

Exhibit 2: Adjustment Factors for Urban Streets

Factor	Formula	Definitions of Variables	Defaults / Notes
Lane width	$f_w = 1 + [(W - 12) / 30]$	W = lane width	Assume 1.0 <i>Exhibit 10-12</i>
Heavy vehicles	$f_{HV} = 100 / [100 + \%HV(E_T - 1)]$	%HV = % heavy vehicles for lane group volume	$E_T = 2.0$ pc/HV <i>Exhibit 10-12</i>
Approach grade	$f_g = 1 - [\%G / 200]$	%G = % grade on lane group approach	0% - flat 3% - moderate grades <i>p. 10-25</i>
Parking	$f_p = [N - 0.1 - (18N_m / 3600)] / N$	N = # through lanes in lane group N _m = # parking maneuvers/hour	$f_p \geq 0.050$ $f_p = 1.00$ for no parking <i>See Exhibit 10-20 for N_m</i>
Bus blockage	$f_{bb} = [N - 14.4N_B / 3600] / N$	N _B = # buses stopping/hour	$f_{bb} \geq 0.050$ <i>See Exhibit 10-21 for N_B</i>
Area type	$f_a = 0.900$ in CBD $f_a = 1.00$ in all other areas		
Lane utilization	$f_{LU} = v_g / (v_{g1}N)$	v_g = unadjusted demand flow rate for the lane group, veh/h v_{g1} = unadjusted demand flow rate on the single lane in the lane group with the highest volume N = number of lanes in the lane group	Assume 1.00 for exclusive left turn <i>See Exhibit 10-23 for other default values</i>
Left turns	Protected phasing Exclusive lane: $f_{LT} = 0.95$ Shared lane: $f_{LT} = 1 / [1.0 + 0.05P_{LT}]$	P _{LT} = proportion of left turns in lane group	<i>See Exhibit C16-1, Appendix C, for nonprotected phasing alternatives, p. 16-122</i>
Right turns	Exclusive lane: $f_{RT} = 0.85$ Shared lane: $f_{RT} = 1.0 - (0.15)P_{RT}$ Single lane: $f_{RT} = 1.0 - (0.135)P_{RT}$	P _{RT} = proportion of right turns in lane group	Assume 0.985 (Unless exclusive right turn lane is provided)
Pedestrian-bicycle (Left turns)	$F_{Lpb} = 1.0 - P_{LT}(1 - A_{pbT})(1 - P_{LTA})$	P _{LT} = proportion of left turns in lane group A _{pbT} = permitted phase adjustment P _{LTA} = ratio of left turn protected green to total left turn green	Assume 1.00 <i>Refer to Appendix D for detailed procedure</i>
Pedestrian-bicycle (Right turns)	$F_{Rpb} = 1.0 - P_{RT}(1 - A_{pbT})(1 - P_{RTA})$	P _{RT} = proportion of right turns in lane group A _{pbT} = permitted phase adjustment P _{RTA} = ratio of right turns protected green to total right turns green	Assume 1.00 <i>Refer to Appendix D for detailed procedure</i>

Figure adapted from HCM 2000 Exhibit 16-7

Appendix C1: Urban Streets – Arterials and Collectors/Locals

(also used for On-Ramps and Off Ramps, not normally associated in systems planning)

Exhibit 3: HCM 2000 Urban Streets Worksheet

EXHIBIT 15-14. URBAN STREET WORKSHEET

URBAN STREET WORKSHEET								
General Information				Site Information				
Analyst	_____			Urban Street	_____			
Agency or Company	_____			Direction of Travel	_____			
Date Performed	_____			Jurisdiction	_____			
Analysis Time Period	_____			Analysis Year	_____			
<input type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Design (v_p)		<input type="checkbox"/> Planning (LOS)		<input type="checkbox"/> Planning (v_p)		Analysis Period, T = _____ h
Input Parameters								
	Segments							
	1	2	3	4	5	6	7	8
Cycle length, C (s)								
Effective green-to-cycle-length ratio, g/C								
v/c ratio for lane group, X								
Capacity of lane group, c (veh/h)								
Arrival type, AT								
Length of segment, L (mi)								
Initial queue, Q_b (veh)								
Urban street class, SC (Exhibit 10-3)								
Free-flow speed, FFS (mi/h) (Exhibit 15-2)								
Running time, T_R (s) (Exhibit 15-3)								
Delay Computation								
Uniform delay, d_1 (s) $d_1 = \frac{0.5C[(1 - g/C)^2]}{1 - [(g/C)\min(X, 1.0)]}$								
Signal control adjustment factor, k (Exhibit 15-6)								
Upstream filtering/metering adjustment factor, I (Exhibit 15-7)								
Incremental delay, d_2 (s) $d_2 = 900T \left[(X - 1) + \sqrt{(X - 1)^2 + \frac{8kIX}{cT}} \right]$								
Initial queue delay, d_3 (s) (Ch. 16 Appendix F)								
Progression adjustment factor, PF (Exhibit 15-5)								
Control delay, d (s) $d = (d_1 * PF) + d_2 + d_3$								
Segment LOS Determination								
Segment travel time, ST (s) $ST = T_R + d + \text{Other delay}$								
Segment travel speed, S_A (mi/h) $S_A = \frac{3600(L)}{ST}$								
Segment LOS (Exhibit 15-2)								
Urban Street LOS Determination								
Total travel time = $\sum ST$	_____			s				
Total length = $\sum L$	_____			mi				
Total travel speed, $S_A = \frac{3600 * \text{Total length}}{\text{Total travel time}}$	_____			mi/h				
Total urban street LOS (Exhibit 15-2)	_____							

Appendix C2: Coast Boulevard Inputs - 55 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	18000	18300	20400	21600	21900	24500	23600	23900	26700

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	36100	36500	40800	43300	43900	49000	47200	47800	53500

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	54100	54800	61300	64900	65800	73500	70800	71700	80200

* PAHSI = Principal Arterial - High Speed (I)

Appendix C2: Coastal Boulevard Inputs - 45 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	15700	16500	17300	18900	19800	23600	20600	21600	25700

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	31700	33100	34700	38100	39700	47200	41500	43300	51500

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	47600	49600	52100	57200	59600	70800	62400	65000	77300

* PAHSI = Principal Arterial - High Speed (I)

* PASII = Principal Arterial - Suburban (II)

Appendix C2: Coastal Boulevard Inputs - 35 MPH

	MINIMUM		STANDARD		MAXIMUM	
	1 Lane Per Direction		1 Lane Per Direction		1 Lane Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	60	60	60	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	11700	14100	14000	16900	15300	18500

	MINIMUM		STANDARD		MAXIMUM	
	2 Lanes Per Direction		2 Lanes Per Direction		2 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	60	60	60	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	23400	28500	28100	34300	30700	37400

	MINIMUM		STANDARD		MAXIMUM	
	3 Lanes Per Direction		3 Lanes Per Direction		3 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	60	60	60	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	35200	42900	42200	51700	46000	56400

* PASII = Principal Arterial - Suburban (II)

* PAUIV = Principal Arterial - Urban (IV)

Appendix C2: Coastal Boulevard Inputs - 25 MPH

	MINIMUM	STANDARD	MAXIMUM
	1 Lane Per Direction	1 Lane Per Direction	1 Lane Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	10300	12500	13600

	MINIMUM	STANDARD	MAXIMUM
	2 Lanes Per Direction	2 Lanes Per Direction	2 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	21100	25400	27700

	MINIMUM	STANDARD	MAXIMUM
	3 Lanes Per Direction	3 Lanes Per Direction	3 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	31900	38400	41900

* PAUIV = Principal Arterial - Urban (IV)

Appendix C3: Piedmont Boulevard Inputs - 55 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	16600	16800	18800	19900	20200	22600	21600	21900	24500

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	33300	33700	37700	40000	40500	45200	43300	43900	49000

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	50000	50600	56600	59900	60700	67900	64900	65800	73500

* PAHSI = Principal Arterial - High Speed (I)

Appendix C3: Piedmont Boulevard Inputs - 45 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	14500	15200	16000	17500	18300	21800	18900	19800	23600

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	29300	30500	32000	35100	36600	43600	38100	39700	47200

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	12	10	10	10	10	10	10
D Factor	65	65	65	65	65	65	60	60	60
Arrival Type	3	4	4	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	1.5	1	3	1.5	0.5	3	1.5	0.5
Maximum AADT	44000	45800	48100	52800	55000	65400	57200	59600	70800

* PAHSI = Principal Arterial - High Speed (I)

* PASII = Principal Arterial - Suburban (II)

Appendix C3: Piedmont Boulevard Input - 35 MPH

	MINIMUM		STANDARD		MAXIMUM	
	1 Lane Per Direction		1 Lane Per Direction		1 Lane Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	65	60	65	55	60
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	11700	13000	14000	15600	15300	16900

	MINIMUM		STANDARD		MAXIMUM	
	2 Lanes Per Direction		2 Lanes Per Direction		2 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	65	60	65	55	60
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	23400	26300	28100	31600	30700	34300

	MINIMUM		STANDARD		MAXIMUM	
	3 Lanes Per Direction		3 Lanes Per Direction		3 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	10
D Factor	60	65	60	65	55	60
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	35200	39600	42200	47700	46000	51700

* PASII = Principal Arterial - Suburban (II)

* PAUIV = Principal Arterial - Urban (IV)

Appendix C3: Piedmont Boulevard Input - 25 MPH

	MINIMUM	STANDARD	MAXIMUM
	1 Lane Per Direction	1 Lane Per Direction	1 Lane Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	10300	12500	13600

	MINIMUM	STANDARD	MAXIMUM
	2 Lanes Per Direction	2 Lanes Per Direction	2 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	21100	25400	27700

	MINIMUM	STANDARD	MAXIMUM
	3 Lanes Per Direction	3 Lanes Per Direction	3 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	31900	38400	41900

* PAUIV = Principal Arterial - Urban (IV)

Appendix C4: Mountain Boulevard Inputs - 55 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	10	11
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	18000	18300	18800	21600	21900	22300	23600	23900	24300

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	10	11
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	36100	36500	37700	43300	43900	44500	47200	47800	48600

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	I	I	I	I	I	I	I	I	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	10	11
D Factor	60	60	60	60	60	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	15	10	10	15	10	10	15	10	10
Cycle Length	200	200	200	200	200	200	200	200	200
g/C Ratio	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
FFS	55	55	55	55	55	55	55	55	55
Total Segment Length	3	3	3	3	3	3	3	3	3
Signals Per Mile	1.5	1	0.5	1.5	1	0.5	1.5	1	0.5
Maximum AADT	54100	54800	56600	64900	65800	66800	70800	71700	72900

* PAHSI = Principal Arterial - High Speed (I)

Appendix C4: Mountain Boulevard Inputs - 45 MPH

	MINIMUM			STANDARD			MAXIMUM		
	1 Lane Per Direction			1 Lane Per Direction			1 Lane Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	9	11
D Factor	60	55	60	60	55	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	2	1	3	2	0.5	3	2	0.5
Maximum AADT	15700	17200	16700	18900	20700	21400	20600	23000	23400

	MINIMUM			STANDARD			MAXIMUM		
	2 Lanes Per Direction			2 Lanes Per Direction			2 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	9	11
D Factor	60	55	60	60	55	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	2	1	3	2	0.5	3	2	0.5
Maximum AADT	31700	34500	33500	38100	41400	42900	41500	46000	46800

	MINIMUM			STANDARD			MAXIMUM		
	3 Lanes Per Direction			3 Lanes Per Direction			3 Lanes Per Direction		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Arterial Type*	PASII	PASII	PAHSI	PASII	PASII	PAHSI	PASII	PASII	PAHSI
LOS	D	D	D	D	D	D	D	D	D
Street Class	II	II	I	II	II	I	II	II	I
PHF	0.92	0.9	0.88	0.92	0.9	0.88	0.92	0.9	0.88
Driver Pop Factor	1	1	1	1	1	1	1	1	1
K Factor	12	12	13	10	10	11	10	9	11
D Factor	60	55	60	60	55	60	55	55	55
Arrival Type	3	4	5	3	4	5	3	4	5
Left Turn %	20	15	10	20	15	10	20	15	10
Cycle Length	150	150	200	150	150	200	150	150	200
g/C Ratio	0.55	0.55	0.6	0.55	0.55	0.6	0.55	0.55	0.6
FFS	45	45	45	45	45	45	45	45	45
Total Segment Length	2	2	3	2	2	3	2	2	3
Signals Per Mile	3	2	1	3	2	0.5	3	2	0.5
Maximum AADT	47600	51700	50200	57200	62100	64400	62400	69100	70200

* PAHSI = Principal Arterial - High Speed (I)

* PASII = Principal Arterial - Suburban (II)

Appendix C4: Mountain Boulevard Inputs - 35 MPH

	MINIMUM		STANDARD		MAXIMUM	
	1 Lane Per Direction		1 Lane Per Direction		1 Lane Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	9
D Factor	60	55	60	55	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	11700	15300	14000	18500	15300	20600

	MINIMUM		STANDARD		MAXIMUM	
	2 Lanes Per Direction		2 Lanes Per Direction		2 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	9
D Factor	60	55	60	55	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	23400	31100	28100	37400	30700	41600

	MINIMUM		STANDARD		MAXIMUM	
	3 Lanes Per Direction		3 Lanes Per Direction		3 Lanes Per Direction	
	Urban	Suburban	Urban	Suburban	Urban	Suburban
Arterial Type*	PAUIV	PASII	PAUIV	PASII	PAUIV	PASII
LOS	D	D	D	D	D	D
Street Class	IV	II	IV	II	IV	II
PHF	0.92	0.9	0.92	0.9	0.92	0.9
Driver Pop Factor	1	1	1	1	1	1
K Factor	12	12	10	10	10	9
D Factor	60	55	60	55	55	55
Arrival Type	4	3	4	3	4	3
Left Turn %	20	15	20	15	20	15
Cycle Length	120	150	120	150	120	150
g/C Ratio	0.42	0.55	0.42	0.55	0.42	0.55
FFS	35	35	35	35	35	35
Total Segment Length	1	2	1	2	1	2
Signals Per Mile	6	3	6	3	6	3
Maximum AADT	35200	46800	42200	56400	46000	62700

* PASII = Principal Arterial - Suburban (II)

* PAUIV = Principal Arterial - Urban (IV)

Appendix C4: Mountains Boulevard Inputs - 25 MPH

	MINIMUM	STANDARD	MAXIMUM
	1 Lane Per Direction	1 Lane Per Direction	1 Lane Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	10300	12500	13600

	MINIMUM	STANDARD	MAXIMUM
	2 Lanes Per Direction	2 Lanes Per Direction	2 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	21100	25400	27700

	MINIMUM	STANDARD	MAXIMUM
	3 Lanes Per Direction	3 Lanes Per Direction	3 Lanes Per Direction
	Urban	Urban	Urban
Arterial Type*	PAUIV	PAUIV	PAUIV
LOS	D	D	D
Street Class	IV	IV	IV
PHF	0.92	0.92	0.92
Driver Pop Factor	1	1	1
K Factor	12	10	10
D Factor	60	60	55
Arrival Type	4	4	4
Left Turn %	20	20	20
Cycle Length	120	120	120
g/C Ratio	0.42	0.42	0.42
FFS	30	30	30
Total Segment Length	1	1	1
Signals Per Mile	8	8	8
Maximum AADT	31900	38400	41900

* PAUIV = Principal Arterial - Urban (IV)