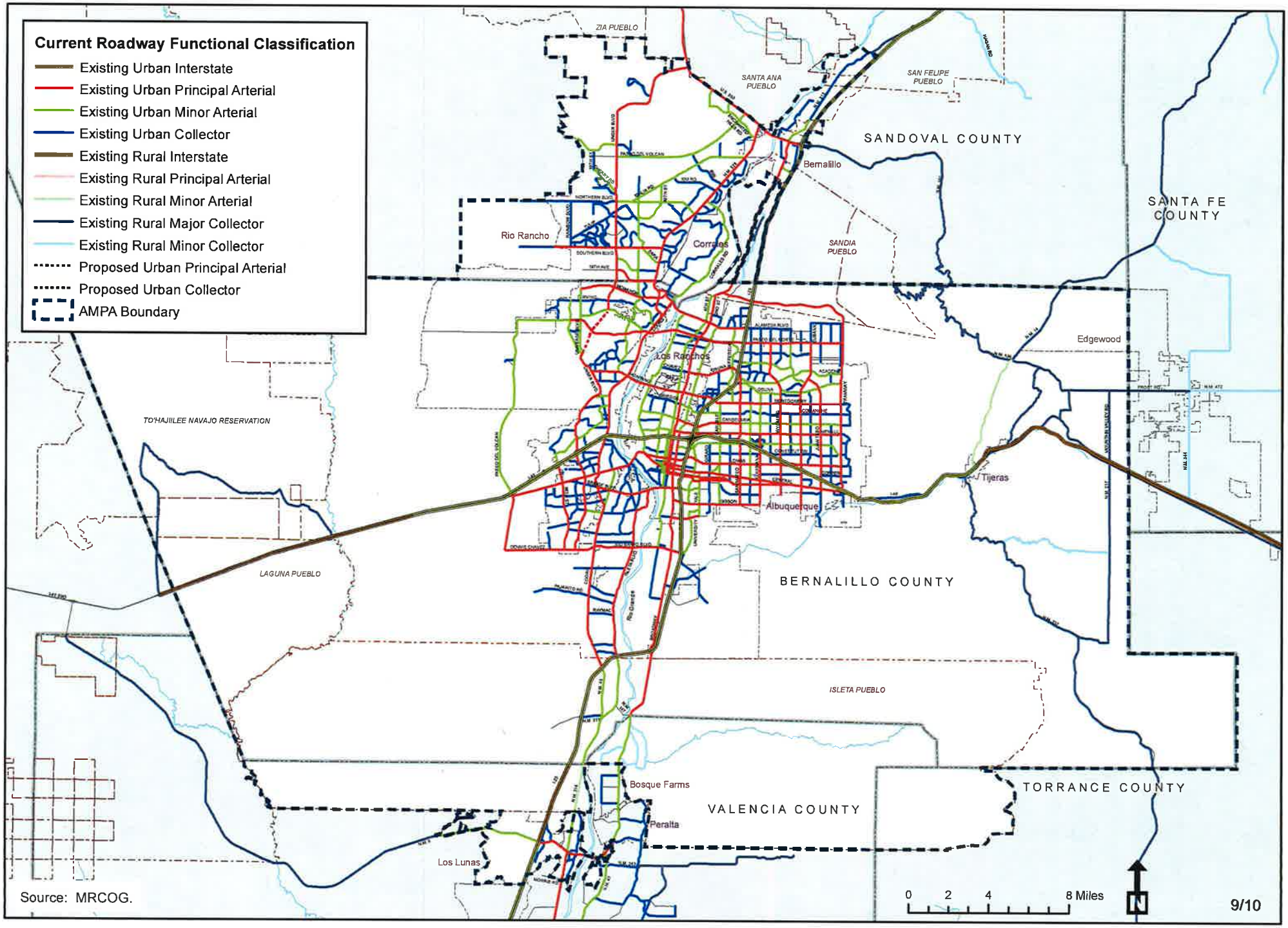
APPENDIX A

MAP OF CURRENT ROADWAY FUNCTIONAL CLASSIFICATION (MRCOG)



Source: MRCOG.

APPENDIX B

2015 AND 2035 FORECAST TRAFFIC VOLUMES (AM, PM, DAILY) (MRCOG)

2015 No Build
Sunport Boulevard and I-25
Traffic Volumes

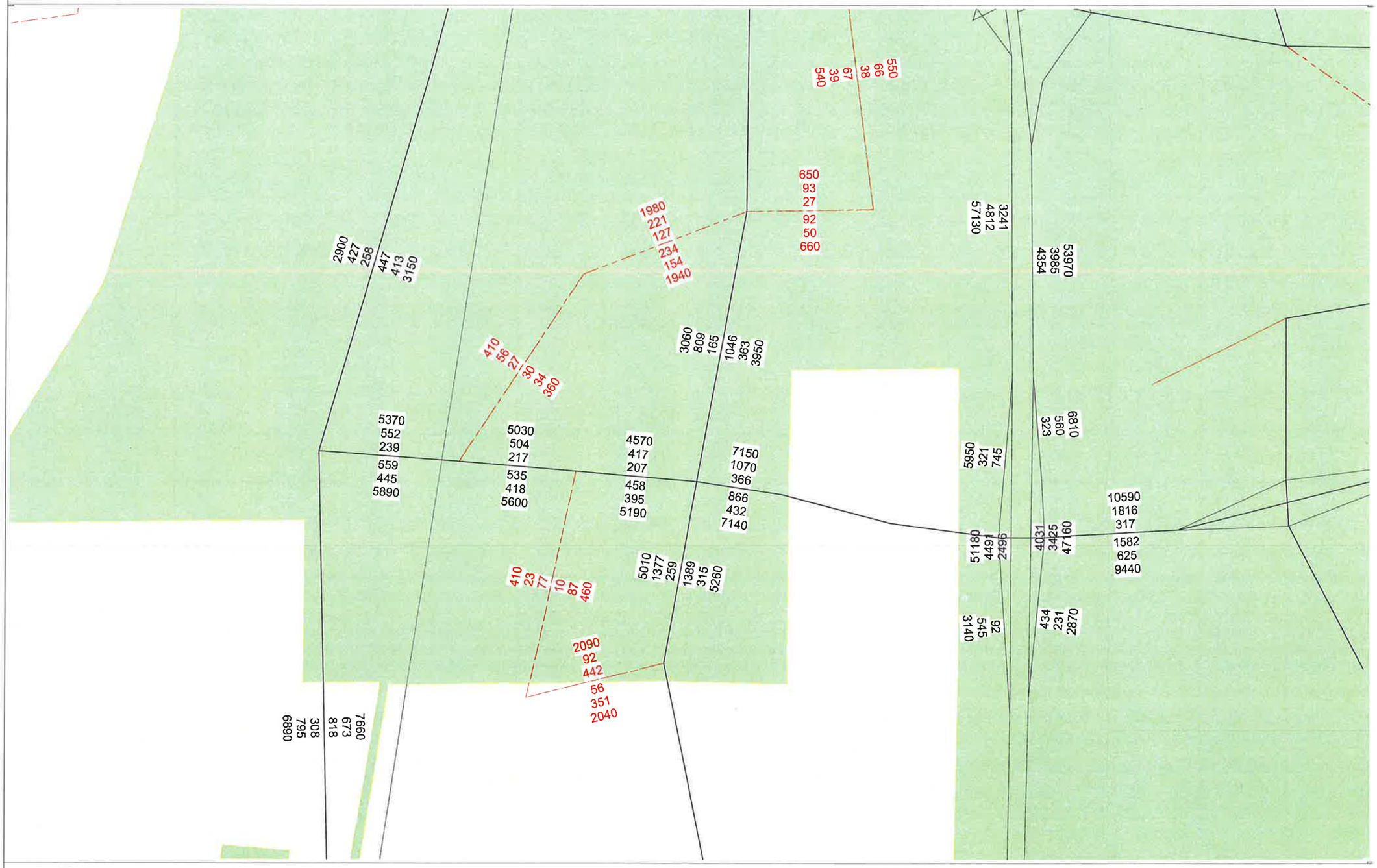
2015 No Build [Peak Hour AM (PM)]

- Nodes
- Principal
- Minor
- Collector
- Local
- Frontage
- Freeway
- On Ramp
- Off Ramp
- LAPA
- Minor Collector
- Principal Arterial
- Minor Arterial
- Major Collector
- Local
- Interstate Frontage
- Interstate
- On Ramp
- Off Ramp
- 21
- 22
- 50
- 99

Source: Mid Region Council of Governments (MRCOG)

0 0.125 0.25 0.5 Miles

2035 MTP Dataset, Raw Model Output
Year 2015
AM Pk Hr, PM Pk Hr, and Daily Volumes
AM stat closest to link



cube

Licensed to Mid-Region Council of Governments

2035 No Build
Sunport Boulevard and I-25
Traffic Volumes

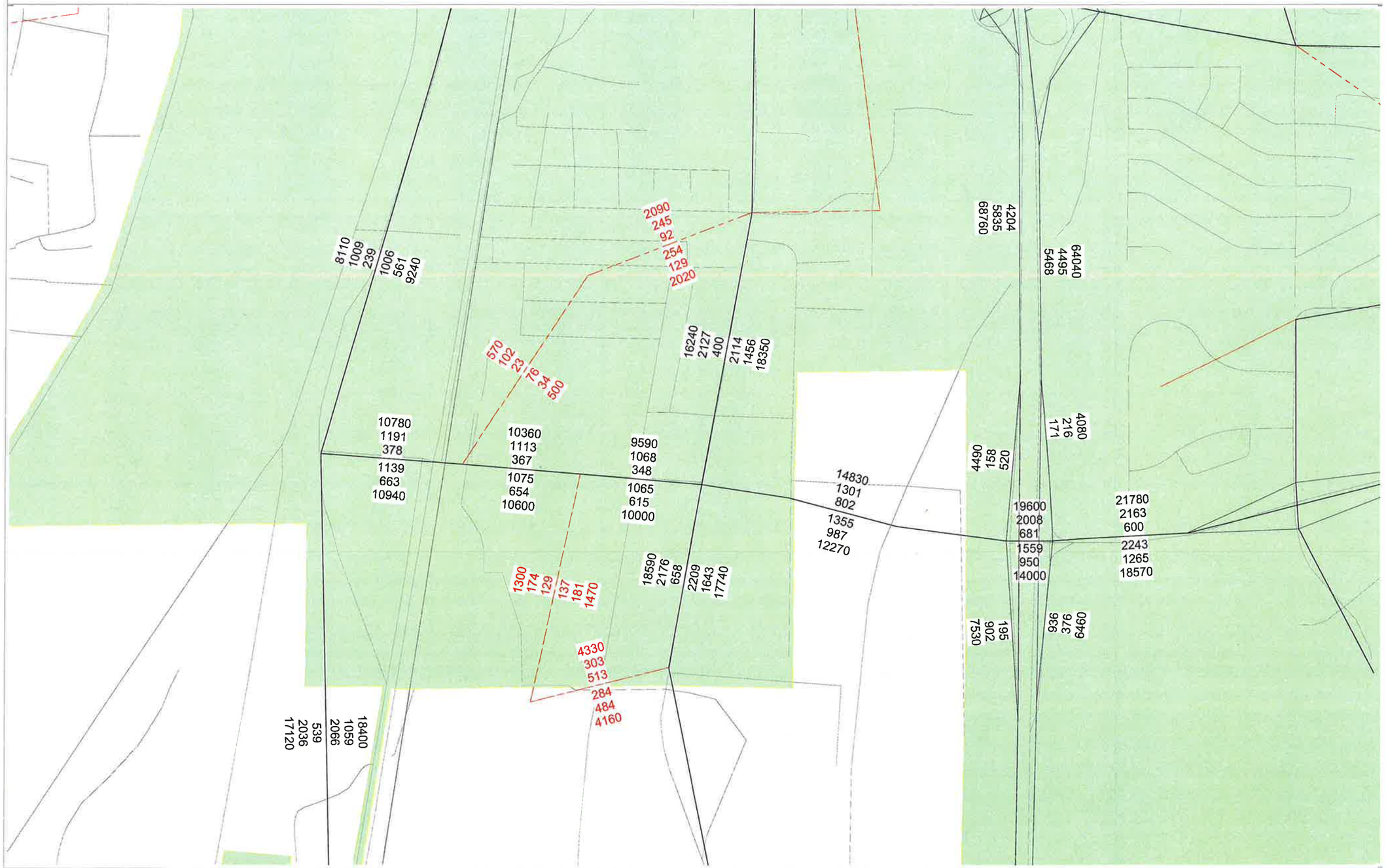
2035 No Build [Peak Hour AM (PM)]

- Nodes
- Principal
- Minor
- Collector
- Local
- Frontage
- Freeway
- On Ramp
- Off Ramp
- LAPA
- Minor Collector
- Principal Arterial
- Minor Arterial
- Major Collector
- Local
- Interstate Frontage
- Interstate
- On Ramp
- Off Ramp
- 21
- 22
- 50
- 99

Source: Mid Region Council of Governments (MRCOG)

0 0.125 0.25 0.5 Miles

2035 MTP Dataset, Raw Model Output
Year 2035
AM Pk Hr, PM Pk Hr, and Daily Volumes
AM stat closest to link



cube

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APPENDIX C

EXCERPT FROM DEVELOPMENT PROCESS MANUAL (COA)

Chapter 23
TRANSPORTATION DESIGN

INTRODUCTION

Transportation in an urban environment is a complex interplay of different modes of travel, trip purposes, and variability of transportation characteristics through time. This chapter presents criteria established for use in the design of street systems and related features to accommodate these differing needs. These criteria are intended to assure acceptable levels of comfort, safety, quality and durability in completed designs.

Material presented is intended for use by qualified design professionals familiar with municipal street design. A brief overview of important governing regulations is presented together with references to commonly accepted standard publications related to the subject. Designers and others using this manual are expected to familiarize themselves fully with the following regulations, other pertinent regulations and the standard reference publications cited herein.

The purpose of this chapter is to promote consistently sound design of street systems having acceptable performance characteristics, to encourage innovative design, and to assert the need for exercise of sound, responsible, professional judgment by the designer.

While the use of minimum design standards typically results in the lowest cost for a project, the use of above minimum design may result in a more effective design with operational benefits and a more economic life cycle cost. The design values in this chapter represent the minimum standard. However the project designer is encouraged to use values above this minimum.

Section 1. GOVERNING REGULATIONS

Following are overviews of several of the most important City regulatory documents pertaining to street design. The list is not intended to be exhaustive, and the user is cautioned that these regulations are subject to change at any time. The competent designer must maintain a constant familiarity with these and other pertinent regulations as they evolve.

Subdivision Ordinance (Article 14-7 R.O.A. 1994)

The following topics in this Ordinance are particularly important to street design:

The requirement for Traffic Engineer approval of any plat which creates public right-of-way and private access easements.

The general right-of-way standards for streets, based upon roadway classification.

Street or Element Classification (as defined by Subdivision Ordinance)	Minimum Required Right-of-Way Width (see notes: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12)	*Recommended Bike Facility (see note 11)*	Minimum Required Sidewalk (See note 7)	Required Pavement Width (See notes 2, 3, 4, 5, 6) (Flowline to Flowline)
Principal Arterial	a)* As required by LRRS(1), if not established therein, or b)* 124 feet in Established and Redeveloping Areas, or c)* 156 feet elsewhere d)* Add 12 feet for bike lanes if road is on bikeway system (1, 2, 3, 4, 5, 7, 8, 9, 10, 11)	6-foot minimum bike lane or 5-foot paved shoulder bikeway for posted speeds of 35 mph or less; 7-foot bike lane or 6-foot paved shoulder bikeway for posted speeds of 40 mph or greater	6 feet with a 6-foot setback from back of curb (7)	a) As required by LRRS, or b) As required by Traffic Engineer/Development (2, 3, 4, 5, 6)
Minor Arterial	a)* As required by LRRS(1), if not established therein, or b)* 91 feet c)* Add 12 feet for bike lanes if road is on bikeway system (1, 2, 3, 4, 5, 7, 8, 9, 10, 11)	6-foot minimum bike lane or 5-foot paved shoulder bikeway for posted speeds of 35 mph or less; 7-foot bike lane or 6-foot paved shoulder bikeway for posted speeds of 40 mph or greater	6 feet with a 6-foot setback from back of curb (7)	a) As required by LRRS, or b) 66 feet to 74 feet including gutter and median/center turn lane (2, 3, 4, 5, 6)
Collector	a)* As required by LRRS(1), if not established therein, or b)* 73 feet c)* Add 12 feet for bike lanes if road is on bikeway system (1, 2, 3, 4, 5, 7, 8, 9, 10, 11)	6-foot bike lane or 4-foot paved shoulder bikeway (min.)	6 feet with a 6-foot setback from back of curb (7)	a) As required by LRRS, or b) 48 feet (2, 3, 4, 5, 6)
Major Local	See Table 23.2.1B for local street standards (Major, Normal, and			

APPENDIX D

CONSTRUCTION COST ESTIMATES—WOODWARD ROAD ULTIMATE AND MINIMUM IMPROVEMENTS

Concept-Level Construction Cost Estimate
Full reconstruction of Woodward between Broadway and 2nd Street.
Reconfiguration of Intersection of Woodward and 2nd Street.

URS
6501 Americas Pkwy, NE, # 900
Albuquerque, NM 87110
505-855-7500

Prepared For :
Bernallilo County Public Works Division
Date: 20-Feb-14

Quantities below are estimated based on Figures 2, 3a and 3b, Ultimate Woodward Road Improvements (4-Lane Major Collector)

Item No	Description	Units	Quantity	Unit Price	Cost
203000	UNCLASSIFIED EXCAVATION	CY	5,000	$ 9.00	$ 45,000.00
207000	SUBGRADE PREPARATION	SY	24,700	$ 1.25	$ 30,875.00
303000	BASE COURSE	TON	8,040	$ 15.00	$ 120,600.00
423282	HMA SP-III COMPLETE	TON	4,020	$ 65.00	$ 261,300.00
423283	HMA SP-IV COMPLETE	TON	2,680	$ 80.00	$ 214,400.00
570024	24" STORM DRAIN CULVERT PIPE	LF	350	$ 65.00	$ 22,750.00
570461	36" STORM DRAIN CULVERT PIPE	LF	1,500	$ 90.00	$ 135,000.00
601000	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 15,000.00	$ 15,000.00
606000	METAL BARRIER W-BEAM	LF	50	$ 18.00	$ 900.00
606050	METAL BARRIER END TREATMENT	EA	4	$ 2,500.00	$ 10,000.00
608004	CONCRETE SIDEWALK, 4"	SY	3,330	$ 46.41	$ 154,545.30
608404	CONCRETE MEDIAN PAVEMENT 4"	SY	850	$ 50.53	$ 42,950.50
609200	HEADER CURB - WHEELCHAIR RAMPS	LF	36	$ 21.88	$ 787.68
609462	CONCRETE VERTICAL CURB AND GUTTER, Type C, 8"x32"	LF	5,800	$ 19.14	$ 111,012.00
609478	CONCRETE VERTICAL CURB AND GUTTER, Type D, 6"x18"	LF	2,000	$ 16.68	$ 33,360.00
623416	MODIFIED CURB DROP INLET (CONFORM TO COA TYPE)	EA	8	$ 4,000.00	$ 32,000.00
662010	MANHOLE TYPE C--6' DIA (0 TO 6' DEPTH)	EA	6	$ 5,800.00	$ 34,800.00
704000	Retroreflectorized Painted Markings, 4"	LF	17,500	$ 0.15	$ 2,625.00
704224	Retroreflectorized Plastic Pvmnt Stripe, 24"	LF	72	$ 5.50	$ 396.00
704717	Hot Thermo Pvmnt Marking, RIGHT ARROW	EA	2	$ 120.00	$ 240.00
704718	Hot Thermo Pvmnt Marking, LEFT ARROW	EA	6	$ 120.00	$ 720.00
704720	Hot Thermo Pvmnt Marking, "ONLY"	EA	5	$ 175.00	$ 875.00
704736	Hot Thermo Pvmnt Marking, Left Lane DROP ARROW	EA	3	$ 340.00	$ 1,020.00
704XXX	Hot Thermo Pvmnt Marking, COMBINED LEFT/RIGHT ARROW	EA	2	$ 200.00	$ 400.00
				subtotal	$ 1,271,556.48
201000	Clearing and Grubbing	LS	1	1.00%	$ 12,715.56
603xxx	Erosion Control/Seeding	LS	1	1.00%	$ 12,715.56
621000	Mobilization	LS	1	10.00%	$ 127,155.65
701xxx	Permanent Signing (Panel Signs)	LS	1	2.00%	$ 25,431.13
702xxx	Construction Traffic Control	LS	1	5.00%	$ 63,577.82
801xxx	Construction Surveying	LS	1	3.00%	$ 38,146.69
	Signalized Intersection: 3 approaches, w/ Video detection actuation, Ped Signal w/ Countdown Timer and Intersection Lighting	LS	1	$225,000.00	$ 225,000.00
	Utility Relocations (Overhead Elect/Telecomm/Cable etc, Underground Telecomm)	LS	1	2.00%	$ 25,431.13
	Gas line Relocation	LS	1	3.00%	$ 38,146.69
				subtotal	$ 1,839,876.73
	Miscellaneous Items / Contingencies			30.0%	$ 551,963.02
				subtotal	$ 2,391,839.75
	NMGRT (City of Albuquerque)			7.0000%	*$ 167,428.78*
	Estimated Conceptual Level Construction Cost				**$ 2,559,268.53**

Assumptions:

1. Full reconstruction of Woodward and 2nd Street within the project limits. Assumed section: 5" PMBP over 6" ABC over subgrade preparation Additional pavement width is included to accommodate WB-62 (48' Trailer) truck trailer offtracking

2. No changes to Profile grade

3. Raised Medians at intersections

4. Signal is 3-Leg, w/ Video Detection, ped push buttons and countdown timers due to Bosque Trail access currently under construction at this location and includes Type III standard for Luminaires.

Concept-Level Construction Cost Estimate
Minimum Improvements to Increase Capacity of Intersection of Woodward and 2nd Street

Prepared For :
Bernallilo County Public Works Division

URS
6501 Americas Pkwy, NE, # 900
Albuquerque, NM 87110
505-855-7500

Date: 20-Feb-14

Quantities below are estimated based on Figure 4, Woodward Road/2nd Street-Minimum Intersection Improvements

Item No	Description	Units	Quantity	Unit Price	Cost
203000	Unclassified Excavation	CY	5,000	$ 9.00	$ 45,000.00
207000	Subgrade Preparation	SY	8,450.0	$ 1.25	$ 10,562.50
303000	Basecourse	TON	2,560	$ 15.00	$ 38,400.00
423282	HMA SP-III Complete	TON	1,430	$ 65.00	$ 92,950.00
423283	HMA SP-IV Complete	TON	950	$ 80.00	$ 76,000.00
606532	Concrete Wall Barrier, 32"	LF	90	$ 75.00	$ 6,750.00
704000	Retroreflectorized Painted Markings, 4"	LF	9,800	$ 0.15	$ 1,470.00
704224	Retroreflectorized Plastic Pvmnt Stripe, 24"	LF	60	$ 5.50	$ 330.00
704718	Hot Thermo Pvmnt Marking, LEFT ARROW	EA	4	$ 120.00	$ 480.00
704720	Hot Thermo Pvmnt Marking, "ONLY"	EA	2	$ 175.00	$ 350.00
704736	Hot Thermo Pvmnt Marking, Left Lane DROP ARROW	EA	3	$ 340.00	$ 1,020.00
704XXX	Hot Thermo Pvmnt Marking, COMBINED LEFT/RIGHT ARROW	EA	2	$ 200.00	$ 400.00
720050	Permanent Vehicle Impact Attenuator Unit	EA	1	$ 14,000.00	$ 14,000.00
				subtotal	$ 287,712.50
201000	Clearing and Grubbing	LS	1	1.00%	$ 2,877.13
570xxx	Drainage	LS	1	5.00%	$ 14,385.63
603xxx	Erosion Control/Seeding	LS	1	2.00%	$ 5,754.25
621000	Mobilization	LS	1	10.00%	$ 28,771.25
701xxx	Permanent Signing (Panel Signs)	LS	1	2.00%	$ 5,754.25
702xxx	Construction Traffic Control	LS	1	5.00%	$ 14,385.63
801xxx	Construction Surveying	LS	1	3.00%	$ 8,631.38
	Signalized Intersection: 3 approaches, w/ detector loop actuation, Ped Signal w/ Countdown Timer and Intersection Lighting	LS	1	$225,000.00	$ 225,000.00
	Utility Relocations (Overhead Elect/Telecomm/Cable etc, Underground Telecomm)	LS	1	2.00%	$ 5,754.25
				subtotal	$ 599,026.25
	Miscellaneous Items / Contingencies			30.0%	$ 179,707.88
				subtotal	$ 778,734.13
	NMGRT (City of Albuquerque)			7.0000%	*$ 54,511.39*
	Estimated Conceptual Level Construction Cost				**$ 833,245.51**

Assumptions:

1. Full reconstruction of Woodward and 2nd Street Within the project Limits. Assumed section: 5" PMBP over 6" ABC over subgrade preparation Additional pavement width is included to accommodate WB-62 (48' Trailer) truck trailer offtracking

2. No changes to Profile grade

3. CWB is installed at Gas Line Facility on NE Corner

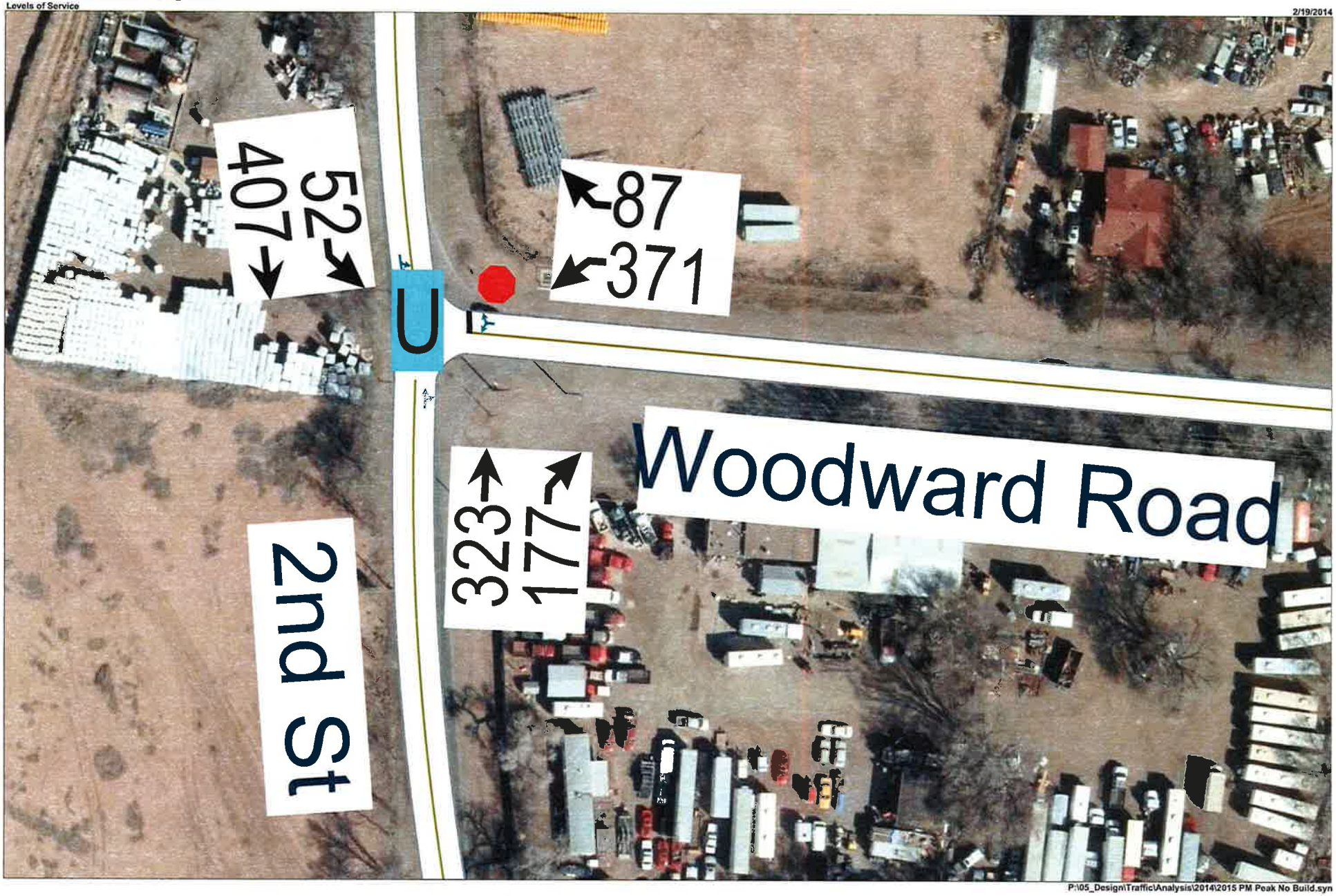
4. Signal is 3-Leg, loop detector actuated, w/ ped push buttons and countdown timers due to Bosque Trail access currently under construction at this location and includes Type III standard for Luminaires.

APPENDIX E

INTERSECTION OPERATIONAL ANALYSES—SYNCHRO OUTPUT FOR WOODWARD/2ND ALTERNATIVES (2015 BUILD)

Map - I-25 & Sunport Blvd 2015 PM Peak_No Build
Levels of Service

2/19/2014



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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/19/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	371	87	323	177	52	407
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.974		0.952			
Flt Protected	0.961					0.994
Satd. Flow (prot)	1744	0	1773	0	0	1852
Flt Permitted	0.961					0.994
Satd. Flow (perm)	1744	0	1773	0	0	1852
Link Speed (mph)	30		30			30
Link Distance (ft)	863		751			663
Travel Time (s)	19.6		17.1			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	403	95	351	192	57	442
Shared Lane Traffic (%)						
Lane Group Flow (vph)	498	0	543	0	0	499
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 87.9%	ICU Level of Service E
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
14: 2nd St & Woodward Road

2/20/2014

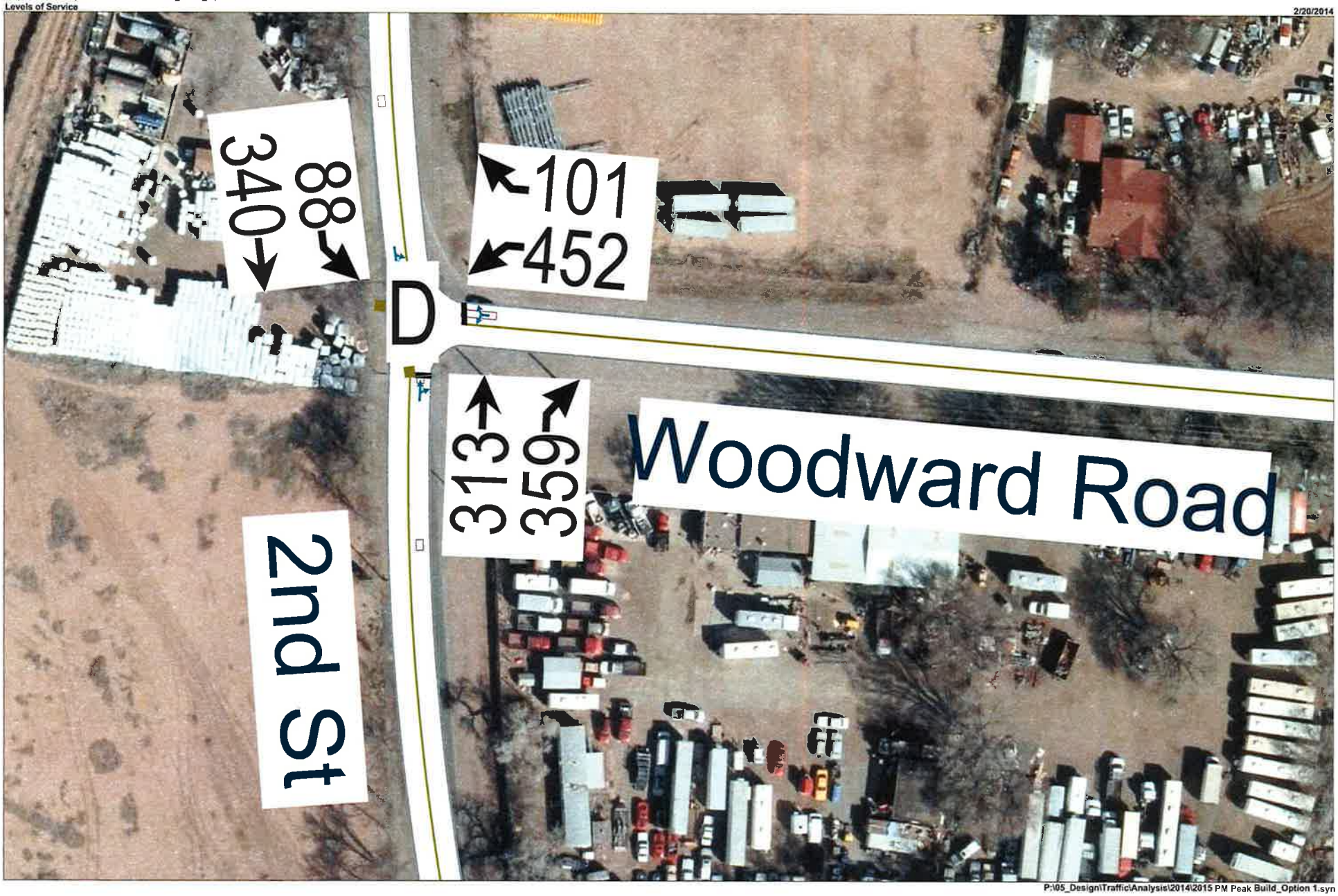
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	371	87	323	177	52	407
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	403	95	351	192	57	442
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1003	447			543	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1003	447			543	
tC, single (s)	6.5	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.3	
p0 queue free %	0	84			94	
cM capacity (veh/h)	244	593			982	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	498	543	499
Volume Left	403	0	57
Volume Right	95	192	0
cSH	274	1700	982
Volume to Capacity	1.82	0.32	0.06
Queue Length 95th (ft)	838	0	5
Control Delay (s)	412.3	0.0	1.6
Lane LOS	F		A
Approach Delay (s)	412.3	0.0	1.6
Approach LOS	F		

Intersection Summary			
Average Delay	133.8		
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

Map - I-25 & Sunport Blvd 2015 PM Peak_Build_Option 1
Levels of Service

2/20/2014



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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/20/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	452	101	313	359	88	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99			
Frt	0.975		0.928			
Flt Protected	0.961					0.990
Satd. Flow (prot)	1584	0	1556	0	0	1681
Flt Permitted	0.961					0.508
Satd. Flow (perm)	1584	0	1556	0	0	863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	16		110			
Link Speed (mph)	30		30			30
Link Distance (ft)	863		751			663
Travel Time (s)	19.6		17.1			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	2	2	2	2	2	2
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	491	110	340	390	96	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	730	0	0	466
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.01	1.00	1.00	1.01
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	20		100		20	100
Trailing Detector (ft)	0		0		0	0
Turn Type	NA		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		10.0	10.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5		20.5		20.5	20.5
Total Split (s)	33.0		47.0		47.0	47.0
Total Split (%)	41.3%		58.8%		58.8%	58.8%
Maximum Green (s)	28.5		42.5		42.5	42.5
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.5		4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	5.0		5.0		5.0	5.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	28.5		42.5			42.5
Actuated g/C Ratio	0.36		0.53			0.53
v/c Ratio	1.05		0.83			1.02
Control Delay	77.8		23.6			68.8
Queue Delay	0.0		0.0			0.0
Total Delay	77.8		23.6			68.8
LOS	E		C			E
Approach Delay	77.8		23.6			68.8
Approach LOS	E		C			E
Stops (vph)	447		467			335
Fuel Used(gal)	15		10			10
CO Emissions (g/hr)	1045		681			704
NOx Emissions (g/hr)	203		133			137
VOC Emissions (g/hr)	242		158			163
Dilemma Vehicles (#)	0		0			0
Queue Length 50th (ft)	~326		247			~230
Queue Length 95th (ft)	#526		#486			#428
Internal Link Dist (ft)	783		671			583
Turn Bay Length (ft)						
Base Capacity (vph)	574		878			458
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	1.05		0.83			1.02

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.05
Intersection Signal Delay: 53.5 Intersection LOS: D
Intersection Capacity Utilization 103.7% ICU Level of Service G
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: 2nd St & Woodward Road

Map - I-25 & Sunport Blvd 2015 PM Peak_Build_Option 2
Levels of Service

3/20/2014

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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/20/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	452	101	313	359	88	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	350		0	0	
Storage Lanes	1	1		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97	0.99			
Frt		0.850	0.928			
Flt Protected	0.950					0.990
Satd. Flow (prot)	1613	1443	1556	0	0	1681
Flt Permitted	0.950					0.569
Satd. Flow (perm)	1613	1406	1556	0	0	966
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		110	131			
Link Speed (mph)	30		30			30
Link Distance (ft)	916		423			663
Travel Time (s)	20.8		9.6			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	2	2	2	2	2	2
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	491	110	340	390	96	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	491	110	730	0	0	466
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.00	1.00	1.01
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1	1	2		1	2
Detector Template	Left	Right	Thru		Left	Thru
Leading Detector (ft)	20	20	100		20	100
Trailing Detector (ft)	0	0	0		0	0
Turn Type	NA	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Detector Phase	8	8	2		6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0		10.0	10.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5	20.5	20.5		20.5	20.5
Total Split (s)	27.0	27.0	43.0		43.0	43.0
Total Split (%)	38.6%	38.6%	61.4%		61.4%	61.4%
Maximum Green (s)	22.5	22.5	38.5		38.5	38.5
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0			0.0
Total Lost Time (s)	4.5	4.5	4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	None	None	Max		Max	Max
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	22.3	22.3	38.5			38.5
Actuated g/C Ratio	0.32	0.32	0.55			0.55
v/c Ratio	0.95	0.21	0.80			0.88
Control Delay	55.7	5.1	18.6			34.8
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	55.7	5.1	18.6			34.8
LOS	E	A	B			C
Approach Delay	46.5		18.6			34.8
Approach LOS	D		B			C
Stops (vph)	377	17	434			325
Fuel Used(gal)	10	1	11			7
CO Emissions (g/hr)	730	64	745			493
NOx Emissions (g/hr)	142	13	145			96
VOC Emissions (g/hr)	169	15	173			114
Dilemma Vehicles (#)	0	0	0			0
Queue Length 50th (ft)	203	0	190			160
Queue Length 95th (ft)	#383	31	#419			#352
Internal Link Dist (ft)	836		343			583
Turn Bay Length (ft)		350				
Base Capacity (vph)	519	527	916			532
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.95	0.21	0.80			0.88

Intersection Summary

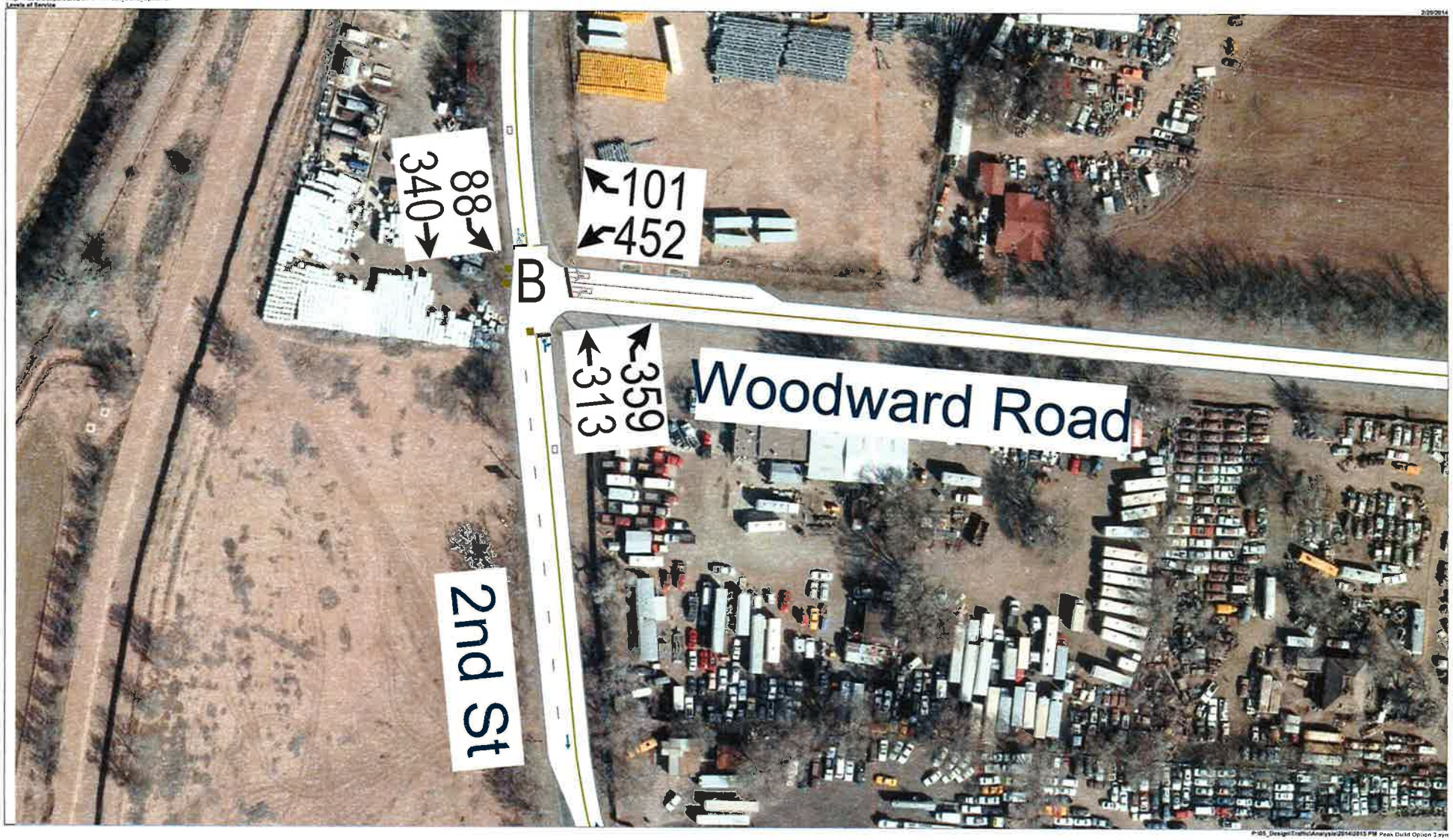
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 69.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.95
Intersection Signal Delay: 32.1 Intersection LOS: C
Intersection Capacity Utilization 97.5% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: 2nd St & Woodward Road

Map - I-25 & Sunport Blvd 2015 PM Peak_Build_Option 3
Levels of Service

2/20/2014



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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/20/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	452	101	313	359	88	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	150		0	0	
Storage Lanes	2	1		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	0.97	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99			
Frt	0.973		0.928			
Flt Protected	0.961					0.990
Satd. Flow (prot)	3077	0	1556	0	0	1681
Flt Permitted	0.961					0.677
Satd. Flow (perm)	3077	0	1556	0	0	1150
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	45		165			
Link Speed (mph)	30		30			30
Link Distance (ft)	916		423			663
Travel Time (s)	20.8		9.6			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	2	2	2	2	2	2
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	491	110	340	390	96	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	730	0	0	466
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.01	1.00	1.00	1.01
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	20		100		20	100
Trailing Detector (ft)	0		0		0	0
Turn Type	NA		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		10.0	10.0

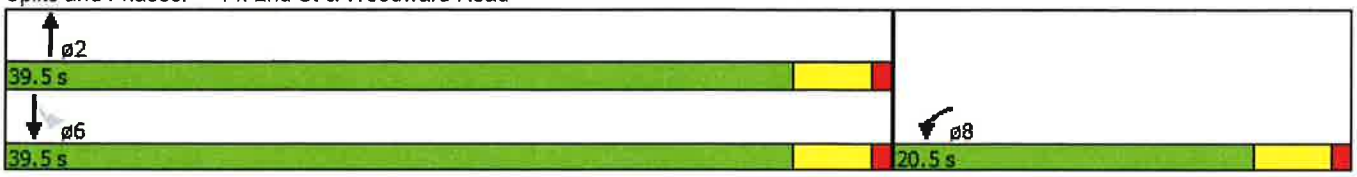
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5		20.5		20.5	20.5
Total Split (s)	20.5		39.5		39.5	39.5
Total Split (%)	34.2%		65.8%		65.8%	65.8%
Maximum Green (s)	16.0		35.0		35.0	35.0
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.5		4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	5.0		5.0		5.0	5.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	14.4		35.1			35.1
Actuated g/C Ratio	0.25		0.60			0.60
v/c Ratio	0.76		0.73			0.68
Control Delay	25.7		12.3			14.8
Queue Delay	0.0		0.0			0.0
Total Delay	25.7		12.3			14.8
LOS	C		B			B
Approach Delay	25.7		12.3			14.8
Approach LOS	C		B			B
Stops (vph)	451		377			288
Fuel Used(gal)	9		9			5
CO Emissions (g/hr)	653		663			357
NOx Emissions (g/hr)	127		129			69
VOC Emissions (g/hr)	151		154			83
Dilemma Vehicles (#)	0		0			0
Queue Length 50th (ft)	92		127			103
Queue Length 95th (ft)	142		262			210
Internal Link Dist (ft)	836		343			583
Turn Bay Length (ft)						
Base Capacity (vph)	875		998			688
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.69		0.73			0.68

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 58.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 88.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 14: 2nd St & Woodward Road



Map - I-25 & Sunport Blvd 2015 PM Peak_Build_Option 4
Levels of Service

2/20/2014

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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/20/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	452	101	313	359	88	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	150		0	100	
Storage Lanes	2	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	0.97	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99			
Frt	0.973		0.928			
Flt Protected	0.961				0.950	
Satd. Flow (prot)	3077	0	1556	0	1613	1698
Flt Permitted	0.961				0.258	
Satd. Flow (perm)	3077	0	1556	0	438	1698
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	46		162			
Link Speed (mph)	30		30			30
Link Distance (ft)	916		423			663
Travel Time (s)	20.8		9.6			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	2	2	2	2	2	2
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	491	110	340	390	96	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	730	0	96	370
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.01	1.00	1.01	1.01
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	20		100		20	100
Trailing Detector (ft)	0		0		0	0
Turn Type	NA		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		10.0	10.0

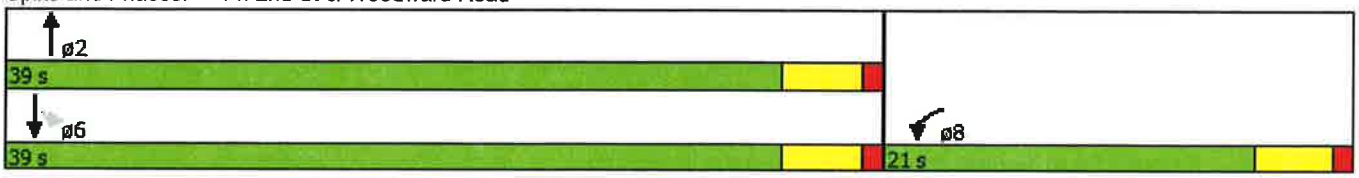
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5		20.5		20.5	20.5
Total Split (s)	21.0		39.0		39.0	39.0
Total Split (%)	35.0%		65.0%		65.0%	65.0%
Maximum Green (s)	16.5		34.5		34.5	34.5
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5		4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		Max		Max	Max
Walk Time (s)	5.0		5.0		5.0	5.0
Flash Dont Walk (s)	11.0		11.0		11.0	11.0
Pedestrian Calls (#/hr)	0		0		0	0
Act Effct Green (s)	14.5		34.5		34.5	34.5
Actuated g/C Ratio	0.25		0.59		0.59	0.59
v/c Ratio	0.75		0.74		0.37	0.37
Control Delay	24.9		12.8		12.0	7.8
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	24.9		12.8		12.0	7.8
LOS	C		B		B	A
Approach Delay	24.9		12.8			8.7
Approach LOS	C		B			A
Stops (vph)	446		380		50	165
Fuel Used(gal)	9		10		1	3
CO Emissions (g/hr)	644		669		66	225
NOx Emissions (g/hr)	125		130		13	44
VOC Emissions (g/hr)	149		155		15	52
Dilemma Vehicles (#)	0		0		0	0
Queue Length 50th (ft)	91		127		16	62
Queue Length 95th (ft)	140		#275		50	112
Internal Link Dist (ft)	836		343			583
Turn Bay Length (ft)					100	
Base Capacity (vph)	907		990		260	1009
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.66		0.74		0.37	0.37

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 58.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

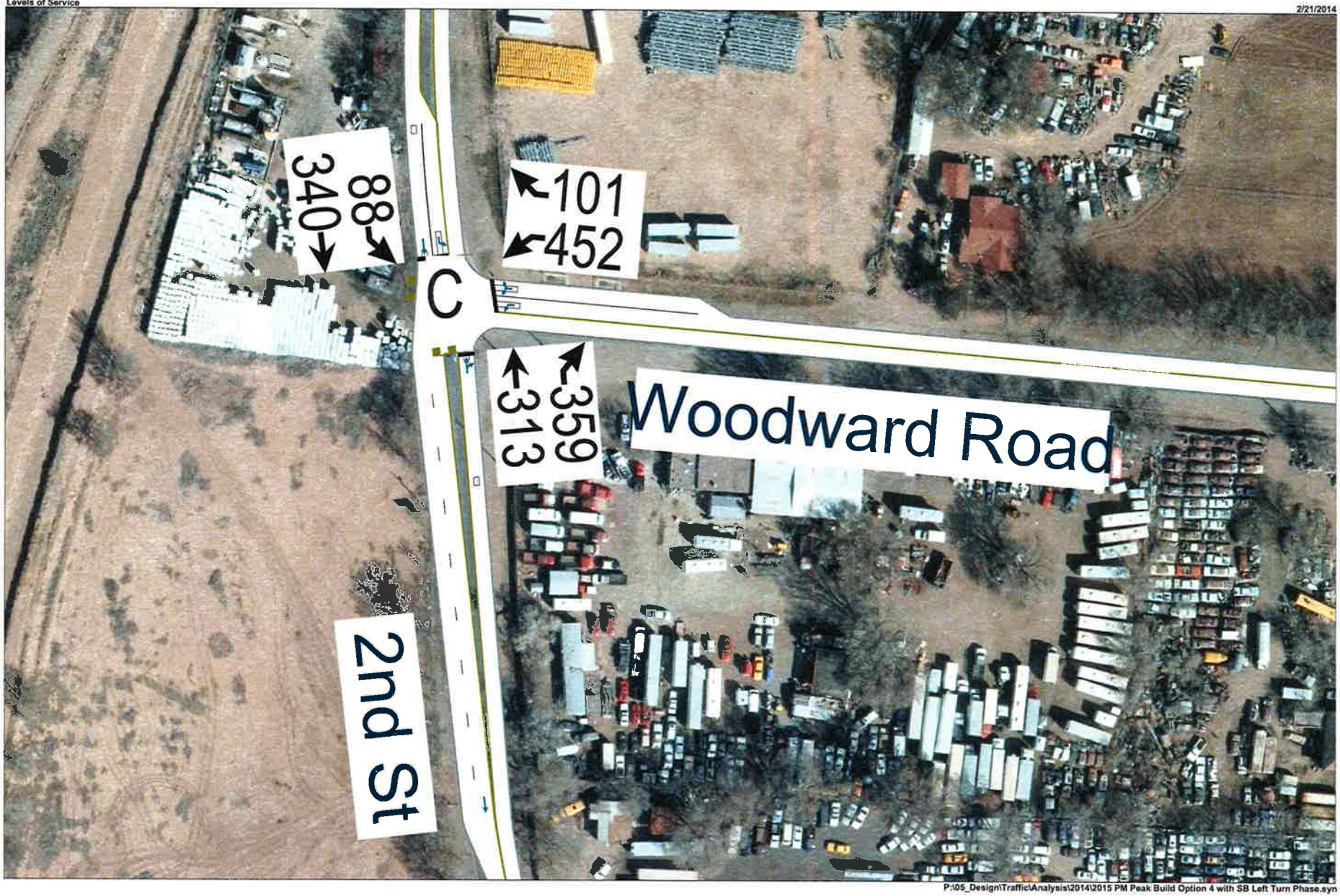
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 74.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: 2nd St & Woodward Road



Map - I-25 & Sunport Blvd 2015 PM Peak_Build_Option 4 with SB Left Turn Phase
Levels of Service

2/21/2014



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Lanes, Volumes, Timings
14: 2nd St & Woodward Road

2/21/2014

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	452	101	313	359	88	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	150		0	100	
Storage Lanes	2	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	0.97	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99			
Frt	0.973		0.928			
Flt Protected	0.961				0.950	
Satd. Flow (prot)	3078	0	1556	0	1613	1698
Flt Permitted	0.961				0.206	
Satd. Flow (perm)	3078	0	1556	0	350	1698
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	39		111			
Link Speed (mph)	30		30			30
Link Distance (ft)	916		423			663
Travel Time (s)	20.8		9.6			15.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		5		5		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	2	2	2	2	2	2
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	491	110	340	390	96	370
Shared Lane Traffic (%)						
Lane Group Flow (vph)	601	0	730	0	96	370
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.01	1.00	1.01	1.01
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	20		100		20	100
Trailing Detector (ft)	0		0		0	0
Turn Type	NA		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		4.0	10.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5		20.5		8.5	20.5
Total Split (s)	24.0		37.2		8.8	46.0
Total Split (%)	34.3%		53.1%		12.6%	65.7%
Maximum Green (s)	19.5		32.7		4.3	41.5
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5		4.5		4.5	4.5
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		Max		None	Max
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	16.6		34.6		41.6	41.6
Actuated g/C Ratio	0.25		0.51		0.62	0.62
v/c Ratio	0.76		0.85		0.32	0.35
Control Delay	28.7		26.4		12.4	7.9
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	28.7		26.4		12.4	7.9
LOS	C		C		B	A
Approach Delay	28.7		26.4			8.9
Approach LOS	C		C			A
Stops (vph)	456		446		34	157
Fuel Used(gal)	10		12		1	3
CO Emissions (g/hr)	678		825		61	222
NOx Emissions (g/hr)	132		160		12	43
VOC Emissions (g/hr)	157		191		14	51
Dilemma Vehicles (#)	0		0		0	0
Queue Length 50th (ft)	110		229		15	67
Queue Length 95th (ft)	162		#481		34	123
Internal Link Dist (ft)	836		343			583
Turn Bay Length (ft)					100	
Base Capacity (vph)	921		855		297	1049
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.65		0.85		0.32	0.35

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 67.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85
Intersection Signal Delay: 22.6 Intersection LOS: C
Intersection Capacity Utilization 70.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

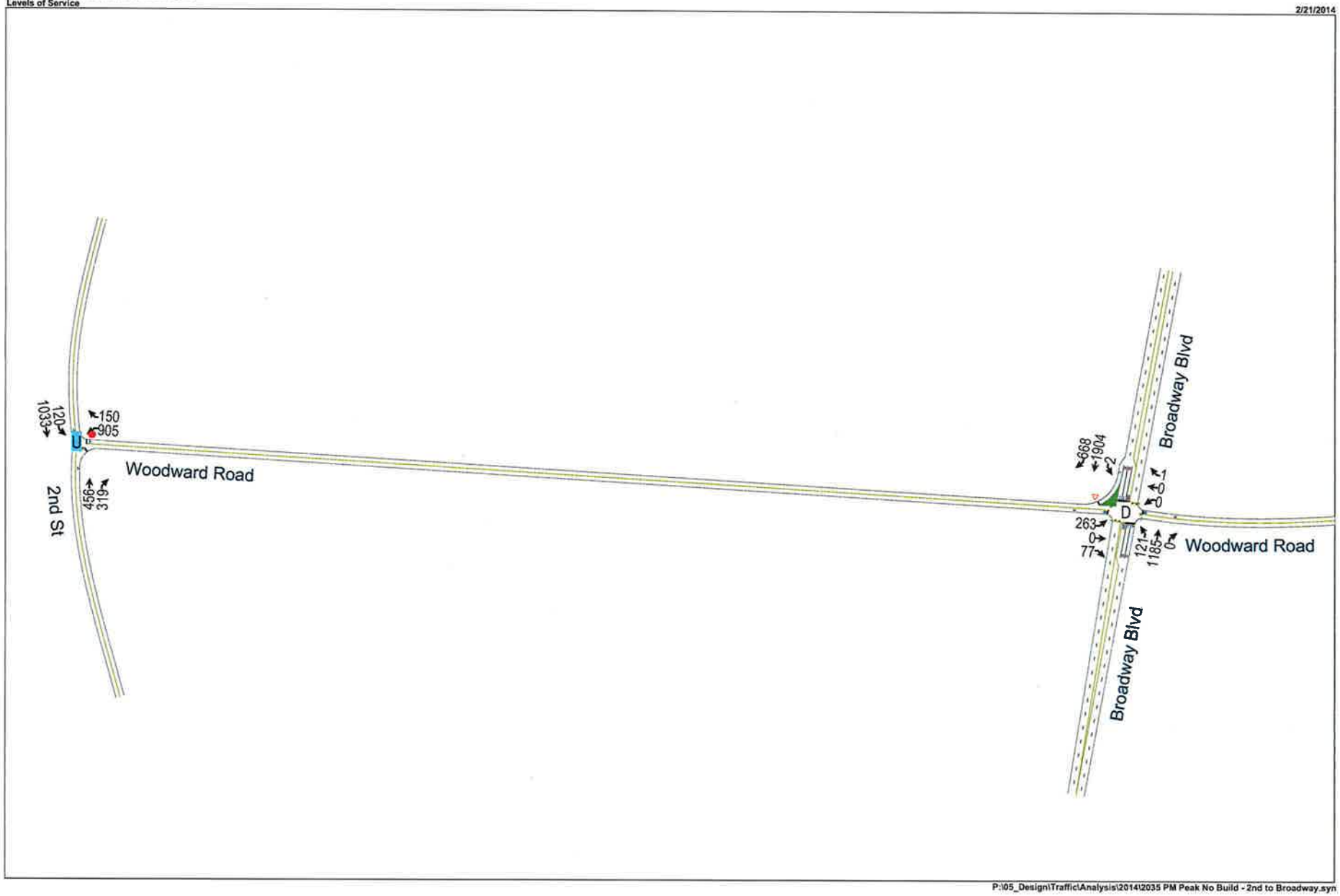
Splits and Phases: 14: 2nd St & Woodward Road

APPENDIX F

INTERSECTION OPERATIONAL ANALYSES—SYNCHRO OUTPUT FOR WOODWARD/BROADWAY/SUNPORT (2035 BUILD AND 2035 NO BUILD)

Map - Woodward Rd 2035 PM Peak_No Build
Levels of Service

2/21/2014



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Lanes, Volumes, Timings
13: Broadway Blvd & Woodward Road

2/21/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	0	77	0	0	1	121	1185	0	2	1904	668
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	100		0	100		100
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00			0.98							0.98
Frt		0.969			0.865							0.850
Flt Protected		0.963					0.950			0.950		
Satd. Flow (prot)	0	1590	0	0	1453	0	1626	3252	0	1626	3252	1455
Flt Permitted		0.775					0.048			0.169		
Satd. Flow (perm)	0	1280	0	0	1453	0	82	3252	0	289	3252	1420
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50			149							238
Link Speed (mph)		30			45			30			30	
Link Distance (ft)		3042			674			828			703	
Travel Time (s)		69.1			10.2			18.8			16.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)			7			7			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	286	0	84	0	0	1	132	1288	0	2	2070	726
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	370	0	0	1	0	132	1288	0	2	2070	726
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			18			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	10.0		7.0	10.0	10.0

Lanes, Volumes, Timings
13: Broadway Blvd & Woodward Road

2/21/2014

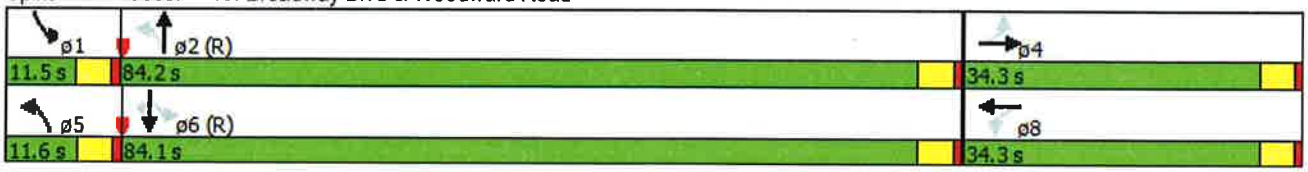
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	20.5	20.5		20.5	20.5		11.5	20.5		11.5	20.5	20.5
Total Split (s)	34.3	34.3		34.3	34.3		11.6	84.2		11.5	84.1	84.1
Total Split (%)	26.4%	26.4%		26.4%	26.4%		8.9%	64.8%		8.8%	64.7%	64.7%
Maximum Green (s)	29.8	29.8		29.8	29.8		7.1	79.7		7.0	79.6	79.6
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0			0			0	0
Act Effct Green (s)		29.8			29.8		90.3	88.9		86.6	79.6	79.6
Actuated g/C Ratio		0.23			0.23		0.69	0.68		0.67	0.61	0.61
v/c Ratio		1.12			0.00		0.94	0.58		0.01	1.04	0.76
Control Delay		124.8			0.0		91.0	12.6		6.0	56.9	17.6
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		124.8			0.0		91.0	12.6		6.0	56.9	17.6
LOS		F			A		F	B		A	E	B
Approach Delay		124.8			0.0			19.9			46.7	
Approach LOS		F			A			B			D	
Stops (vph)		247			0		58	599		1	1639	355
Fuel Used(gal)		18			0		3	14		0	42	8
CO Emissions (g/hr)		1263			0		234	979		1	2906	561
NOx Emissions (g/hr)		246			0		45	190		0	565	109
VOC Emissions (g/hr)		293			0		54	227		0	673	130
Dilemma Vehicles (#)		0			0		0	0		0	0	0
Queue Length 50th (ft)		~323			0		65	255		1	~990	288
Queue Length 95th (ft)		#524			0		#199	418		3	#1126	467
Internal Link Dist (ft)		2962			594			748			623	
Turn Bay Length (ft)							100			100		100
Base Capacity (vph)		331			447		141	2223		264	1991	961
Starvation Cap Reductn		0			0		0	0		0	0	0
Spillback Cap Reductn		0			0		0	0		0	0	0
Storage Cap Reductn		0			0		0	0		0	0	0
Reduced v/c Ratio		1.12			0.00		0.94	0.58		0.01	1.04	0.76

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 130

Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 44.7 Intersection LOS: D
Intersection Capacity Utilization 96.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Broadway Blvd & Woodward Road



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	905	150	456	319	120	1033
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		225	100	
Storage Lanes	1	0		0	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.981		0.944			
Flt Protected	0.959					0.995
Satd. Flow (prot)	1610	0	1616	0	0	1703
Flt Permitted	0.959					0.995
Satd. Flow (perm)	1610	0	1616	0	0	1703
Link Speed (mph)	30		30			30
Link Distance (ft)	3042		749			644
Travel Time (s)	69.1		17.0			14.6
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		7		7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	984	163	496	347	130	1123
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1147	0	843	0	0	1253
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 173.8%	ICU Level of Service H
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
14: 2nd St & Woodward Road

2/21/2014

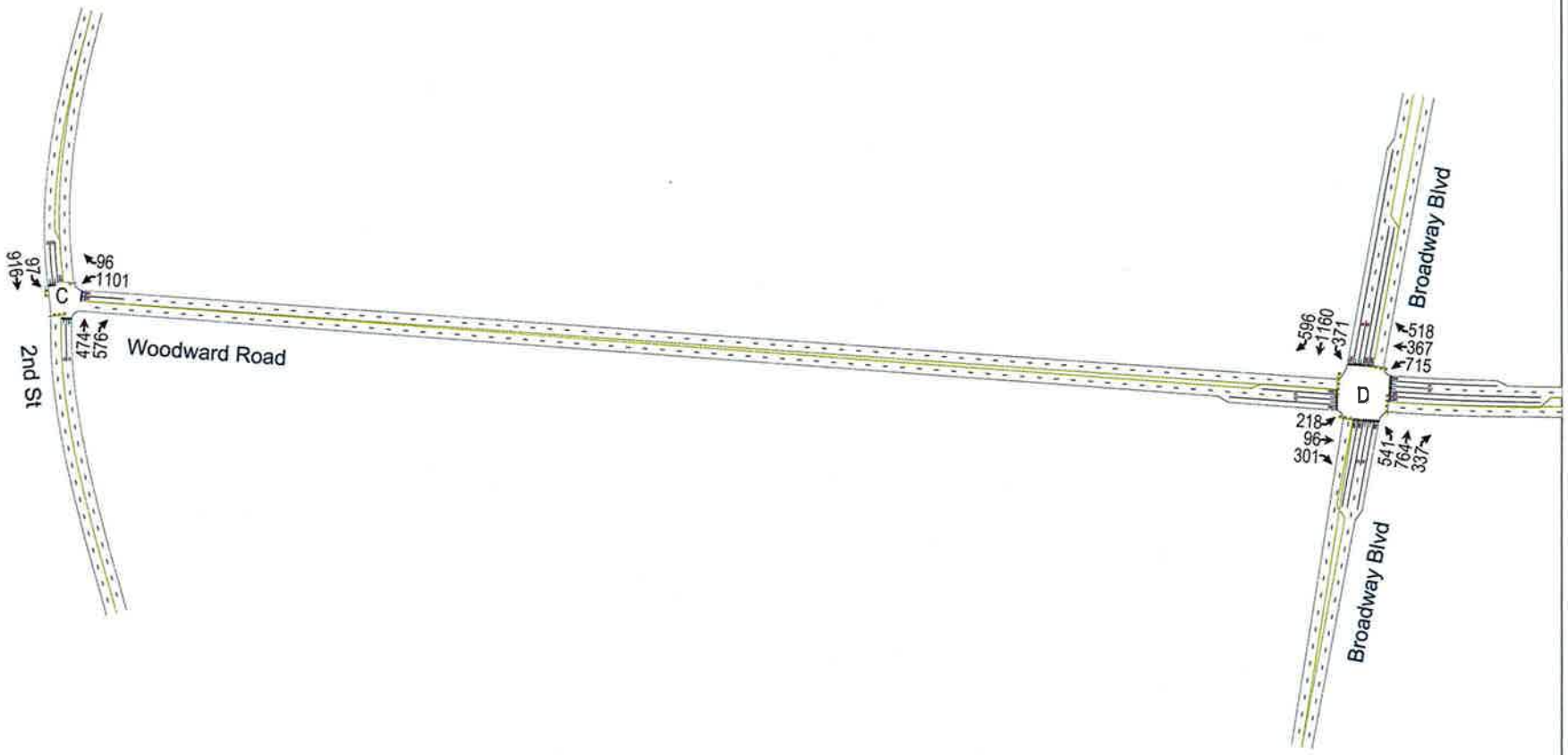
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	905	150	456	319	120	1033
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	984	163	496	347	130	1123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2053	669			496	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2053	669			496	
tC, single (s)	6.5	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.3	
p0 queue free %	0	63			87	
cM capacity (veh/h)	50	442			1023	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1147	842	1253
Volume Left	984	0	130
Volume Right	163	347	0
cSH	57	1700	1023
Volume to Capacity	19.96	0.50	0.13
Queue Length 95th (ft)	Err	0	11
Control Delay (s)	Err	0.0	4.0
Lane LOS	F		A
Approach Delay (s)	Err	0.0	4.0
Approach LOS	F		

Intersection Summary			
Average Delay	3537.9		
Intersection Capacity Utilization	173.8%	ICU Level of Service	H
Analysis Period (min)	15		

Map - I-25 & Sunport Blvd 2035 PM Peak_Build_Optimized
Levels of Service

2/21/2014



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Lanes, Volumes, Timings
13: Broadway Blvd & Woodward Road/Sunport Blvd

2/21/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	218	96	301	715	367	518	541	764	337	371	1160	596
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	175		250	350		250	200		200	325		500
Storage Lanes	1		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.98			0.98			0.98			0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3252	1455	3155	3252	1455	3155	3252	1455	3155	3252	1455
Flt Permitted	0.517			0.536			0.097			0.240		
Satd. Flow (perm)	885	3252	1423	1780	3252	1427	322	3252	1432	797	3252	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245			305			366			262
Link Speed (mph)		30			45			30			30	
Link Distance (ft)		3039			1491			828			703	
Travel Time (s)		69.1			22.6			18.8			16.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)			7			7			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	237	104	327	777	399	563	588	830	366	403	1261	648
Shared Lane Traffic (%)												
Lane Group Flow (vph)	237	104	327	777	399	563	588	830	366	403	1261	648
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0	7.0	10.0	10.0

Lanes, Volumes, Timings
13: Broadway Blvd & Woodward Road/Sunport Blvd

2/21/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	11.5	20.5	20.5	11.5	20.5	20.5	11.5	20.5	20.5	11.5	20.5	20.5
Total Split (s)	11.8	20.6	20.6	17.7	26.5	26.5	19.0	44.3	44.3	17.4	42.7	42.7
Total Split (%)	11.8%	20.6%	20.6%	17.7%	26.5%	26.5%	19.0%	44.3%	44.3%	17.4%	42.7%	42.7%
Maximum Green (s)	7.3	16.1	16.1	13.2	22.0	22.0	14.5	39.8	39.8	12.9	38.2	38.2
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	23.4	16.1	16.1	33.8	22.0	22.0	55.6	41.3	41.3	49.6	38.2	38.2
Actuated g/C Ratio	0.23	0.16	0.16	0.34	0.22	0.22	0.56	0.41	0.41	0.50	0.38	0.38
v/c Ratio	0.91	0.20	0.75	0.99	0.56	1.02	1.00	0.62	0.45	0.61	1.02	0.92
Control Delay	69.1	37.5	23.3	62.3	38.2	63.3	64.6	25.9	4.2	15.3	61.0	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.1	37.5	23.3	62.3	38.2	63.3	64.6	25.9	4.2	15.3	61.0	37.0
LOS	E	D	C	E	D	E	E	C	A	B	E	D
Approach Delay		41.8			57.1			34.2			46.3	
Approach LOS		D			E			C			D	
Stops (vph)	201	80	86	556	318	216	353	585	29	191	1016	344
Fuel Used(gal)	9	3	9	23	10	14	13	12	3	4	26	10
CO Emissions (g/hr)	653	241	632	1601	724	1005	878	853	183	296	1845	675
NOx Emissions (g/hr)	127	47	123	311	141	195	171	166	36	58	359	131
VOC Emissions (g/hr)	151	56	146	371	168	233	203	198	42	69	427	157
Dilemma Vehicles (#)	0	0	0	0	18	0	0	0	0	0	0	0
Queue Length 50th (ft)	116	30	47	222	120	~205	147	216	0	60	~431	254
Queue Length 95th (ft)	#258	55	#175	#381	168	#428	#266	287	56	86	#582	#497
Internal Link Dist (ft)		2959			1411			748			623	
Turn Bay Length (ft)	175		250	350		250	200		200	325		500
Base Capacity (vph)	261	523	434	783	715	551	589	1341	805	711	1242	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.20	0.75	0.99	0.56	1.02	1.00	0.62	0.45	0.57	1.02	0.92

Intersection Summary

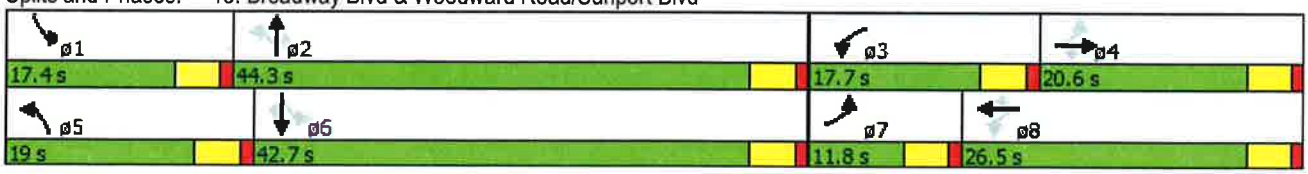
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Natural Cycle: 100
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 45.4	Intersection LOS: D
Intersection Capacity Utilization 91.2%	ICU Level of Service F
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Broadway Blvd & Woodward Road/Sunport Blvd



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1101	96	474	576	97	916
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		225	100	
Storage Lanes	2	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	0.95
Ped Bike Factor	1.00		0.99			
Frt	0.988		0.918			
Flt Protected	0.956				0.950	
Satd. Flow (prot)	3130	0	2958	0	1626	3252
Flt Permitted	0.956				0.106	
Satd. Flow (perm)	3130	0	2958	0	181	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	13		370			
Link Speed (mph)	30		30			30
Link Distance (ft)	3039		749			661
Travel Time (s)	69.1		17.0			15.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)		7		7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	11%	11%	11%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	1197	104	515	626	105	996
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1301	0	1141	0	105	996
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		0			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1		2		1	2
Detector Template	Left		Thru		Left	Thru
Leading Detector (ft)	20		100		20	100
Trailing Detector (ft)	0		0		0	0
Turn Type	NA		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		10.0		7.0	10.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.5		20.5		11.5	20.5
Total Split (s)	43.0		35.4		11.6	47.0
Total Split (%)	47.8%		39.3%		12.9%	52.2%
Maximum Green (s)	38.5		30.9		7.1	42.5
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.5		4.5		4.5	4.5
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		Max		None	Max
Walk Time (s)	5.0		5.0			5.0
Flash Dont Walk (s)	11.0		11.0			11.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	38.5		33.2		42.5	42.5
Actuated g/C Ratio	0.43		0.37		0.47	0.47
v/c Ratio	0.97		0.86		0.53	0.65
Control Delay	43.8		26.4		23.8	20.6
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	43.8		26.4		23.8	20.6
LOS	D		C		C	C
Approach Delay	43.8		26.4			20.9
Approach LOS	D		C			C
Stops (vph)	1026		663		54	669
Fuel Used(gal)	45		15		1	12
CO Emissions (g/hr)	3124		1079		89	856
NOx Emissions (g/hr)	608		210		17	167
VOC Emissions (g/hr)	724		250		21	198
Dilemma Vehicles (#)	0		0		0	0
Queue Length 50th (ft)	358		230		32	217
Queue Length 95th (ft)	#514		#370		65	285
Internal Link Dist (ft)	2959		669			581
Turn Bay Length (ft)					100	
Base Capacity (vph)	1346		1325		199	1535
Starvation Cap Reductn	0		0		0	0
Spillback Cap Reductn	0		0		0	0
Storage Cap Reductn	0		0		0	0
Reduced v/c Ratio	0.97		0.86		0.53	0.65

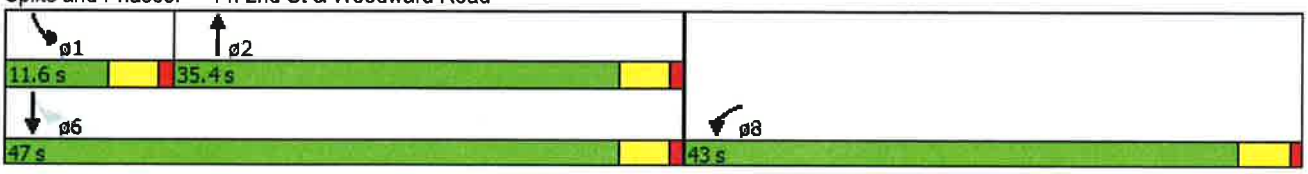
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 31.1	Intersection LOS: C
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: 2nd St & Woodward Road



APPENDIX G

TURNING VOLUME CALCULATIONS

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS

URS Project No. 24343112
Updated: 2/19/2014 PARJ
P:\05_Design\Traffic\Analysis\2014\[CALC_Turn-Distrib_2015 Build_Woodward_2nd_PM.xls]Final

Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2015 No Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

			458	408			
			SB IN	NB OUT			
0	WB OUT	←	TOTAL IN:	1,416	←	WB IN	457
			TOTAL OUT:	1,417			
0	EB IN	→	DIFFERENCE:	1	→	EB OUT	228
			SB OUT	NB IN			
			781	501			

BALANCED FLOWS

			458	408			
			SB IN	NB OUT			
0	WB OUT	←	TOTAL IN:	1,416	←	WB IN	457
			TOTAL OUT:	1,417			
0	EB IN	→	DIFFERENCE:	1	→	EB OUT	228
			SB OUT	NB IN			
			781	501			

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2015 No Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

2nd Street

	TOTAL:	TARGET:	FACTOR:
NB OUT:	410	408	0.9952
SB IN:	459	458	0.9977

SEED:	0	781	228
VOLUME:	0	407	52

Woodward Road

	WB OUT:	EB IN:
TOTAL:	0	0
TARGET:	0	0
FACTOR:	0.0000	0.0000

SEED:	VOLUME:
408	0
228	0
781	0

TOTAL IN: 1,416
TOTAL OUT: 1,416

VOLUME:	SEED:
87	408
0	0
371	781

	WB IN:	EB OUT:
TOTAL:	458	229
TARGET:	457	228
FACTOR:	0.9982	0.9957

VOLUME:	0	323	177
SEED:	1	408	228

	TOTAL:	TARGET:	FACTOR:
NB IN:	499	501	1.0031
SB OUT:	777	781	1.0046

2nd Street

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

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URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2035 No Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

			1,151 SB IN	603 NB OUT			
0	WB OUT	←	TOTAL IN:	2,982	←	WB IN	1,054
0	EB IN	→	TOTAL OUT:	2,982	→	EB OUT	437
			DIFFERENCE:	0			
			SB OUT 1,942	NB IN 777			

BALANCED FLOWS

			1,151 SB IN	603 NB OUT			
0	WB OUT	←	TOTAL IN:	2,982	←	WB IN	1,054
0	EB IN	→	TOTAL OUT:	2,982	→	EB OUT	437
			DIFFERENCE:	0			
			SB OUT 1,942	NB IN 777			

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2035 No Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

2nd Street

	TOTAL:	TARGET:	FACTOR:
NB OUT:	606	603	0.9954
SB IN:	1,152	1,151	0.9989

SEED:	0	1942	437
VOLUME:	0	1032	120

Woodward Road

	WB OUT:	EB IN:	SEED:	VOLUME:
TOTAL:	0	0	603	0
TARGET:	0	0	437	0
FACTOR:	0.0000	0.0000	1,942	0

TOTAL IN: 2,982
TOTAL OUT: 2,982

	VOLUME:	SEED:
	150	603
	0	1
	905	1,942

	WB IN:	EB OUT:
TOTAL:	1,055	439
TARGET:	1,054	437
FACTOR:	0.9991	0.9957

VOLUME:	0	456	319
SEED:	0	603	437

	TOTAL:	TARGET:	FACTOR:
NB IN:	775	777	1.0030
SB OUT:	1,937	1,942	1.0024

2nd Street

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/Broadway Boulevard
Analysis: 2035 No Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

		2,597 SB IN ↓		1,493 NB OUT ↑		
781	WB OUT ←	TOTAL IN:	4,222	←	WB IN	2
		TOTAL OUT:	4,223			
336	EB IN →	DIFFERENCE:	1	→	EB OUT	2
		↓ SB OUT 1,947		↑ NB IN 1,287		

BALANCED FLOWS

		2,597 SB IN ↓		1,493 NB OUT ↑		
781	WB OUT ←	TOTAL IN:	4,222	←	WB IN	2
		TOTAL OUT:	4,223			
336	EB IN →	DIFFERENCE:	1	→	EB OUT	2
		↓ SB OUT 1,947		↑ NB IN 1,287		

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/Broadway Boulevard
Analysis: 2035 No Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

Broadway Boulevard

	TOTAL:	TARGET:	FACTOR:
NB OUT:	1450	1493	1.0300
SB IN:	2,574	2,597	1.0088

SEED:	781	1947	2
VOLUME:	668	1904	2

Woodward Road

	WB OUT:	EB IN:	SEED:	VOLUME:
TOTAL:	790	340	1,493	263
TARGET:	781	336	2	0
FACTOR:	0.9891	0.9893	1,947	77

TOTAL IN: 4,222
TOTAL OUT: 4,222

	VOLUME:	SEED:
	1	1,493
	0	781
	0	1,947

	WB IN:	EB OUT:
TOTAL:	2	2
TARGET:	2	2
FACTOR:	0.9905	0.9902

VOLUME:	121	1185	0
SEED:	781	1493	2

	TOTAL:	TARGET:	FACTOR:
NB IN:	1,306	1,287	0.9852
SB OUT:	1,981	1,947	0.9828

Broadway Boulevard

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2015 Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

		427	413			
		SB IN ↓	NB OUT ↑			
0	WB OUT ←	TOTAL IN:	1,652	←	WB IN	552
		TOTAL OUT:	1,653			
0	EB IN →	DIFFERENCE:	1	→	EB OUT	445
		↓ SB OUT	↑ NB IN			
		795	673			

BALANCED FLOWS

		427	413			
		SB IN ↓	NB OUT ↑			
0	WB OUT ←	TOTAL IN:	1,652	←	WB IN	552
		TOTAL OUT:	1,653			
0	EB IN →	DIFFERENCE:	1	→	EB OUT	445
		↓ SB OUT	↑ NB IN			
		795	673			

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2015 Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

2nd Street

	TOTAL:	TARGET:	FACTOR:
NB OUT:	414	413	0.9973
SB IN:	428	427	0.9983

SEED:	0	795	445
VOLUME:	0	340	88

Woodward Road

	WB OUT:	EB IN:
TOTAL:	0	0
TARGET:	0	0
FACTOR:	0.0000	0.0000

	SEED:	VOLUME:
↑	413	0
→	445	0
↓	795	0

TOTAL IN: 1,652
TOTAL OUT: 1,652

	VOLUME:	SEED:
↑	101	413
←	0	0
↓	452	795

	WB IN:	EB OUT:
TOTAL:	553	446
TARGET:	552	445
FACTOR:	0.9981	0.9967

	↰	↑	↱
VOLUME:	0	313	359
SEED:	1	413	445

	TOTAL:	TARGET:	FACTOR:
NB IN:	672	673	1.0021
SB OUT:	792	795	1.0041

2nd Street

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS

URS Project No. 24343112
Updated: 2/19/2014 PARJ
P:\05_Design\Traffic\Analysis\2014\[CALC_Turn-Distrib_2035 Build_Woodward_2nd_PM.xls]Step 1

Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2035 Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

			1,009	561			
			SB IN	NB OUT			
0	WB OUT	←	TOTAL IN:	3,259	←	WB IN	1,191
0	EB IN	→	TOTAL OUT:	3,260	→	EB OUT	663
			DIFFERENCE:	1			
			SB OUT	NB IN			
			2,036	1,059			

BALANCED FLOWS

			1,009	561			
			SB IN	NB OUT			
0	WB OUT	←	TOTAL IN:	3,259	←	WB IN	1,191
0	EB IN	→	TOTAL OUT:	3,260	→	EB OUT	663
			DIFFERENCE:	1			
			SB OUT	NB IN			
			2,036	1,059			

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/2nd Street
Analysis: 2035 Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

2nd Street

	TOTAL:	*TARGET:*	FACTOR:
NB OUT:	**569**	*561*	0.9857
SB IN:	**1,013**	*1,009*	0.9958

SEED:	0	2036	663
VOLUME:	**0**	**916**	**97**

Woodward Road

	WB OUT:	EB IN:
TOTAL:	**0**	**0**
TARGET:	*0*	*0*
FACTOR:	0.0000	0.0000

	SEED:	**VOLUME:**
	561	**0**
	663	**0**
	2,036	**0**

TOTAL IN: 3,259
TOTAL OUT: 3,259

	VOLUME:	SEED:
	96	561
	0	0
	1101	2,036

	WB IN:	EB OUT:
TOTAL:	**1,196**	**673**
TARGET:	*1,191*	*663*
FACTOR:	0.9956	0.9849

VOLUME:	**0**	**474**	**576**
SEED:	1	561	663

	TOTAL:	*TARGET:*	FACTOR:
NB IN:	**1,050**	*1,059*	1.0087
SB OUT:	**2,017**	*2,036*	1.0094

2nd Street

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/Broadway Boulevard
Analysis: 2035 Build PM

STEP 1: Approach Volume Balance (NCHRP 255 Method)

UNBALANCED FLOWS

			2,127 SB IN	1,500 NB OUT			
1,504	WB OUT	←	TOTAL IN:	5,985	←	WB IN	1,600
			TOTAL OUT:	5,985			
615	EB IN	→	DIFFERENCE:	0	→	EB OUT	805
			SB OUT 2,176	NB IN 1,643			

BALANCED FLOWS

			2,127 SB IN	1,500 NB OUT			
1,504	WB OUT	←	TOTAL IN:	5,985	←	WB IN	1,600
			TOTAL OUT:	5,985			
615	EB IN	→	DIFFERENCE:	0	→	EB OUT	805
			SB OUT 2,176	NB IN 1,643			

Sunport Boulevard Extension
BERNCO Project No. 2014-0041

URS Project No. 24343112
Updated: 2/19/2014 PARJ
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Turning Volume Calculation

Location: Woodward Road/Broadway Boulevard
Analysis: 2035 Build PM

Turning Movement Volumes (NCHRP 255 Method)

FINAL

Broadway Boulevard

	TOTAL:	TARGET:	FACTOR:
NB OUT:	1500	1500	1.0000
SB IN:	2,127	2,127	1.0000

SEED:	1504	2176	805
VOLUME:	596	1160	371

Woodward Road

	WB OUT:	EB IN:
TOTAL:	1,504	615
TARGET:	1,504	615
FACTOR:	1.0000	1.0000

SEED:	VOLUME:
1,500	218
805	96
2,176	301

TOTAL IN: 5,985
TOTAL OUT: 5,985

VOLUME:	SEED:
518	1,500
367	1,504
715	2,176

	WB IN:	EB OUT:
TOTAL:	1,600	805
TARGET:	1,600	805
FACTOR:	1.0000	1.0000

VOLUME:	541	764	337
SEED:	1504	1500	805

Broadway Boulevard

	TOTAL:	TARGET:	FACTOR:
NB IN:	1,643	1,643	1.0000
SB OUT:	2,176	2,176	1.0000