ATTACHMENT NO. 1

DESIGN CRITERIA TABLE

CREEKSIDE TOWN CENTER ROAD IMPROVEMENTS
DESIGN CRITERIA TABLE

ELEMENT	VALUE	SOURCE
Functional Classification - Muldoon Road - 16th Avenue/Creekside Parkway	Class III Major Arterial National Highway System Collector	OSHP (page 8-11) and MOA- DCM (page 6-19)
Number of Lanes/Roadways - Muldoon Road - 16th Avenue/Creekside Parkway	5/1 2/1	N/A
Present Year ADT (2004) - Muldoon Road - Creekside Parkway - 16th Avenue	31,930 N/A 300	ADOT&PF Central Region Traffic Report and 0.5% growth rate for Muldoon Road and a 1.0% growth rate for 16th Avenue/Creekside Parkway
Mid-Period ADT (2014) - Muldoon Road - Creekside Parkway - 16th Avenue	33,560 4,500 340	
Design Year ADT (2024) - Muldoon Road - Creekside Parkway - 16th Avenue	35,280 4,970 380	
Design Hourly Volume (DHV)/Directional Split	10% of ADT/50:50	AASHTO (pages 58-62)
Trucks (%T)	2%	DOWL (study), HCM (Exhibit 12-14)
10-Year Design ESAL (2014) - Muldoon Road - Creekside Parkway - 16th Avenue	1,270,000 170,000 12,700	HPM (Section 1180, pages 22-24)
Pavement Design Year - Creekside Parkway	2014	DOWL
Design Vehicle	WB-50	AASHTO (pages 15-46)
Design Speed (Posted Speed) - Muldoon Road - 16th Avenue/Creekside Parkway	45 mph (40 mph) 35 mph (30 mph)	AASHTO (page 67), MOA-DCM (Figure 1-17), and DOWL (Study)
Stopping Sight Distance - Muldoon Road - 16th Avenue/Creekside Parkway	305 feet 200 feet	AASHTO (Exhibit 3-1)
Maximum Grade Minimum Grade	5.0% 0.5%	AASHTO (Exhibit 7-2)
Minimum K-Value for Vertical Curves (crest/sag) - Muldoon Road - 16th Avenue/Creekside Parkway	120/90 50/50	AASHTO (Exhibits 3-76, 3-79)
Minimum Left-Turn Lane Storage Length - Muldoon Road	150 feet	MOA-DCM (page 1-36) DOWL (Synchro)
Minimum Taper Ratio	8:1 Add lane; speed limit :1 drop lane	MOA, AASHTO (pages 719 and 720)
Width of Shoulders	Urban Section/None to 4.0 feet	MOA-DEM (page 1-36) DOWL (Synchro)
Lane width	10 feet minimum, 11 feet typical	MOA- DEM
Surfacing, Lanes	AC Pavement	N/A
Side Slope Ratios	3:1 or flatter	N/A
Median Treatment	Concrete (<8-foot width) Landscape (≥8-foot width)	MOA-Title 21
Curb and Gutter	Types 1 through 6	MOA-DCM (Figure 1-25)
Curb Return Radii - Collector intersecting an arterial - Collector street intersecting a Collector Street	40 feet 30 feet	MOA-DCM, (page 1-54) HPM (pages 4-15) and DOWL
Pedestrian Provisions - Sidewalk Width - Multi-use Trail - Maximum Cross Slope - Minimum Vertical Clearance - Minimum Curb Ramp Landing Width	5.0 feet min. 8 feet min. 2% 8.0 feet 5.0 feet	MOA-DCM (page 4-19) and ADAAG
Roadway Cross Slope	2%	MOA-DCM (Page 1-40) hpm (Section 1130)

Designer/Consultant: DOWL Engineers

Proposed by: _____ Date: _____
Steven K. Noble, P.E., PTOE
Project Manager, DOWL Engineers

Recommended by: _____ Date: _____
Jerry Hansen, Project Manager
Project Management & Engineering

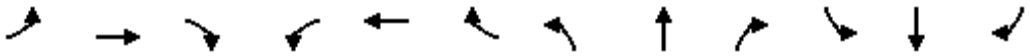
Accepted by: _____ Date: _____
Howard Holtan, P.E., Director
Project Management & Engineering

ATTACHMENT NO. 2, PUBLIC CORRESPONDENCE, IS NOT AVAILABLE ONLINE. PLEASE CONTACT BILL COGHILL AT DOWL ENGINEERS WITH ANY QUESTIONS YOU MAY HAVE.
(907 562-2000)

ATTACHMENT NO. 3

TRAFFIC ANALYSIS WORKSHEETS

(SUPPLEMENTAL TO THE CONCEPT LEVEL TRAFFIC STUDY TRAFFIC ANALYSIS WORKSHEETS [DOWL 2003])



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
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	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1643	1446		1643	1533		1643	3283		1643	3280	
Flt Permitted	0.48	1.00		0.65	1.00		0.07	1.00		0.05	1.00	
Satd. Flow (perm)	828	1446		1115	1533		121	3283		91	3280	
Volume (vph)	49	4	145	8	4	9	192	2283	10	7	1834	15
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	4	145	8	4	9	192	2283	10	7	1834	15
RTOR Reduction (vph)	0	136	0	0	9	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	13	0	8	4	0	192	2293	0	7	1849	0
Confl. Peds. (#/hr)			3			1	5		1	1		1
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	14.0	9.7		7.0	6.2		137.0	131.9		117.3	116.2	
Effective Green, g (s)	14.0	9.7		7.0	6.2		137.5	132.4		117.8	116.7	
Actuated g/C Ratio	0.09	0.06		0.04	0.04		0.86	0.83		0.74	0.73	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	94	88		51	59		264	2717		78	2392	
v/s Ratio Prot	c0.01	c0.10		0.00	0.01		c0.08	c0.70		0.00	0.56	
v/s Ratio Perm	0.03			0.01			0.55			0.07		
v/c Ratio	0.52	0.15		0.16	0.07		0.73	0.84		0.09	0.77	
Uniform Delay, d1	68.8	71.2		73.6	74.1		38.6	7.9		10.0	13.4	
Progression Factor	1.00	1.00		1.00	1.00		0.81	1.53		0.39	0.58	
Incremental Delay, d2	5.1	0.8		1.4	0.5		3.2	1.1		0.2	1.2	
Delay (s)	74.0	72.0		75.1	74.7		34.7	13.2		4.2	9.1	
Level of Service	E	E		E	E		C	B		A	A	
Approach Delay (s)		72.5			74.8			14.9			9.0	
Approach LOS		E			E			B			A	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.4	14.2	27.6	0.12	15.2	E
E20th AVE	II	40	37.1	23.0	60.1	0.39	23.1	C
Creekside Boulevard	II	40	30.0	12.0	42.0	0.29	25.2	C
Debarr	II	40	23.1	27.4	50.5	0.20	14.3	E
E. 11th Ave	II	40	22.6	65.1	87.7	0.20	8.1	F
E6th Ave	II	40	31.0	36.7	67.7	0.30	16.2	E
Duben	II	40	27.9	22.4	50.3	0.25	18.2	D
Total	II		185.1	200.8	385.9	1.75	16.4	E

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	11.3	39.2	0.25	23.3	C
E. 11th Ave	II	40	31.0	10.4	41.4	0.30	26.4	C
Debarr	II	40	22.6	37.1	59.7	0.20	11.9	F
Creekside Boulevard	II	40	23.1	9.4	32.5	0.20	22.2	C
Chester Pk Dr	II	40	30.0	3.6	33.6	0.29	31.6	B
Carrs	II	40	37.1	5.4	42.5	0.39	32.7	B
N.L. Blvd	II	40	13.4	6.6	20.0	0.12	21.0	D
Total	II		185.1	83.8	268.9	1.75	23.5	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
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	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1643	1478		1643	1556		1643	3283		1643	3281	
Flt Permitted	0.55	1.00		0.63	1.00		0.06	1.00		0.04	1.00	
Satd. Flow (perm)	947	1478		1098	1556		98	3283		73	3281	
Volume (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
RTOR Reduction (vph)	0	148	0	0	10	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	13	0	9	5	0	194	2411	0	7	1944	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	12.5	8.6		7.9	6.3		137.8	133.0		116.6	115.8	
Effective Green, g (s)	12.5	8.6		7.9	6.3		137.8	133.0		116.6	115.8	
Actuated g/C Ratio	0.08	0.05		0.05	0.04		0.86	0.83		0.73	0.72	
Clearance Time (s)	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	
Lane Grp Cap (vph)	91	79		60	61		258	2729		61	2375	
v/s Ratio Prot	c0.01	c0.11		0.00	0.01		c0.08	c0.73		0.00	0.59	
v/s Ratio Perm	0.03			0.01			0.56			0.08		
v/c Ratio	0.54	0.17		0.15	0.09		0.75	0.88		0.11	0.82	
Uniform Delay, d1	70.4	72.3		72.8	74.1		45.8	8.6		12.1	15.0	
Progression Factor	1.00	1.00		1.00	1.00		0.76	1.29		0.53	0.50	
Incremental Delay, d2	6.0	1.0		1.2	0.6		1.1	0.4		0.3	1.2	
Delay (s)	76.4	73.3		74.0	74.7		35.7	11.5		6.7	8.7	
Level of Service	E	E		E	E		D	B		A	A	
Approach Delay (s)		74.0			74.4			13.4			8.7	
Approach LOS		E			E			B			A	

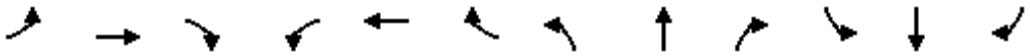
Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
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	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654	1470		1675	1470	1643	3283		1643	3281	
Flt Permitted		0.74	1.00		0.84	1.00	0.06	1.00		0.04	1.00	
Satd. Flow (perm)		1272	1470		1444	1470	107	3283		78	3281	
Volume (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
RTOR Reduction (vph)	0	0	134	0	0	9	0	0	0	0	0	0
Lane Group Flow (vph)	0	54	22	0	14	1	194	2411	0	7	1944	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4	2			6		
Actuated Green, G (s)		11.7	11.7		11.7	11.7	139.8	134.5		119.6	118.8	
Effective Green, g (s)		11.7	11.7		11.7	11.7	140.3	135.0		120.6	119.3	
Actuated g/C Ratio		0.07	0.07		0.07	0.07	0.88	0.84		0.75	0.75	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		93	107		106	107	257	2770		72	2446	
v/s Ratio Prot							c0.08	c0.73		0.00	0.59	
v/s Ratio Perm		0.04	0.11		0.01	0.01	0.58			0.07		
v/c Ratio		0.58	0.20		0.13	0.01	0.75	0.87		0.10	0.79	
Uniform Delay, d1		71.8	69.8		69.4	68.8	42.9	7.4		10.2	12.7	
Progression Factor		1.00	1.00		1.00	1.00	0.87	0.99		0.46	0.40	
Incremental Delay, d2		8.9	0.9		0.6	0.0	1.2	0.4		0.2	1.0	
Delay (s)		80.7	70.7		70.0	68.8	38.6	7.7		4.9	6.1	
Level of Service		F	E		E	E	D	A		A	A	
Approach Delay (s)		73.3			69.5			10.0			6.1	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
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	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.90		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1643	1478		1643	1556		1643	3283		1643	3281	
Flt Permitted	0.95	1.00		0.95	1.00		0.06	1.00		0.04	1.00	
Satd. Flow (perm)	1643	1478		1643	1556		97	3283		73	3281	
Volume (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	5	156	9	5	10	194	2401	10	7	1929	15
RTOR Reduction (vph)	0	148	0	0	10	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	13	0	9	5	0	194	2411	0	7	1944	0
Turn Type	Prot			Prot			pm+pt			pm+pt		
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)	5.4	8.7		1.6	4.9		137.7	132.9		116.4	115.6	
Effective Green, g (s)	5.4	8.7		1.6	4.9		137.7	132.9		116.4	115.6	
Actuated g/C Ratio	0.03	0.05		0.01	0.03		0.86	0.83		0.73	0.72	
Clearance Time (s)	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	
Lane Grp Cap (vph)	55	80		16	48		258	2727		61	2371	
v/s Ratio Prot	c0.03	c0.11		0.01	0.01		c0.08	c0.73		0.00	0.59	
v/s Ratio Perm							0.56			0.08		
v/c Ratio	0.89	0.17		0.56	0.11		0.75	0.88		0.11	0.82	
Uniform Delay, d1	77.0	72.2		78.9	75.4		45.9	8.6		12.2	15.1	
Progression Factor	1.00	1.00		1.00	1.00		0.76	1.31		0.58	0.51	
Incremental Delay, d2	82.3	1.0		38.3	1.0		1.1	0.4		0.3	1.2	
Delay (s)	159.3	73.2		117.1	76.5		36.1	11.8		7.3	8.9	
Level of Service	F	E		F	E		D	B		A	A	
Approach Delay (s)		93.3			91.7			13.6			8.9	
Approach LOS		F			F			B			A	

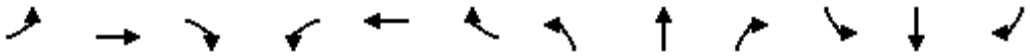
Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



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	200	0	0	24	194	2401	0	0	1929	15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	200	0	0	24	194	2401	0	0	1929	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											1060	
pX, platoon unblocked	0.58	0.58	0.58	0.58	0.58		0.58					
vC, conflicting volume	3549	4726	972	3954	4733	1200	1944			2401		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	4670	6698	228	5368	6711	1200	1903			2401		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)							3.2			3.2		
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	100	100	55	100	100	86	67			100		
cM capacity (veh/h)	0	0	441	0	0	170	596			601		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	200	24	194	1601	800	0	1286	658
Volume Left	0	0	194	0	0	0	0	0
Volume Right	200	24	0	0	0	0	0	15
cSH	441	170	596	1700	1700	1700	1700	1700
Volume to Capacity	0.45	0.14	0.33	0.94	0.47	0.00	0.76	0.39
Queue Length (ft)	58	12	35	0	0	0	0	0
Control Delay (s)	19.8	29.6	13.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	D	B					
Approach Delay (s)	19.8	29.6	1.0			0.0		
Approach LOS	C	D						

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	78.2%	ICU Level of Service	D	
Analysis Period (min)	15			



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)	46	5	156	9	4	10	194	2401	0	0	1929	15
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	46	5	156	9	4	10	194	2401	0	0	1929	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											1060	
pX, platoon unblocked	0.58	0.58	0.58	0.58	0.58		0.58					
vC, conflicting volume	3537	4726	972	3912	4733	1200	1944			2401		
vC1, stage 1 conf vol							0			0		
vC2, stage 2 conf vol							0			0		
vCu, unblocked vol	4650	6698	228	5296	6711	1200	1903			2401		
tC, single (s)	7.6	6.6	7.0	7.6	6.6	7.0	4.2			4.2		
tC, 2 stage (s)							3.2			3.2		
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
p0 queue free %	0	0	65	0	0	94	67			100		
cM capacity (veh/h)	0	0	441	0	0	170	596			601		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	51	156	13	10	194	1601	800	0	1286	658
Volume Left	46	0	9	0	194	0	0	0	0	0
Volume Right	0	156	0	10	0	0	0	0	0	15
cSH	0	441	0	170	596	1700	1700	1700	1700	1700
Volume to Capacity	Err	0.35	Err	0.06	0.33	0.94	0.47	0.00	0.76	0.39
Queue Length (ft)	Err	39	Err	5	35	0	0	0	0	0
Control Delay (s)	Err	17.6	Err	27.5	13.9	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	C	F	D	B					
Approach Delay (s)	Err		Err		1.0			0.0		
Approach LOS	F		F							

Intersection Summary				
Average Delay		Err		
Intersection Capacity Utilization	91.1%	ICU Level of Service		F
Analysis Period (min)	15			

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.8	17.0	30.8	0.12	14.1	E
E20th AVE	II	40	37.1	63.1	100.2	0.39	13.9	E
E 16th Ave	II	40	30.0	10.7	40.7	0.29	26.0	C
Debarr	II	40	23.1	29.1	52.2	0.20	13.8	E
E 11th Ave.	II	40	22.6	90.5	113.1	0.20	6.3	F
E6th Ave	II	40	31.9	84.2	116.1	0.31	9.7	F
Duben	II	40	27.9	24.6	52.5	0.25	17.4	D
Total	II		186.4	319.2	505.6	1.77	12.6	F

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	15.1	43.0	0.25	21.2	D
E 11th Ave.	II	40	31.9	12.3	44.2	0.31	25.5	C
Debarr	II	40	22.6	39.9	62.5	0.20	11.3	F
E 16th Ave	II	40	23.1	9.5	32.6	0.20	22.2	C
Chester Pk Dr	II	40	30.0	3.9	33.9	0.29	31.3	B
Carrs	II	40	37.1	6.6	43.7	0.39	31.8	B
N.L. Blvd	II	40	13.8	8.3	22.1	0.12	19.6	D
Total	II		186.4	95.6	282.0	1.77	22.5	C

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.8	17.0	30.8	0.12	14.1	E
E20th AVE	II	40	37.1	63.1	100.2	0.39	13.9	E
E 16th Ave	II	40	30.0	7.6	37.6	0.29	28.2	B
Debarr	II	40	23.1	30.8	53.9	0.20	13.4	E
E 11th Ave.	II	40	22.6	90.6	113.2	0.20	6.3	F
E6th Ave	II	40	31.9	84.2	116.1	0.31	9.7	F
Duben	II	40	27.9	24.6	52.5	0.25	17.4	D
Total	II		186.4	317.9	504.3	1.77	12.6	F

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	15.1	43.0	0.25	21.2	D
E 11th Ave.	II	40	31.9	12.3	44.2	0.31	25.5	C
Debarr	II	40	22.6	39.9	62.5	0.20	11.3	F
E 16th Ave	II	40	23.1	6.7	29.8	0.20	24.3	C
Chester Pk Dr	II	40	30.0	5.0	35.0	0.29	30.3	B
Carrs	II	40	37.1	7.7	44.8	0.39	31.0	B
N.L. Blvd	II	40	13.8	8.3	22.1	0.12	19.6	D
Total	II		186.4	95.0	281.4	1.77	22.6	C

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.8	17.0	30.8	0.12	14.1	E
E20th AVE	II	40	37.1	63.1	100.2	0.39	13.9	E
E 16th Ave	II	40	30.0	11.0	41.0	0.29	25.9	C
Debarr	II	40	23.1	28.9	52.0	0.20	13.9	E
E 11th Ave.	II	40	22.6	90.6	113.2	0.20	6.3	F
E6th Ave	II	40	31.9	84.2	116.1	0.31	9.7	F
Duben	II	40	27.9	24.6	52.5	0.25	17.4	D
Total	II		186.4	319.4	505.8	1.77	12.6	F

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	15.1	43.0	0.25	21.2	D
E 11th Ave.	II	40	31.9	12.3	44.2	0.31	25.5	C
Debarr	II	40	22.6	39.9	62.5	0.20	11.3	F
E 16th Ave	II	40	23.1	9.7	32.8	0.20	22.0	C
Chester Pk Dr	II	40	30.0	4.1	34.1	0.29	31.1	B
Carrs	II	40	37.1	6.4	43.5	0.39	32.0	B
N.L. Blvd	II	40	13.8	8.3	22.1	0.12	19.6	D
Total	II		186.4	95.8	282.2	1.77	22.5	C

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.8	17.0	30.8	0.12	14.1	E
E20th AVE	II	40	37.1	63.1	100.2	0.39	13.9	E
Debarr	II	40	46.1	33.2	79.3	0.50	22.5	C
E 11th Ave.	II	40	22.6	90.6	113.2	0.20	6.3	F
E6th Ave	II	40	31.9	84.2	116.1	0.31	9.7	F
Duben	II	40	27.9	24.6	52.5	0.25	17.4	D
Total	II		179.4	312.7	492.1	1.77	12.9	F

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	15.1	43.0	0.25	21.2	D
E 11th Ave.	II	40	31.9	12.3	44.2	0.31	25.5	C
Debarr	II	40	22.6	39.9	62.5	0.20	11.3	F
Chester Pk Dr	II	40	46.1	8.5	54.6	0.50	32.7	B
Carrs	II	40	37.1	8.3	45.4	0.39	30.6	B
N.L. Blvd	II	40	13.8	8.2	22.0	0.12	19.7	D
Total	II		179.4	92.3	271.7	1.77	23.4	C

Arterial Level of Service: NB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Carrs	II	40	13.8	17.0	30.8	0.12	14.1	E
E20th AVE	II	40	37.1	63.1	100.2	0.39	13.9	E
Debarr	II	40	46.1	33.2	79.3	0.50	22.5	C
E 11th Ave.	II	40	22.6	90.6	113.2	0.20	6.3	F
E6th Ave	II	40	31.9	84.2	116.1	0.31	9.7	F
Duben	II	40	27.9	24.6	52.5	0.25	17.4	D
Total	II		179.4	312.7	492.1	1.77	12.9	F

Arterial Level of Service: SB Muldoon#9

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
E6th Ave	II	40	27.9	15.1	43.0	0.25	21.2	D
E 11th Ave.	II	40	31.9	12.3	44.2	0.31	25.5	C
Debarr	II	40	22.6	39.9	62.5	0.20	11.3	F
Chester Pk Dr	II	40	46.1	8.6	54.7	0.50	32.6	B
Carrs	II	40	37.1	8.4	45.5	0.39	30.6	B
N.L. Blvd	II	40	13.8	8.2	22.0	0.12	19.7	D
Total	II		179.4	92.5	271.9	1.77	23.4	C

Intersection	Downhill Approach	Grade @ Stop Bar	Grade 150' from Stop Bar	Grade 300' from Stop Bar	Grade 450' from Stop Bar	AADT	Average # of Crashes per year	MOA Published Crash Rate (1999-2002)	MOA Average Crash Rate	Statewide ADOT Ave. Crash Rate
Tudor/Baxter	WB	4.3%	4.3%	4.3%	4.3%	30,175	12	1.11	1.17	1.64
Northern Lights/Patterson	WB					19,300	6	0.85	0.96	1.64
Boniface/Emmanuel (34th)	NB	2.6%	5.0%	5.0%	5.0%	17,125	2	0.32	0.92	1.64
Muldoon/Northern Lights	NB	1.9%	1.9%	1.9%	1.9%	34,550	16	1.27	1.22	1.32
Tudor/Boniface	EB	1.9%	1.6%	1.3%	1.0%	37,800	19	1.36	1.25	1.32
Totals/Average		**2.7%**	**3.2%**	**3.1%**	**3.1%**	**34,738**	**14**	**1.08**	**1.38**	**1.89**
Boniface/24th Ave	SB	Approximately Level Approach				23,350	7	0.77	1.04	1.64
Muldoon/6th Ave	NB	Approximately Level Approach				36,400	13	1.01	1.25	1.64
Muldoon/Duben	NB	Approximately Level Approach				33,300	9	0.71	1.21	1.64
Tudor/Tudor Center Rd	WB	Approximately Level Approach				44,675	15	0.94	1.22	1.32
Totals/Average							**7**	**0.86**	**1.18**	**1.56**
Muldoon/16th Ave	NB	0.5%	2.0%	3.7%	5.2%	33,000				

Intersection	Total Crashes on Downhill Approach			Type of Crashes Caused By Down Hill						Poor Weather Conditions (Snow/Ice, Wet & Rain)		Pavement Cond Skidding/Out of Cntrl	
				Rear		Angle		Other					
	Involving	Caused By	%	#	%	#	%	#	%	#	%	#	%
Tudor/Baxter	24	13	54%	6	46%	4	31%	3	23%	7	54%	4	31%
Northern Lights/Patterson	9	4	44%	3	75%	1	25%	0	0%	3	75%	3	75%
Boniface/Emmanuel (34th)	4	3	75%	2	67%	1	33%	0	0%	3	100%	1	33%
Muldoon/Northern Lights	28	25	89%	8	32%	13	52%	4	16%	16	64%	7	28%
Tudor/Boniface	23	17	74%	15	88%	1	6%	1	6%	5	29%	3	18%
Totals/Average	**88**	**62**	**70%**	**34**	**55%**	**20**	**32%**	**8**	**13%**	**34**	**55%**	**18**	**29%**
Boniface/24th Ave	15	13	87%	6	46%	4	31%	4	31%	10	77%	4	31%
Muldoon/6th Ave	28	22	79%	10	45%	10	45%	2	9%	13	59%	2	9%
Muldoon/Duben	19	14	74%	3	21%	8	57%	3	21%	10	71%	3	21%
Tudor/Tudor Center Rd	34	27	79%	17	63%	6	22%	4	15%	14	52%	4	15%
Totals/Average	**96**	**76**	**79%**	**36**	**47%**	**28**	**37%**	**13**	**17%**	**47**	**62%**	**13**	**17%**
Muldoon/16th Ave													

ATTACHMENT NO. 4

UNDER SEPARATE COVER